The fossil crescent

GREEN

Géopolitique, réseau, énergie, environnement, nature

Scientific direction **Paul Magnette**

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From the Midlands to Silesia, the Fossil Crescent is characterized by industrial development, environmental upheaval, urban growth, migratory and demographic changes, closely linked social and political movements, and profoundly shaped by the presence of coal. It forms a bioregion that is at once singular and universal. Singular in its genesis and the contrast it provides with its neighboring territories; universal in that it anticipated an extractivist, productivist model that would eventually permeate most of the world during the "great acceleration". A pioneer in the consumption of fossil fuels, as well as in the subsequent human and natural transformations, this region was also the first to experience the consequences of the Anthropocene. When coal mines were closed one after the other, from the Midlands to the Ruhr, they left behind desolate landscapes and mass unemployment.

The agony was swift in geological time, but long-lasting in human time. The Fertile Crescent's cities saw their populations decline and their territories shrink. Two generations after the last mines closed, the economy, employment rate and average education level in these regions are still well behind the national average. What remains from the dawn of the Anthropocene are forgotten regions where nature is reasserting its rights, a diverse and mobile population, a civic culture where communal traditions persist, and a certain way of inhabiting space that reflects geology. Studying these territories and their natural, social, urban and industrial history, as well as the ways in which they have shaped the present, is essential if we are to consider their future.

What becomes of people, and the territories they inhabit, when coal mining comes to an end; how does nature reassert its rights; how do societies react; are civic ties diluted and solidarities reshaped? Can we renew cities that are no longer suited to their environment and population; what should be done about the massive amount of industrial infrastructure that has outlived its usefulness; how can we restore nature that has been devastated and prevent the effects of climate change? In short, is there a future when the orgiastic phase of the early Anthropocene comes to an end? It is by answering these questions that the regions of the Fossil Crescent can give their painful transition meaning and offer a vision

of the future to those who are still living through the mass exploitation of fossil fuels.

The contributions that make up this volume of GREEN outline an answer. The first section includes contributions that navigate between the past and the present, between history and social sciences. These authors ask how coal shaped our civilizations and collective attitudes, and whether we are still living under its influence, and how we can free ourselves from it. Does the present state of scientific and technological development offer sufficient resources to conceive of decarbonizing our modes of production and consumption on a generational scale? With our outlook entirely focused on the future and fed by the prospect of continuous material growth, can we imagine freedom and social cohesion from any perspective other than that of the ever-increasing accumulation and consumption of materials and energy? Can the major centers of the Anthropocene – Europe and the United States, now being joined by China – restrain themselves to allow other parts of the world to have a turn to achieve prosperity? And can these other regions of the world imagine their own development without imitating the extractivist, productivist model?

The second section features contributions that shift from time to space, examining the Anthropocene's impact on our way of inhabiting territories. At the Fossil Crescent's heart, primary nature has disappeared and been completely replaced with a secondary nature and by inhabited spaces entirely shaped by humans. The brutal decline of the industrial model inherited from coal has left enormous vacant infrastructure, abandoned zones and vast industrial wastelands currently in the process of rewilding. The architects, urban planners and landscape architects featured here have all worked in the heart of the Fossil Crescent, particularly in Charleroi.

Conscious that the buildings resulting from the industrial revolution represent a significant energetic and human heritage, they are experimenting with an urbanism and architecture of restoration – in the etymological sense of the

term, that of a recovery that aims to regain lost strength, in the same way that sleep is said to be restorative. Confronted with spaces that have begun to regain their wild character, they are inventing a "ternary nature", developing spaces where pioneering vegetation has taken hold, revealing and amplifying it so as to create the cities of tomorrow.

The Anthropocene is a point of no return, an irreversible transformation that forces us to radically rethink the relationship between human and natural temporalities. And since it was born somewhere, let's begin our examination with the times and places that served as its cradle.

Paul Magnette • Scientific Directeur
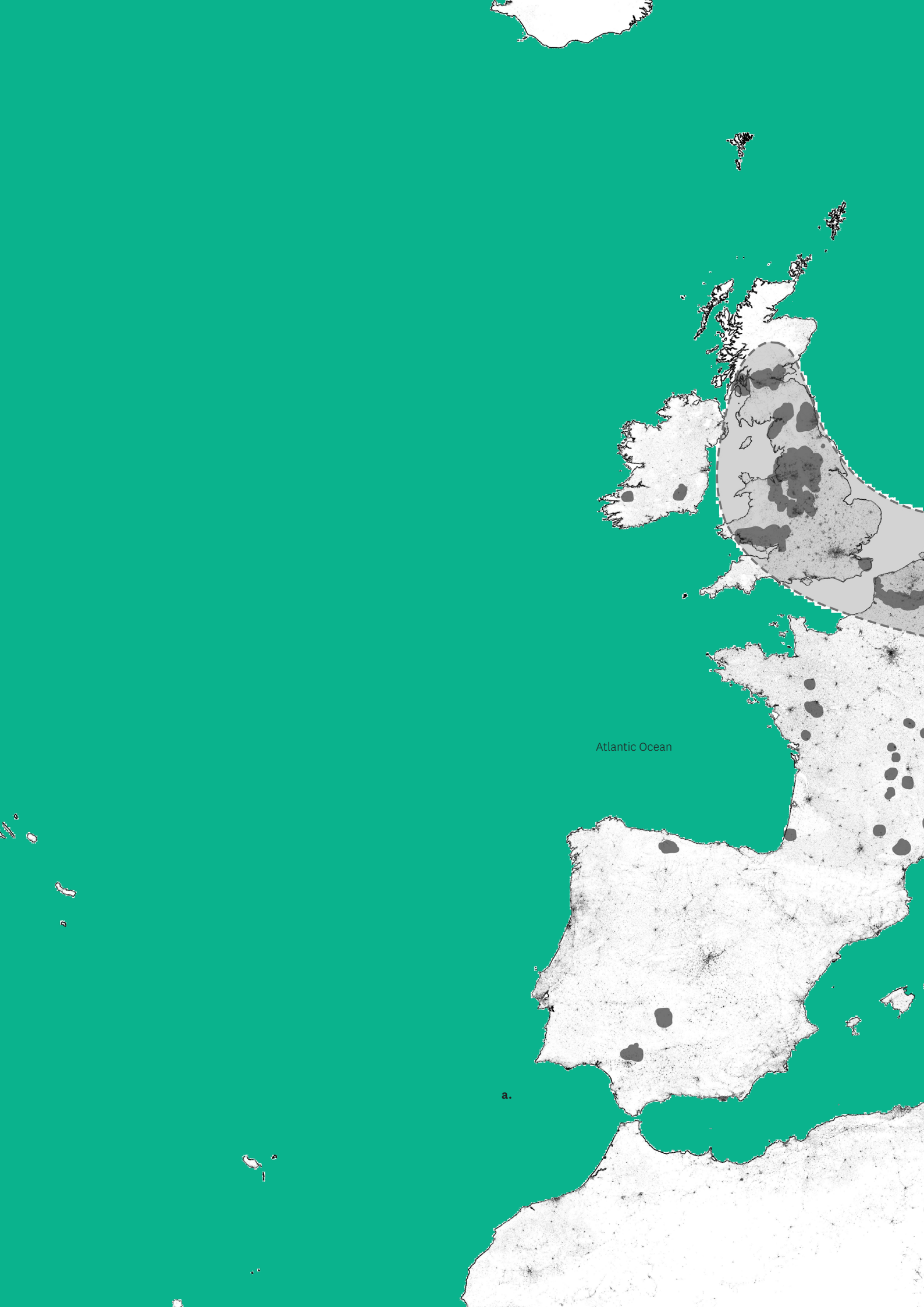
Atlantic Ocean

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CHARLEROI

Paul Magnette • Mayor of Charleroi, President of the Belgian Socialist Party, Professor of political theory at the Université Libre de Bruxelles

The Fossil Crescent. At the Origins of the Anthropocene

Twenty years ago, Nobel Prize winner in chemistry, Paul Crutzen, introduced the term Anthropocene to describe our modern era. Since the end of the 18th century, he observed, human action on the environment has become so great that "global climate may depart significantly from natural behavior for many millennia to come".[1] Two decades later, this concept has become firmly established in discussions around climate change and is slowly entering mainstream language. The term is extremely effective in that it focuses on human responsibility in climate disruption. However, it also has the drawback of diluting analysis with abstract references. Who is this Anthropos that caused climate change, and who are the humans that will most directly suffer its consequences? To this question, Crutzen does not provide an answer. The Anthropocene has no sociology, no geography, and barely the beginnings of a history. And yet, if we look past its causes, and the way in which it materializes in human communities, ecosystems and specific territories, if we ignore the "environmental reflexivity"[2] that it creates, we deprive ourselves of the opportunity to gain an in-depth understanding of it, and therefore reorienting the course of human actions. [3]

Birth of a new geological age

Establishing the moment of the Anthropocene's birth is not the most complicated aspect. Crutzen chose 1784 as a turning point, the year that the steam engine was "invented" by James Watt. In retrospect, this machine, fueled by coal, appears to be the symbol of technological power that allowed humans to break free of the yoke that natural limits placed on production and move away from the subsistence economy that they had been confined to since the beginnings of the Neolithic. For some, like American sociologist Jason Moore, the underlying principles of this new era in our planet's history can only be understood through if we go even further back in time, to the "great discoveries" that ushered in European imperialism, as well as the scientific and intellectual origins of the capitalist system around the turn of the 15th and 16th centuries.[4] Others, like environmental historian John McNeill, instead point to the "great acceleration" of energy consumption and the production of greenhouse gasses that proliferated in the aftermath of World War II.[5]

These differences of opinion are more relative than absolute. This is first and foremost because on the scale of planetary time, a few centuries do not make much difference; the previous geological era covers a period whose boundaries are flexible, spanning the last ten to twelve millennia. Secondly, and above all, because what is important is defining the causality of the passing from one era to another, as well as the inherent dynamics of moving into the Anthropocene. By making the invention of the steam engine the symbol of this transition, Crutzen points in a direction. During the Holocene, it was the "Agricultural Revolution", made possible by a temperate climate, that brought about Neolithic civilization. Our entry into the Anthropocene was caused by the "Industrial Revolution" and gave rise to our productivist and urban civilization.[6] We can therefore trace the intellectual origins of the Anthropocene to the scientific revolution that took place between the 15th and 17th centuries[7], identify its first material expressions in Europe at the end of the 18th century, and follow its global spread starting in the second half of the 20th century.[8]

This timeline points us in the direction of where the Anthropocene originated. Time points to space. If this new era was born out of the extensive mining and consumption of coal, its cradle is without a doubt Great Britain: the transition from water wheels to steam engines in Lancashire's cotton industry ushered in the in-

1. Paul J. Crutzen, "Geology of Mankind : The Anthropocene", Nature, 3 january 2002, n°415, p. 23.

2. Cf. Christophe Bonneuil and Jean-Baptiste Fressoz, L'événement Anthropocène, La Terre, l'histoire et nous, Paris, Points Histoire, 2016.

3. Cf. Bruno Latour, « Quel Etat peut imposer des « gestes barrières » aux catastrophes écologiques ? », Esprit, 2020, n° 466, pp. 159-168

4. Cf. Jason W. Moore (ed.), Anthropocene or Capitalocene ? Nature, History and the Crisis of Capitalism, Oakland, Kairos/PM Press, 2016.

5. Cf. John R. McNeill, Peter Engelke, The Great Acceleration, An Environmental History of the Anthropocene since 1945, Cambridge (MA), The Belknap Press of Harvard University Press, 2014

6. Crutzen notes that the first analyses of air trapped in polar ice, showing the beginning of an increase in carbon dioxide and methane concentrations, also date from this period. It's worth noting - and this is far from being a detail - that in the first case, climate change leads to a profound transformation in modes of production and social relations, while in the second, the causality is reversed.

7. Cf. Carolyn Merchant, La mort de la nature, Les femmes, l'écologie et la révolution scientifique, Paris, Editions Wildproject, 2021

8. The date of 1850 is chosen by medievalist Lynn White Jr. who wrote in 1967 that "The emergence, as a widespread practice, of Francis Bacon's creed that scientific knowledge means technical power over nature, can rarely be dated before about 1850", Lynn White Jr, The Historical Roots of Our Ecological Crisis, Paris, PUF, 2019, p. 25.

tensification of coal mining.[9] Moreover, England was one of the first global imperial powers, a territory living "in a space that is not its own".[10] Compared to other regions of the world that had reached a similar level of scientific and technological development at the dawn of the Anthropocene, the explosion of European prosperity can be explained by two factors: mining of coal on the one hand, and on the other hand, imperialism.[11] Without coal, Europeans would not have been able to break free from the energy constraints that had condemned them to recurrent famines and epidemics since the spread of agriculture. Without the violence of colonial conquest and exploitation, Europe, which witnessed rapid demographic growth, would not have been able to obtain the vital resources for its own subsistence: wheat, wood, cotton, sugar, tea, coffee, and chocolate produced in the Americas, often through the labor of slaves that had been torn from African soil. These two major historic factors – imperialism and the massive exploitation of fossil energies – have their origins in the political agenda of the English bourgeoisie of the mid-19th century.[12]

From the outset, the dual movement that preceded the Anthropocene took place across a territory that went well beyond the United Kingdom's natural borders. This encourages us to broaden our focus. When historians and anthropologists were setting out at the beginning of the previous century to pinpoint the Neolithic's origins, they set off to explore the territories of the Mesopotamian and Egyptian civilizations. There, on the banks of the Tigris, Euphrates, and Nile rivers, they discovered the first traces of cereal cultivation, vestiges of the first forms of writing and accounting, and the first traces of urbanization. Relying on this work, American Egyptologist James Henry Breasted, proposed delineating the cradle of this civilization and baptized it the "Fertile Crescent" in 1914. He wrote that it was in this "arable desert zone", irrigated by the Nile, the Jordan, the Tigris, and the Euphrates that agriculture was "invented".[13] This is where wheat cultivation was born before making its way to Mediterranean Europe, and then the rest of the world. This was the foundation on which writing and measuring instruments were developed, and it was the combination of these discoveries that gave rise to urban civilization and the first states.[14] If, as Crutzen suggests, the Industrial Revolution is to the

Anthropocene what the Agricultural Revolution was to the Holocene, then coal is to our era what wheat was to Neolithic civilization: a total social fact.[15] We can therefore delineate the geographical cradle of the Anthropocene by identifying a "Fossil Crescent" that spans the entire length of the European coal seam, from northern England to Silesia, through Picardie and Nord-Pas-de-Calais, Wallonia and the Ruhr. This is where, beginning in the 18th century, coal was mined, in ever-increasing quantities and where Watt's steam engine became a powerful force. It was here that a particular geological fact, the presence of vast quantities of exploitable fossil energy[16], gave rise to a new mode of production, the famous extractivist-productivist model. This was the birthplace of a civilization that, like the one that emerged from the Neolithic period, eventually spread to the four corners of the planet.

Geological era	Holocene	Anthropocene
Birth date	c. 12.000 BC	c. 1850
Birthplace	Fertile Crescent	Fossil Crescent
Causal Event	Agricultural Revolution	Industrial Revolution
Key material	Wheat	Coal
Socio-demographic transformation	Sedentary lifestyle	Rural exodus

Coal, a total social fact

What strikes visitors when they travel through the regions that make up the Fossil Crescent, from the Midlands to the Ruhr, is their uncanny similarity. Ken Loach's films could be shot in Seraing or Marchiennes, and the Dardenne brothers' films would not be out of place in Newcastle or Manchester. Through his actions, man has so profoundly transformed the landscape, and so profoundly transformed himself, that he has erased even the memory of nature and previous social relationships. To explain the origins of the city where I live, Charleroi, I usually refer to two maps. The first is the map produced by the Austrian Netherlands, drawn up by the Count of Ferraris around 1775: Charleroy is a small town on the banks of a river, composed of a few hundred houses, about ten leagues away from other identical hamlets and villages. The primeval wilderness has almost completely disappeared, replaced over the centuries by fields and pastures carved

9. Cf. Andreas Malm, Fossil Capital, Londres, Verso, 2015 ; Andreas Malm, L'anthropocène contre l'histoire, Le réchauffement climatique à l'heure du capital, Paris, La Fabrique éditions, 2017 and Fredrik Albritton Jonsson, « The Coal Question Before Jevons », The Historical Journal, 2019, vol. 63, n°1, p. 1-20.

10. Pierre Charbonnier, Abondance et liberté, Une histoire environnementale des idées politiques, Paris, La Découverte, 2020, p. 124.

11. Cf. Kenneth Pommeranz, Une grande divergence, La Chine, l'Europe et la construction de l'économie mondiale, Paris, Albin Michel, 2010.

12. Cf. Charles-François Mathis, La civilisation du charbon, En Angleterre, du règne de Victoria à la Seconde Guerre mondiale, Paris, Vendémiaire, 2021.

13. On the genesis and uses of this concept, see Vincent Capdepuy, "Le croissant fertile. Naissance, définition et usages d'un concept géohistorique", L'information géographique, 2008, vol. 72, n°2, pp. 89-106.

14. Cf. James C. Scott, Homo Domesticus, Une histoire profonde des premiers Etats, Paris, La Découverte, 2020.

15. Borrowing the concept of "total social fact" from Marcel Mauss, American historian Steven Kaplan applies it to the role of wheat and bread in European civilization, and particularly in the French 18th century, Steven Kaplan, Raisonner sur les blés. Essais sur les Lumières économiques, Paris, Fayard, 2017. Fernand Braudel spoke of wheat as a "plant of civilization", which is to the Mediterranean and Europe what rice is to Asia and corn to the Americas. Cf. Fernand Braudel, Civilisation matérielle et capitalisme, Paris, Armand Colin, 1967.

16. Cf. Elena Esposito, Scott F. Abramson, « The European Coal Curse », Journal of Economic Growth, 2021, vol. 26, n°1, pp. 77-112.

out of ancient forests. But the landforms are unchanged, the rivers follow their natural course and the villages and roads built by humans, following the meandering landscape, take up only a tiny fraction of the space.

The second map was made one hundred and thirty-five years later for the World's fair in 1911. In this time, Charleroi had become one of the wealthiest and most technologically advanced cities in the world and one of the Anthropocene's capitals. On maps from this time period, the once winding river can be seen channeled in a straight line; the small towns are buried in a series of anarchic conurbations; the entire region is crisscrossed by railways, canals, roads, bridges, and electrical lines; dozens of black symbols indicate coal mines and metallurgical and glass factories. The Anthropocene made the natural environment unrecognizable, ripping tens of thousands of people from the countryside and cramming them into shacks built near mine shafts and factories.

And when the surrounding countryside was no longer able to supply industry with enough manpower, workers were imported from the north and south of the Mediterranean, leaving lasting marks on the region's demographic dynamics and human diversity.

Coal did not just transform the landscape; it also shaped social and democratic life. The strong concentration of mines as well as iron and steel works in the Fossil Crescent gave certain segments of the working class a strategic role. Miners, steel workers, railway workers, dockworkers and sailors lived and worked in densely populated areas, where direct contact allowed them to recognize their shared struggles and organize their efforts. As a result, they won the trade union and political rights for the entire working class which underpin our democracies and laid the foundations for a civic community culture. Mass democracy was born in the heart of the Fossil Crescent in the wake of the "great transformation" that radically transformed nature and social relationships.

This was also where the foundations of European unification were laid. The old cosmopolitical dream of bringing the peoples of Europe together had been shattered a hundred times over by the imperialist desires of the great powers and the failures of traditional diplomacy. In the aftermath of the Second World War, it was the idea of mutualizing coal and steel resources, once again at the heart of the Fossil Crescent, that led to the founding of the first institutions of which the European Union is the distant descendant.
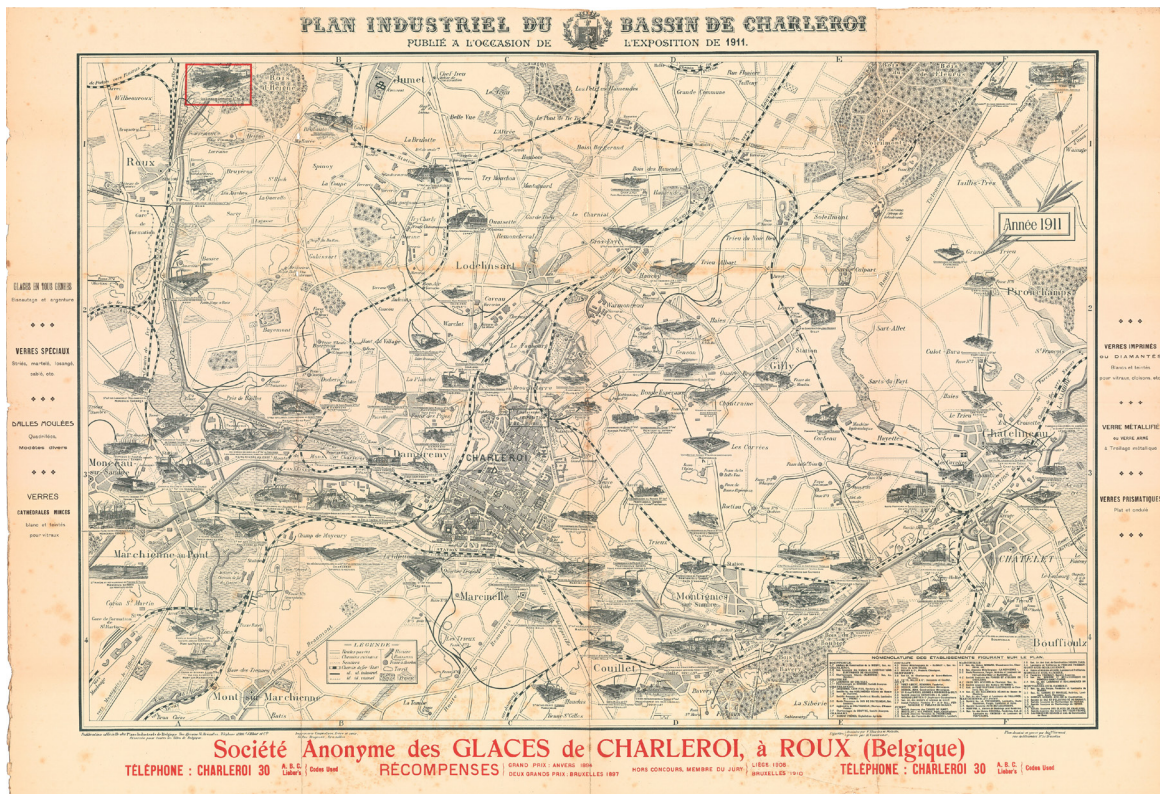
Coal consumption in Europe
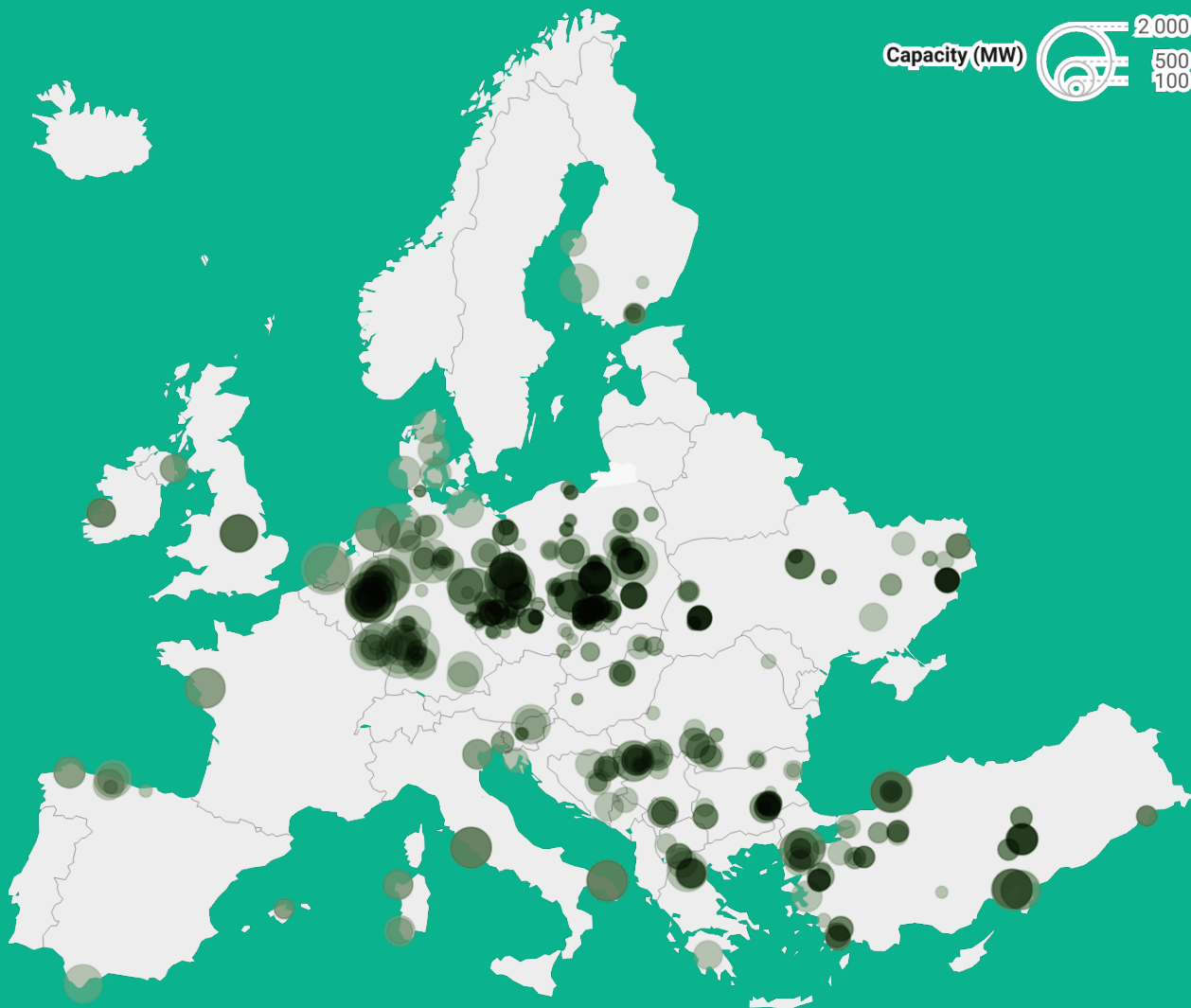
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Coal is the most deadly form of energy in terms of accidents occurring during the mining and transport of primary raw materials, and in terms of its contribution to air pollution. It is also the energy resource that emits the most CO2-equivalent emissions per gigawatt-hour of electricity produced: 820 tonnes over the lifecycle of a power plant, 273 times more than nuclear power.

In 2022, in the European Union, almost 40% of electricity production came from renewable sources and 38.6% from fossil fuels - gas (19.5%) and coal (15.8%).

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The fossil range of the Anthropocene

Towards a critical theory of the world of coal: material sources, infrastructures, doctrines

◄ 18 novembre 2018. Juechen, Rhénanie-du-Nord-Westphalie en Allemagne. Open-cast lignite mine operated by RWE, Garzweiler. View of the Frimmersdorf thermal power station, Grevenbroich.

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Cities and coal: can we overcome the fossil hybris?

In his 1877 novel The Child of the Cavern, Jules Verne imagines an unusual city: "Coal City" is located completely underground in a giant coal vein in Scotland. Artificially lit by lamps which probably use electricity produced by the omnipresent fuel source, the city houses the mine's workers who build their brick cottages around a subterranean lake in a huge cave. Protected from storms above ground, the inhabitants of the strange place live in harmony and good health – with the ending even suggesting that they could live to be centenarians. One man's madness finally threatens this place with a destructive explosion which is averted at the last moment by the heroine.

Even if this mediocre novel is not among Jules Verne's best work, its merit lies in the fact that "Coal City" captures some of the 19th century's crucial energy issues. How better to describe the structuring power of coal in Victorian urban planning? Does this not already suggest, to use current terminology, that the Anthropocene is an "anglocene"?[1] When thinking about the "fossil crescent", it's clear that the United Kingdom under Victoria deserves a special mention, as it is the birthplace of what I refer to as a "coal civilization", given that this fuel source touched all aspects of English life.[2] This experiment in life and thinking is, in fact, closely linked to the urban phenomenon – the UK was the first nation to see its population become predominantly urban, beginning in 1851. Of course, coal has not been confined to this time or place. In the 19th century, it was more generally part of the "world's store"[3] and has continued to transform the planet ever since: in 2010, it still accounted for 40% of world electricity production and 20% of greenhouse gas emissions,

while its per capita consumption on a global scale has continued to rise since the 19th century.[4] We can therefore consider the effect of coal on cities and whether, beyond the English experience, it has had a much greater impact on their contemporary destiny.

Coal naturally first shaped the places it was extracted from. There is no need to go into detail about the dramatic changes in the landscapes surrounding coalfields, with their distinctive landmarks of headframes, slag heaps, tiles, chimneys, miner's cottages, and so on. Let us simply be reminded of their progressive expansion. For example, in 1955, in the town of Ince (Lancashire), there were 33 mine shafts covering 80 ha, a slag heap spread over 2.5 ha and 36 disused mines.[5] The Nord-Pas-de-Calais coalfield follows the same pattern, gradually expanding from east to west over the years: in the 1990s, when production came to a halt, it covered 2,400 km2 of the French side, with urban sprawl from Valenciennes to Béthune.[6] In general, the industrial towns situated in or near these coalfields can be described as "Coketowns", to use the name invented by Dickens in Hard Times in 1854: Le Creusot, Middlesbrough, Essen, Liège, all of which, from the 19th century onwards, conjure images of chimneys belching smoke, pollution, bricks, misery and striking social contrast.[7] The urban form and the experience of these places – whether British, French, Belgian, German, etc. – is therefore new and shaped by the presence of coal. These are new landscapes of energy production that are emerging here – whereas, as Sylvain Allemand suggests, oil and electricity will give rise to landscapes of consumerism (linked to mobility, superstores, etc.).[8]

Yet as early as the 19th century, these consumerist landscapes were already taking shape in the United Kingdom, where coal also played a decisive role in shaping towns, regardless of their location, through the way it was used. For example, coal's presence can be seen in the warehouses that are woven into the urban fabric near river quays or railway terminals, sometimes sprawling across several hectares. It also circulates in highly visible ways, not only between the places it is produced and consumed, but also within cities themselves, leaving traces of its passage on the pavement or in the dust-filled air. It can also be seen in landfills where it accumulates in gigantic heaps, sometimes right in city centers: King's Cross in London for example. In 1929, the most impressive if these waste heaps – largely made up of coal – was undoubtedly the one at Hornchurch, in Greater London, that was

1. We should call it a "Britannocene", since the story is set in Scotland…

2. More than the British, in fact, it seems to me, with all due respect to Jules Verne.

3. See François Jarrige, "Charbon", in the section "le magasin du monde" of the work by Pierre Singaravelou and Sylvain Venayre (dir.), Histoire du monde au XIXe siècle, Paris, Pluriel, 2019, p. 608-614.

4. https://jancovici.com/transition-energetique/charbon/a-quoi-sert-le-charbon/

5. William G. Hoskins, The Making of the English Landscape, London, Hodder & Stoughton, 1960, p. 176.

6. Sylvain Allemand (dir.), Paysages et énergies. Une mise en perspective historique, Paris, Hermann Editeurs, 2021, p. 193.

7. Dominique Kalifa, "Urbanisation et cultures urbaines", in Pierre Singaravelou and Sylvain Venayre (dir.), op. cit., p. 162.

8. Sylvain Allemand (dir.), Paysages et énergies, op. cit., p. 21.

a kilometer long, 500 meters wide, and 270 meters high. Finally, there is the internal organization of homes themselves, which must accommodate the specific requirements of this fuel. First, it needs to be brought into the home: where possible, openings were made in the street at the top of cellar walls (sometimes a hole was made in the pavement, closed by a small cast-iron plate, and passing through the ceiling); failing this, reserves were stored as best as possible, usually under a staircase. The means used to burn it also had to be adapted. Over the course of the 19th century, English hearths were transformed, driven in particular by social reformers concerned about the senseless waste caused by burning in open fireplaces – although they were unable to convince everyone to accept stoves, they at least hoped to improve the calorific efficiency of fireplaces. The same applied to cookstoves, which also underwent transformations wherever possible, often in line with the recommendations made by Count Rumford as early as the end of the 18th century.

Coal also played a role in shaping cities through the way it was experienced – what WJT Mitchell calls "place", as opposed to the "designed" space that I have just described.[9] The relative invisibility of oil and electricity (except in times of crisis!) have made us forget the physical nature of energy sources – particularly coal – which used to be a part of everyday life. Though not all territories used coal to the same extent as England or certain coal-mining regions, it was nonetheless a common material, encountered and handled frequently, first and foremost by those who burned it in their homes: it had to be retrieved from the cellar or storage, it had to then be placed into the fireplace after clearing out the ashes from previous fires, the fire had to be lit and maintained, the ashes and soot which settled everywhere had to be cleaned from the home, etc. Not to mention the difficulty of using coal cookers! Of course, coal could also be burned in stoves, which was more common in France or Germany for example than in the United Kingdom, where the experience of the open-hearth fireplace was integral to feelings of domestic well-being and the image of "home sweet home". If it was not used at home, coal could also be encountered in the workplace, whether in businesses equipped with steam engines, in those converting coal into coke or gas, or in those that used it as fuel, such as metalworks.

These life experiences and spatial organizations are unique to England and the handful of places where coal dominated. Without the disappearance of this fuel, these places have been partly transformed by the addition of oil, the use of coal in thermal power stations to produce electricity, and so on. Nevertheless, I believe we must recognize that "coal made it possible to break free from territory"[10], and that in this sense, it anticipates a more general urban transformation that might be considered as the Anthropocene.

I would therefore like to emphasize a first point that I consider fundamental: coal ushered in the era of mobility, which would be perpetuated and intensified by the pairing of oil and automobiles. The gradual introduction of railroads and steamships (even if the latter initially struggled to gain traction against the advances of sailing ships) set the world in motion. The increased speed and number of journeys considerably altered the experience of life for men and women in the 19th century. Easier transport of goods meant that they could be concentrated in urban centers, and the diversity and increase in consumer goods made them more accessible to all social classes. As for the ever-increasing number of people traveling by train, seeing cities zip past their eyes was dizzying, though they obviously benefited from easier access to cities which were once far away. The way in which cities themselves were organized was also impacted, though the automobile has had an even greater impact; the laying of tracks, the construction of railway stations and the neighborhoods that surround them, the introduction of sometimes long arterial roads leading to them (just think of the great Haussmann thoroughfares leading to the Gare de l'Est, Gare du Nord or Gare du Montparnasse) – these are all legacies of coal. Coal therefore played a decisive, initial role in the transformation and acceleration of the urban metabolism through the expansion of supply areas, increased energy options (coal gas, electricity), the "invention of waste[11]" through organic chemistry, and so on. Beyond the now-familiar dirt and smoke of the locomotive, this is yet another example of how this fuel – albeit indirectly – tangibly shaped the urban experience from the 19th century onwards.

This breaking free is also embodied in the materials used to construct cities which themselves, even today, rely on coal.[12] The bricks that allowed for London's incredible expansion were made with the most refined coal residues (known as soil) that were mixed with clay, resulting in a synergy that generated vast fortunes, like Dickens's "Golden Dustman" in Our Mutual Friend (1864-1865). Coal was also used to bake bricks, whose production boomed: from 1 to 4.8 billion a year in England between 1830 and 1907; 1 billion a year in New York alone at the beginning of the 20th century.[13] Metal production also grew out of coal, or more specifically, coke. Of course, wood was still used[14], but the explosion in production relied on coal; in

9. WJT Mitchell, Landscape and Power, Chicago, Chicago UP, 2002, introduction.

10. Eric Vidalenc, "Le paysage, réceptacle ou levier de la transition énergétique", blog on Alternatives Economiques, 28 October 2018, cited by Sylvain Allemand (dir.), Paysages et énergies, op. cit., p. 20.

11. Sabine Barles, L'invention des déchets urbains. France, 1790-1970, Seyssel, Champ Vallon, 2005.

12. This paragraph owes much to the stimulating readings of Jean-Baptiste Fressoz, Sans Transition. Une autre histoire de l'énergie, unpublished research manuscript.

13. Ibid., p. 56.

14. See, for example, Jean-Philippe Passaqui, "Frédéric Le Play et la sidérurgie au bois", in François Jarrige and Alexis Vrignon (eds.), Face à la puissance. Une histoire des énergies alternatives à l'âge industriel, Paris, La Découverte, 2020, p. 111.

the United Kingdom alone, cast iron production increased by 65-fold between 1750 and 1850, steel production increased nearly 40-fold between 1870 and 1912 (and more than 90-fold in Germany for the same period). And steel production has only increased (in 2022, China produced more than a billion tons of steel, more than half of global production[15]). Of course, steel is not used only in cities, but in Europe, for example, at least 30% of steel was used in buildings, public projects, and metal structures at the beginning of the 21st century.[16] And, according to the producers themselves, it takes on average between 700 and 800 kg of coal to produce one ton of cast iron.[17] The same is true of cement (and therefore concrete), whose production continues to increase (reaching over 4,000 billion tons worldwide in 2019[18]) to build roads and buildings, and which also primarily relies on the burning of coal: 84% in 1919 and 65% in 1935 in the USA[19], for example (and 71% worldwide in 2006, when coal and coke are combined[20]). In total, according to Jean-Marc Jancovici, 7% of all coal consumed worldwide is used to produce steel, and 4% to produce concrete (and 2/3 to produce electricity[21]). In this sense, we can say that coal helped to shape contemporary cities, giving them some of their characteristics, in particular a capacity to disconnect from their immediate environment.

This can also be seen in the pollution this fuel creates in the urban environment , daily encounters that also shaped the experience of the contemporary city at its birth and persist in more insidious forms today. I do not feel the need to revisit how certain cities were suffocated by fumes, especially household ones, though sometimes industrial ones too: the great London smog of 1952, with its 8,000 to 12,000 deaths, remains etched in everyone's memory. Smog has not been limited to British cities; major mining and metal-producing centers have also been victims. One example is the Meuse valley, which in December 1930, as a result of a meteorological phenomenon, was engulfed in sulfurous fumes for several days in a row. These were caused by the burning of coal for the zinc industry and caused severe respiratory problems for thousands of people, of whom around sixty died.[22] In 1973, German director Wolfgang Petersen made a film entitled Smog, which depicted an air quality disaster in

the Ruhr region. At first, the use of electricity did little to reduce the air pollution caused by CO_2, nitrogen oxides, sulfur oxides and other pollutants in cities. In Europe, especially before the Second World War, thermal power plants are never very far from the places where they are used, and this is still the case today in China and India. In India, where air pollution from thermal power plants (nearly 70% of the country's electricity production) causes around 100,000 deaths a year, many of these plants are located less than 100 km from some of the country's main cities. As an example, it is estimated that 8% of Delhi's fine particle pollution comes from these plants.[23] In 2013, more than 25 billion tons of carbon were released into the atmosphere by the Asia-Pacific region alone – which was covered by a brown cloud stretching from Pakistan to China – mainly (but not only, as automobiles and agricultural practices also play their part) from coal combustion.[24] This air pollution, and more generally the use of coal, also damages soil, leaving behind contamination that can be difficult to erase. This can be seen, for example, in the city of Katowice, in Upper Silesia, which developed around coal and metal production beginning in the 1830s, going on to become one of Central Europe's main urban centers (by the end of the 1990s, the metropolitan area had a population of 2.5 million spread over 1,250 km2), and is still one of Europe's most polluted cities, despite a rehabilitation program and industrial decline.[25]

Consequently, it seems to me that coal, and fossil fuels in general, have created a new way of inhabiting the world, a new relationship with the city. This is, after all, what the industry's earliest critics criticized so fiercely. The Romantic poet Wordsworth, for example, criticized the buildings of his era, whether factories or housing, for failing to blend in with their natural surroundings, in this case the Lake District in the north-west of the country. His contemporary Southey, for his part, saw industry as a "cyst" and declared:

The old cottages [...] couldn't, with such materials, fit in better with the surrounding landscape [...] ; and this harmony has been further enhanced over time, thanks to the marks of the climate, the lichens and mosses [...]. How is it," I said, "that the features of everything related to industry are so completely distorted? From the widest of Mammon's temples to the most wretched of the hovels where his hilots are kept at bay, buildings have only one

15. Wordsteel Association statistics, 2022: https://worldsteel.org/steel-topics/statistics/annual-production-steel-data/?ind=P1_crude_steel_total_pub/CHN/IND

16. Blog by Jean-Marc Jancovici : https://jancovici.com/transition-energetique/charbon/a-quoi-sert-le-charbon/

17. Worldsteel Association statistics: https://worldsteel.org/about-steel/steel-facts/

18. https://www.planetoscope.com/matieres-premieres/1708-production-mondiale-de-ciment.html

19. Jean-Baptiste Fressoz, Sans Transition, op. cit., p. 68.

20. https://www.construction-carbone.fr/lecimentetsapartcarbone/

21. Blog by Jean-Marc Jancovici : https://jancovici.com/transition-energetique/charbon/a-quoi-sert-le-charbon/

22. See Alexis Zimmer, Brouillards toxiques. Vallée de la Meuse, 1930, contre-enquête, Bruxelles, Zones Sensibles, 2016.

23. Sarath K. Guttinkunda and Puja Jawahar, "Atmospheric emissions and pollution from the coal-fired thermal power plants in India", Atmospheric Environment, 92, 2014, p. 449-460.

24. François Jarrige and Thomas Le Roux, La Contamination du monde, Paris, La Découverte, 2017, p. 342.

25. Sustainable Cities Programme 1990-2000 :
https://unhabitat.org/sites/default/files/download-manager-files/Sustainable%20Cities%20Programme%201990%20-%202000.pdf p. 31.
Raphaël Godet, "On a vingt ans de retard" : avant d'accueillir la COP24, Katowice fait mine de combattre la pollution », Franceinfo, 30 November 2018 : https://www.francetvinfo.fr/sante/environnement-et-sante/on-a-vingt-ans-de-retard-avant-d-accueillir-la-cop24-katowice-fait-mine-de-combattre-la-pollution_3025909.html

aspect. Time does not soften them; Nature neither dresses nor conceals them; and they never cease to offend the eyes and the mind![26]

This is a "landless" habitat, the product of industrial upheaval, which is criticized here because it seems to resolutely turn its back on its local environment. Beyond these distinctive landscapes born of underground riches, what is at stake is the affirmation of a kind of detachment from natural constraints, of which American skyscrapers – like the Home Insurance Building erected in Chicago in 1884 and considered to be the first of its kind – symbolize. In this sense, the rural utopias of the late 19th century are highly revealing with regard to this new relationship with the city. The return to nature was not just a response to health, physical or moral ills – it was explicitly presented as reconnecting with the earth and a rejection of the environmental disruption caused by the city. William Morris's 1890 novel News from Nowhere is one of the most famous expressions of this. The socialist world he imagines following a revolution that takes place in 1952 is driven first and foremost by sobriety: gone is the mass consumption of the Victorian 19th century; gone are the ersatz and mediocre products that cheapen taste, clutter homes and, above all, impose unacceptable working conditions and schedules on workers. Less production, less coal. While Morris doesn't go into great detail about the energy sources this new society relies on, the key point is undoubtedly the choice to limit desires. From this point, the city begins to dissolve: London and the major industrial centers are destroyed; small towns resist but are gradually absorbed into the countryside; villages proliferate. Abandoning centralization, particularly in energy production, adopting a lifestyle that we would now call "sustainable", using local materials that were more "natural" than bricks, blending dwellings into their environment, in short, rejecting a relationship of power to the world – or at least its most drastic limitation – all contribute to this urban dissolution.

England "is now a garden, where nothing is wasted and nothing is wasted, with the necessary dwellings, sheds and workshops scattered across the country, all tidy, neat and pretty. Indeed, we would be too ashamed of ourselves if we allowed the manufacture of products, even on a large scale, to have the appearance of desolation and misery."[27]

Today's cities are, among other things, the legacies of these fossil choices. Though they have undoubtedly been further shaped by oil and electricity, they are no less symbols of a rupture, a challenge to the natural world that coal embodies. Are cities then the antithesis of a decarbonized future or rather, through a dialectical reversal, one of its potential futures? Valérie Chansigaud, for example, has argued that concentrating population in urban areas, limiting traffic of all kinds and extending the artificialization of land, is ultimately an asset for the preservation of nature.[28] But, on the contrary, are their roots so deeply embedded, so devastating to the natural environment, that they are dooming the world to ecological devastation? Richard Jefferies, in his remarkable novel After London, offers little hope: although the United Kingdom as a whole has returned to a rather benign state of nature, London – the "coal city" par excellence – leaves in the wake of its collapse poisonous swamps where the contaminated environment renders life impossible. Whatever may happen, there is no doubt that the transition away from coal, and more broadly from fossil fuels, will transform the contemporary city, which will have to reassess its workings, its construction methods and its relationship with its environment. A symbol of fossil hubris, the city will have to accept (rediscover?) the humility of its dependence on the world...

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26.   Robert Southey, Sir Thomas More, on Colloquies on the Progress and Prospects of Society, London, Murray, 1829, vol. 1, p. 173-174.

27.   William Morris, News from Nowhere, London, Penguin, 1993 [1890], p. 105.

28.   Valérie Chansigaud, Les Français et la Nature, Arles, Actes Sud, 2017, p. 144-145.

Coal consumption around the world

Coal consumption evolution (1965-2022)

b.

China

India

United States
EU
Japan

1970   1980   1990   2000   2010   2020
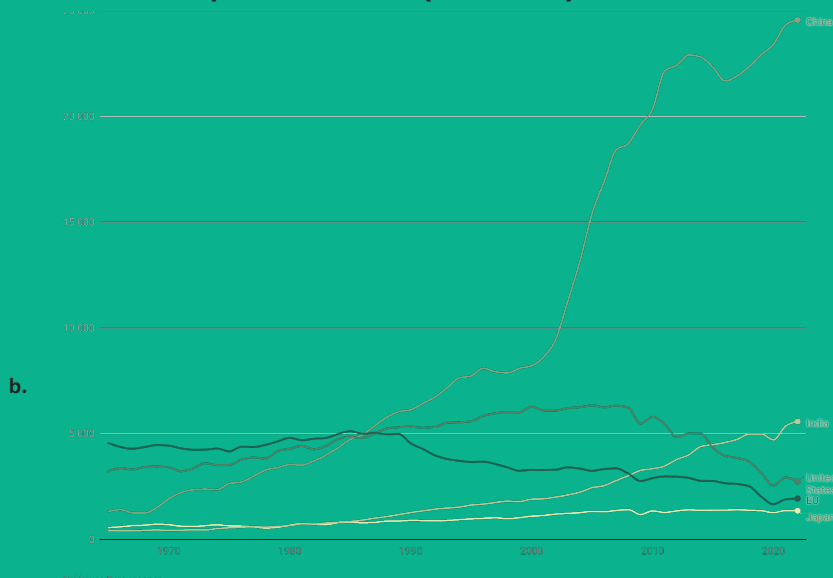
Coal consumption in India and China has more than doubled in less than twenty years. In contrast, the trend has been downwards since the late 1980s in the countries of the European Union and since the late 2000s in the United States.
In Europe, the use of coal for electricity generation is overwhelmingly concentrated in Poland and Germany.

Coal-fired power stations under construction worldwide
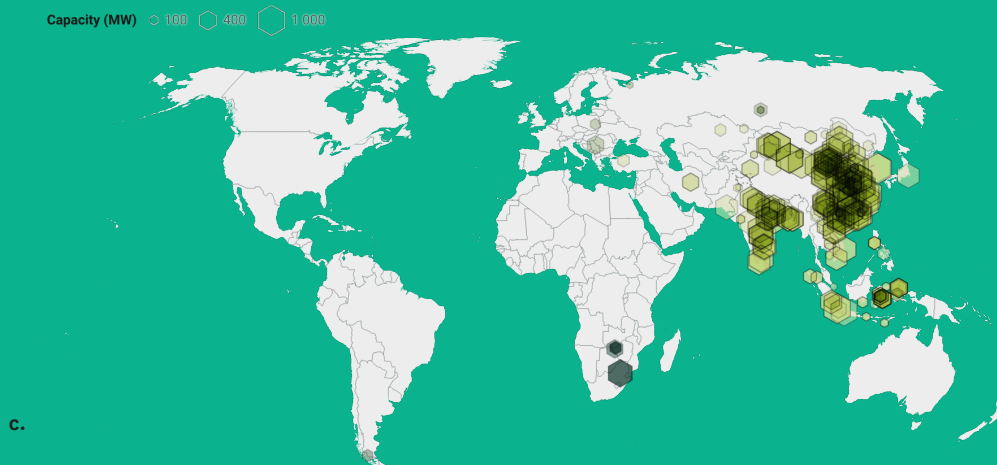
Capacity (MW)   100   400   1 000

c.

The map above illustrates the global divide in terms of future coal use. China, which is aiming to reach its peak CO2 emissions by 2030 and carbon neutrality by 2060, accounts for 61% of new coal-fired power plant construction projects.

Globally, Asia accounts for 65% of all oil and gas-fired power plant construction projects, compared with 17% in the Americas (mainly Latin America and the Caribbean), 9% in Africa and 8% in Europe.

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The Intellectual Origins of the Anthropocene

New York got a taste of the Anthropocene in the spring of 2023. Canadian forest fires turned the skies a hideous orange. Millions of lungs burned with acrid smoke. The apocalyptic weather was so shocking that it moved some observers to hope that the smoke cloud would produce a tipping point in public attitudes about climate change. Yet so far, the jolt of the forest fires seems to have produced no meaningful shift in public opinion or political action. This is perhaps not so surprising. For decades, fossil fuel corporations and their political supporters have actively undermined meaningful action on climate. And behind the vested interests of the oil companies lies an even bigger obstacle: the addiction to economic growth across the fossil fuel countries of the Earth.

Scientific warnings of planetary emergency are all too familiar by now. Fossil fuel burning is overloading the atmosphere with carbon. If business as usual persists, extreme heat waves will ravage economies and ecosystems, causing death and suffering, crop failure and biodiversity loss. At the same time, polar ice melt will accelerate, raising sea levels and disrupting oceanic circulation. Humanity faces a fundamentally altered earth system. We have collectively entered into a new geological epoch, provisionally named the Anthropocene.

The concept of the Anthropocene helps us see the present and future in a new light, but by centering the narrative on the economic and environmental changes after World War Two, this framework limits our understanding of the deeper historical causes behind the planetary emergency. Crucially, this is not just a technical problem for specialists to debate but a major concern for anyone interested in diagnosing the driving forces behind the climate crisis and the threat to biodiversity.

In their original dating of the Anthropocene, Paul Crutzen and Eugene Stoermer picked 1784 as the historical origin of the new epoch - the year of James Watt's patent for a steam engine with a separate condenser. Britain's transition into the fossil fuel economy thus marked the end of the Holocene. More recently, the Anthropocene Working Group, established to validate the epoch in formal stratigraphic terms, has shifted the chronology of the Anthropocene from the Industrial Revolution to the Great Acceleration after 1950. From a geological point of view, the postwar period is the moment when new man-made particles become apparent on a global scale in the Earth's sediments, including the widespread presence of plastic, concrete, and nuclear fission materials. Such stratigraphic criteria provide a powerful way to track anthropogenic effects at the planetary level, but they should not be mistaken for an adequate model of historical explanation.[1]

To grapple with the roots of the Anthropocene, we need to look at developments that preceded the Great Acceleration. This means wrestling with Europe's long history of capitalism and empire, stretching back to 1492, if not farther. Long before the planetary impact of the Great Acceleration, there were seismic social shifts within Western society, including the rise of agrarian capitalism, the European colonization of the New World, and the energy transition into the fossil fuel economy. To understand these social transformations, we must also attend to the history of ideologies and ideas. Without a guiding intellectual framework, the capitalist system of the West could never have become a dominant force in the world.

We locate the intellectual origin of the Anthropocene in the historically distinctive world view we call Cornucopianism. By exploring the historical emergence of Cornucopian ideology, we can a deep understanding of the social and political maladies of the present moment, including the strange apathy of so many in the face of the unfolding planetary emergency. The thinly veiled reason for this inaction is our addiction to exponential economic growth, fostered by the world view of modern economics.[2]

Even though exponential economic growth is an historical anomaly - for 99,9993% of the time Homo sapiens has roamed the earth there has been no sustained economic growth - people across the Global North and the developing world take it for granted. Indeed, a continuous improvement in the material standards of living is the main selling point of capitalism.

While climate scientists have sounded the alarm about

1. Paul J. Crutzen, P.J. and Eugene F. Stoermer, E.F., "The 'Anthropocene,'" Global Change Newsletter (200), 41, 17; Colin N. Waters, Jan Zalasiewicz, Mark Williams, Michael A Ellis. Andrea M. Snelling (eds) "A Stratigraphical Basis for the Anthropocene," Geological Society, London, Special Publications, 395 (2014), 1–21.
2. Fredrik Albritton Jonsson and Carl Wennerlind, Scarcity: A History from the Origins of Capitalism to the Climate Crisis (Cambridge, MA: Harvard University Press, 2023).

the dangers of carbon emissions for the past thirty years, economists have relentlessly proselytized for economic growth. The discipline of economics has, for the most part, completely ignored climate change and global warming – these terms appear in only thirty-two abstracts of nineteen thousand articles published in the top five economic research journals from 1957 to 2019. The most famous economist to write on climate change, Nobel Laureate William Nordhaus, disregards the warnings made by climate scientists, insisting that it is more important to protect the sanctity of economic growth. He argues that economic growth will continue to improve standards of living while at the same time promoting technological improvements that are likely to enable humanity to resolve the environmental damages caused by economic growth.[3]

Nordhaus won the Nobel Prize for a model recommending a ceiling of 3.50C increase in global temperatures by 2100. This is, he argues, the optimal level of global warming in terms of balancing the benefits to consumer and the costs incurred by the damages to the environment – note that Nordhaus sees both costs and benefits from an anthropocentric point of view – entirely disregarding the fate of other species.[4]

Climate scientists shudder at the thought of 3.50C. The latest report by the IPCC outlines a nightmarish scenario, with massive species extinction, disastrous reductions in agricultural yields, and extensive loss of human life from heat alone, not to mention fires, hurricanes, and flooding. What is more, scientists like Johan Rockström, predict that various tipping points will soon be reached, after which the effects of increased earth system change will be non-linear and irreversible. While the destabilization of the earth system might make human life on earth impossible, it definitely will make additional economic growth impossible, undermining the very foundation of Nordhaus's model.[5]

Why are mainstream economists so wedded to economic growth that they are willing to gamble on the habitability of the earth itself? Why do they feel comfortable disregarding or downplaying the findings of climate science? Some economists claim that climate scientists do not understand the power of economic growth to generate substitutes, others suggests that the IPCC is too pessimistic, or that climate scientists are untrustworthy.

3. Michael Roos and Franziska M. Hoffart, "Importance of Climate Change in Economics," in Climate Economics: A Call for More Pluralism and Responsibility, 19–34 (Cham, Switzerland: Palgrave, 2021), 23, 29.

4. Nordhaus, William D. (2017): Revisiting the social cost of carbon. In Proceedings of the National Academy of Sciences of the United States of America 114 (7), pp. 1518–1523. Available online at https://www.pnas.org/content/114/7/1518.

5. IPCC, 2023: Summary for Policymakers. In: Climate Change 2023: Synthesis Report. A Report of the Intergovernmental Panel on Climate Change. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, H. Lee and J. Romero (eds.)]. IPCC, Geneva, Switzerland, 1-36. Available online at https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_SPM.pdf.

We argue that the obsession with growth in economics is grounded in their choice of first principle – the idea of scarcity. Anyone who has taken an ECON 101 course would have had it drilled into them that everyone, regardless of their wealth, is constantly facing scarcity. It is, of course, a truism that everything is scarce – after all, both time and space are limited. Yet, the definition of scarcity that economists use is based on the peculiar idea that consumers have insatiable desires. To satisfy as many of these desires as possible, the consumer must maximize the use of all resources. If some of these resources start running low, economists assume substitutability, that science and markets will come up with replacements. This led Nordhaus's mentor, the legendary MIT professor, Robert Solow, to proclaim: "the world can in effect get along without natural resources, so exhaustion is just an event, not a catastrophe."[6]

In the theoretical world of modern economics, in which everyone always wants more (insatiability), anything can be turned into anything else through the market (fungibility), and everything is replaceable (substitutability), it is perfectly sensible to maximize the use of all resources and to promote as much economic growth as possible.

The idea of infinite growth has a long history, dating back to the seventeenth century. In the midst of the Little Ice Age, the Thirty Years War, and the English Civil War, a small group of scholars, experimentalists, and intelligencers launched an audacious program to foster infinite improvement. The Hartlib Circle sought to operationalize Francis Bacon's vision of using knowledge to commandeer nature, to turn it into economic wealth. Drawing on Millenarianism, alchemy, and science, they sought to unlock nature's storehouse of riches and harness the invisible energies inherent in nature. They envisioned the improvement project as a collaborative endeavor, in which all citizens shared insights derived from their experiments. With nature conceived as infinitely expanding, the Hartlibians also began to think of desires as unlimited. While at any given point desires outstripped available wealth, both desires and wealth were expanding indefinitely, creating a double helix of infinities.

While the boundless optimism of the Hartlib Circle did not survive intact, Enlightenment philosophers retained many of their assumptions. This Cornucopian philosophy persisted until the nineteenth century, when it was challenged by various Finitarian movements, including Malthusianism, Socialism, and Romanticism. Intent on developing a theoretical paradigm that cast capitalism as a system of liberty, the marginalist economists, including Stanley Jevons, Carl Menger, and Leon Walras, offered a

6. Robert Solow, "The Economics of Resources or the Resources of Economics," The American Economic Review, May, 1974, Vol. 64, No. 2, Papers and Proceedings of the Eighty-sixth Annual Meeting of the American Economic Association (May, 1974), 11.

radically different way of conceiving of the nature-economy nexus. They theorized people as utility-maximizing and firms as profit-maximizing, each constantly wanting more. Against the backdrop of high imperialism and the second industrial revolution, they insisted that nature must be exploited maximally at all times, so as to generate as much consumer welfare as possible. After World War Two, neo-classical economics expanded on this program by developing a growth theory, which assumed that all resources would be used as efficiently as possible while the agents of the economy generated the optimal level of economic growth. Together, the general equilibrium approach and the new growth theory contributed to the vast post-war expansion of the world economy. Nature became little more than a storehouse of resources, to bolster consumer society and the economic goals of the democratic welfare states.

Unfortunately, humanity can no longer afford to act in the manner encouraged by the economist's worldview. Our never-ending quest to turn nature into wealth has led to disastrous unintended consequences. We have entered an age of Planetary Scarcity when pollution is threatening the stability of the system by overfilling carbon sinks and endangering ecological resilience. Simply put, there is too much coal, petroleum, and natural gas in relation to the limited capacity of the earth to absorb excess carbon. Instead of chasing endless consumer desires, we need to reimagine the relation between nature and the economy, placing the earth system at the center of economics.

In our book, *Scarcity: A History from the Origins of Capitalism to the Climate Crisis* (Harvard University Press, 2023) we explain how past philosophers, economists, and novelists have conceptualized the economy-nature nexus. Although none of these ideas can be simply transplanted to the age of Planetary Scarcity, they can inspire us to imagine different futures. For example, there is a long tradition of thinkers who resisted the idea of nature as an inexhaustible cornucopia. There is also a rich alternative history of desire that does not associate human welfare with never-ending material consumption. Many of these ideas have already been resurrected. Pope Francis's encyclical Laudato Si' revives the Christian ideal of restricting desire and flourishing within limits. The American environmentalist Bill McKibben, founder of the 350 Movement, espouses notions of self-sufficiency and degrowth that harken back to Rousseau and the Romantics. On the left, a new generation of radicals looks to Marx and his critique of capitalism for a deeper understanding of how we can avoid the climate apocalypse.

We end our book by proposing a new economics centered on ecological repair. Since cornucopian ideology got us into this mess; we must reorient human creativity and labor away from infinite growth towards a more modest and more realistic approach that recognizes the danger of unintended consequences from economic growth and respects the integrity of the biosphere. Ecological repair in this sense involves a mixture of intervention and retreat. Decarbonization requires new labor-intensive infrastructure and land intensive energy sources. But to succeed, we must balance this priority against the protection of biodiversity. In fact, decarbonization depends on safeguarding our natural carbon sinks.

Consider the role of phytoplankton in the earth system and the human economy. Phytoplankton are single-cell organisms that float on the currents in the surface layers of the oceans. They have the power of transforming carbon dioxide and water into oxygen and carbohydrates through photosynthesis. This ability makes phytoplankton the primary producers in ocean food chains as well as critical players in the carbon cycle. About half of the oxygen in the air comes from phytoplankton. Oceans have absorbed about 40% of the carbon dioxide emitted by fossil fuel economies so far.[7]

Yet despite their absolutely central role in maintaining the current state of the earth system, phytoplankton remain mostly unknown and ignored outside scientific circles. They have no cultural representation, no economic value, and no political agency. A new economics of ecological repair will have to find a way to incorporate the action of phytoplankton and other carbon sinks. We need economic models that protect phytoplankton from harm and ensure that they continue to flourish.

Most difficult of all, we need to rethink what we mean by work and creativity in economic and technological terms, moving beyond the shallow anthropocentrism of modern economics, towards a new vision of partnership between human and non-human forces in the earth system.

7. Paul Falkowski, "The Power of Plankton," Nature 483, no. 7387 (March 1, 2012): S17–20.

The great acceleration
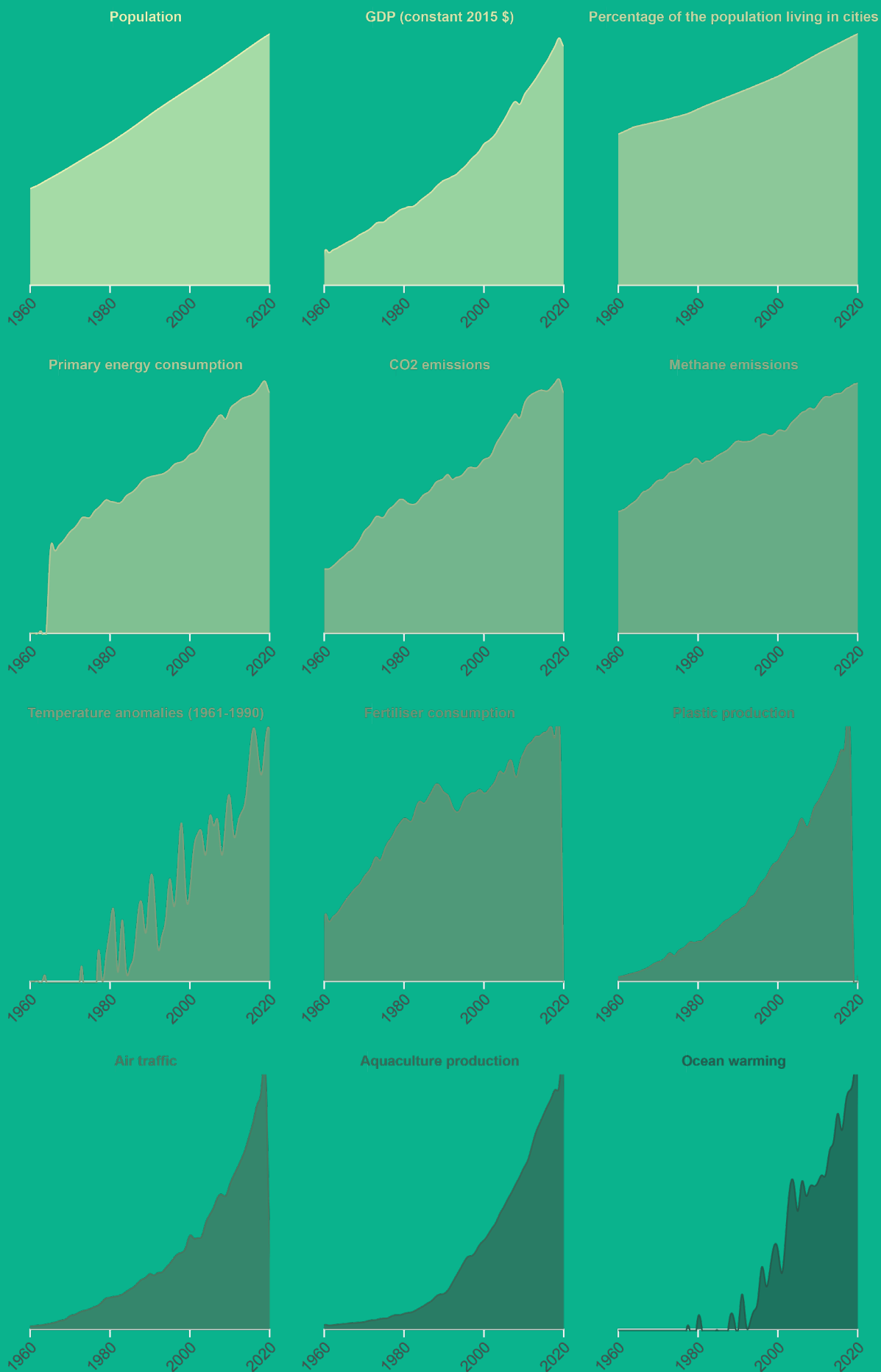
Population

GDP (constant 2015 $)

Percentage of the population living in cities

Primary energy consumption

CO2 emissions

Methane emissions

Temperature anomalies (1961-1990)

Fertiliser consumption

Plastic production

Air traffic

Aquaculture production

Ocean warming

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Climate, The Left, and History

In the essay that opens this edition of the review GREEN, Paul Magnette proposes an exercise in historical reflection: the key to any potential "exit" from the Anthropocene or "fossil capital" could be found in the historic experience of the "Fossil Crescent" – the part of Europe that extends from Northern England, through Wallonia, all the way to Silesia. These coalfields witnessed both coal's peak and its brutal collapse. It is a part of Europe that witnessed an early industrial decline, a part of Europe that Magnette, who is mayor of Charleroi, knows well and which, through a twist of historical fate could become the example to follow, the snuffed out lighthouse showing the way out of the Anthropocene.

But what exactly is the story here?

With the climate crisis, the history of energy has seen a certain uptick in interest. While this is welcome, it is also regrettable that historiography has been content to simply apply political explanations to the standard transactionist narrative. Several authors cited by Paul Magnette believe that they can see capitalism's dirty work in the history of energy: the steam engine was simply a means of breaking free from the constraints of place and exploiting an abundant urban workforce (Andreas Malm); oil had the effect, or even the purpose, of circumvent miners and their unions thanks to its fluid nature (Timothy Mitchell). These compelling narratives do not hold up to analysis: the main purpose of coal was to produce heat. In England, coal extraction began when the price of firewood rose, spurred by urban growth – the steam engine is more of a symbol than a cause of the Anthropocene. As for oil, it did not circumvent miners simply due to the fact that it was not replacing coal; above all, it served to power cars whose production consumed enormous quantities of coal. The decline in the number of miners was not caused by oil, but rather by technological advances in mining. The appeal of the "political" history of energy, which is also its flaw, is that it tends to present climate change as the side-effect of a capitalist endeavor of domination. This historiography, which may seem radical but is reassuring for the anti-capitalist left, underestimates the enormity of the climate challenge: breaking free of carbon will be far more difficult than breaking free from capitalism, a necessary but insufficient condition.

In order to be relevant in the face of global warming, history must shed the phasist narratives of the material world, which present modernity as a series of transitions that anticipate the one to come. Energy sources create as much symbiosis as they do competition. For example, in 1900, England and Belgium consumed more wood just to support the roof of their coal mines than they had burned in the previous century. Coal spurred the consumption of wood, and oil spurred consumption of coal and therefore of wood.[1] The result? We have never burned more wood, coal, and oil as we do today. Just as the "Fertile Crescent" currently consumes much more grain than during Antiquity, the "Fossil Crescent", despite its shuttered blast furnaces and abandoned mines, remains a major consumer of coal. If we take into account the coal included in imports, Great Britain consumes 90 million tons (in 2016) – instead of the 9 million tons officially burnt – almost as much as on the eve of Margaret Thatcher's assault on the mines of England.[2]

A man made geological revolution

What was important in the idea of Anthropocene was to point to the issue of irreversibility. Contrary to the expression "environmental crisis", which implies a brief challenge whose end is near, the Anthropocene marks a point of no return. It is not a crisis that we are living through but a turning point in the Earth's geological history. The economic development of the past several decades will change the environment for the next several centuries. We will not be able to escape the Anthropocene and we will no longer know the climates of the Holocene.[3] This is well known. What has been less understood – and the fault lies with the wrong view of material history – is that this irreversibility applies almost as much to the anthropos as it does to the planet. The Anthropocene signals a dual irreversibility, a dual accumulation, an accumulation of accumulations: not only are material flows piling up in various segments of the Earth-system, but anthro-

1. Jean-Baptiste Fressoz, Sans transition. Une nouvelle histoire de l'énergie, Paris, Le Seuil, 2024.
2. Calculations based on X.F. Wu and G.Q. Chen, "Coal use embodied in globalized world economy: From source to sink through supply chain", Renewable and Sustainable Energy Reviews, no. 81, 2018, pp. 978-993. The Haut Conseil pour le Climat offers a similar estimate for France: "the carbon footprint of the French" write the Hauts Conseillers "increased by 20% between 1995 and 2017. Since 1995, emissions linked to imports have doubled, while those linked to domestic production have fallen by a fifth. [...] In 2015, the French carbon footprint reached 11t CO2e per capita, in comparison national emissions are estimated at 6.6t CO2e per capita". See : Haut Conseil pour le Climat, Annual Report 2019, p. 34.
3. Jean-Baptiste Fressoz, Sans transition. Une nouvelle histoire de l'énergie, Paris, Le Seuil, 2024.

pogenic material flows also follow a cumulative pattern.

Any serious discussion about environmental matters must start from the rather disconcerting historic observation that technological innovations have, until now, never eliminated a flow of material consumption. Throughout the 20th century, the range of raw material available worldwide expanded and each was consumed in ever increasing quantity.[4] So far, technological substitution has always been offset by market expansion, rebound effects and shifts in usage.

Supporters of green growth base their hopes on the decrease in the economy's carbon intensity which has already been halved since 1980. But this statistic hides the unshakeable hold fossil fuels have in the production of just about everything.[5] Since the 1970s, global agriculture has increased its dependency on oil and methane as a result of advances in mechanization and the growing use of nitrogen fertilizers. Mining and metallurgy, faced with declining resource quality, are also becoming more energy-intensive.[6] Building materials are more carbon intensive as well: aluminum requires more energy than steel, polyurethane more than fiberglass, wood panels more than planks.[7] Even though concrete is less energy intensive than bricks, many poor – or formerly poor – countries have used it to replace decarbonized materials such as adobe and bamboo.[8] Finally, with the expansion of value chains, outsourcing, and globalization, the number of kilometers that each product or component travels

has increased, and with it, the role of oil in the smooth functioning of the economy. These phenomena have been hidden by the increased efficiency of machines and the share of services in global GDP, but they are nevertheless major obstacles on the road to decarbonization.

These historical observations do not stem from some irrefutable law of thermodynamics; they simply allow us to grasp the enormity of the challenge to overcome – or the scale of the coming disaster.

Green energies and grey materials

The fact that solar panels and wind turbines have become competitive – including against coal – could lead us to believe that after many false starts, the "energy transition" is well and truly underway and that the world is about to undergo a fundamental shift. The goal here is obviously not to criticize the "transition" if we are referring to the development of renewable energies, but this necessary condition is inadequate and it is unreasonable to expect more from solar panels and wind turbines than they can offer.

Firstly, electricity production only represents 40% of global emissions, and 40% of this electricity is already decarbonized. Eliminating fossil fuels from global electricity production before 2050 would be an extraordinary success, but inadequate in terms of climate objectives.[9] Like all other energy sources, renewables are caught in a web of material symbiosis. According to recent calculations, the construction of renewable energy infrastructure at a global scale would only represent a small amount of CO_2, approximately 50 GT, to produce solar panels and wind turbines as well as the materials they are made of – a highly worthwhile climate investment.[10] Much more problematic, however, are the symbiotic relationships that happen down the line in the world of consumerism. Renewables cannot competitively produce materials on which contemporary infrastructure, machinery and logistics depend on --steel, cement, and plastic-- on the scale and within the timeframe required to reach our climate targets. If "green" electricity powers the same gray world comprising 1.5 billion cars, crisscrossed with cement and steel infrastructure, churning industrial goods made of plastics and many other materials besides, eating food produced with methane and pesticides , climate change will only be slowed down.

But let us be more factual. In regard to "green steel",

4. Of the seventy main raw materials, Christopher L. Magee and Tessaleno C. Devezas identify only six that have dropped since 1960: asbestos, mercury, beryllium, tellurium, thallium and sheep's wool, to which we could add whale oil. Cf. Christopher L. Magee Tessaleno C. Devezas, "A simple extension of dematerialization theory: Incorporation of technical progress and the rebound effect", Technological Forecasting & Social Change, vol. 117, 2017, p. 196-205. Among the major raw materials, only sheep's wool has fallen behind synthetic fibers, which is not good news for the environment; Krausman et al. "From resource extraction to outflows 1900-2015", Global environmental change, 2018; Vaclav Smil, Making the Modern World: Materials and Dematerialization, Chichester, Wiley & Sons, 2013; Tessaleno C. Devezas, António M. Vaz and Christopher L. Magee, "Global Pattern in Materials Consumption: An Empirical Study" in Tessaleno Devezas, João Leitão and Askar Sarygulov, Industry 4.0, Studies on Entrepreneurship, Structural Change and Industrial Dynamics, Springer International Publishing, 2017, pp. 263-292.

5. To generate one dollar of global GDP, 450 grams of CO2 had to be emitted in 1980, compared with 240 grams in 2020. See : IEA, "Global Energy Review: CO2 Emissions in 2021", Paris, IEA, 2022.

6. T. Norgate, N. Haque, " Energy and greenhouse gas impacts of mining and mineral processing operations ", Journal of Cleaner Production, vol. 18, n°3, 2010, p. 266-274.

7. Concrete uses three times less energy than bricks. Ignacio Zabalza Bribián, Antonio Valero Capilla, and Alfonso Aranda Usón, "Life cycle assessment of building materials: Comparative analysis of energy and environmental impacts and evaluation of the eco-efficiency improvement potential", Building and Environment, vol. 46, no. 5, 2011, pp. 1133-1140. G. P. Hammond and C. I. Jones, "Embodied energy and carbon in construction materials", Proceedings of the Institution of Civil Engineers - Energy, vol. 161, no. 2, 2008, pp. 87-98.

8. At the beginning of the 21st century, a third of the world's housing was built from adobe and a sixth from bamboo, materials that are particularly CO2-efficient. By the early 2000s, bamboo provided shelter for one billion people, a rather extraordinary feat when you consider that this plant accounts for just one percent of the world's forest cover. INBAR/FAO, "World Bamboo Resources. A thematic Study prepared in the Framework of the Global Forest Resources Assessment 2005", 2007, p. 31.

9. IEA figures. See: https://www.iea.org/fuels-and-technologies/electricity. It should also be noted that between 2000 and 2022, three times as many coal-fired power plants were opened worldwide (1.5 TW) than were closed (0.45 TW). Calculated from https://globalenergymonitor.org/projects/global-coal-plant-tracker/ data.

10. Aljoša Slameršak, Giorgos Kallis and Daniel W. O'Neill, "Energy requirements and carbon emissions for a low-carbon energy transition" nature communications, November 13, 14, 2022. This means that 3% of fossil fuels would have to be channeled into the production of renewable infrastructures.

that is reduced with hydrogen instead of coke, industry announcements and projections by the International Energy Agency point to a few million tons per year after 2030, a negligible amount compared to the 1.7 billion tons of steel consumed worldwide each year.[11] Despite all the grandiose promises, since the 2000s, the carbon intensity of steel has stagnated.[12] Replacing coke with electrolytic hydrogen in steel mill would require approximately 4,000 Twh of electricity, equivalent to the United States' annual electricity production or 1.2 million wind turbines, which would themselves require a significant amount of steel.[13] Concerning cement, despite the rapid modernization of cement plants since the 2000s, cement's carbon intensity has increased by 1.5% every year over the past decade. Emissions from cement plants have tripled since 1990 and represent 8% of global emissions.[14]

We can also look at plastic, which is responsible for 3-5% of global emissions and shows no sign of slowing down. Plastic production has quadrupled since 1990 and there are still vast, untapped markets. On average, an American consumes four times more plastic than a Chinese person and fifteen times more than an Indian person. The problem is that substitution materials – paper and, above all, aluminum – have an even higher carbon footprint.[15] Finally, there are nitrogen fertilizers, which are responsible for 1.5% of emissions at the production stage – which could eventually be reduced through "green" hydrogen – but 5% overall if we take into account their transformation into nitrous oxide by soil bacteria.[16]

Wind turbines and solar panels are remarkable technologies for generating electricity, but they are of little interest when it comes to producing these materials.[17] Believing that innovation can decarbonize the steel, cement, and plastic industries, as well as the production and use of fertilizers, within thirty years even though recent trends have been reversed, is a rather foolish technological gamble. Taken all together, steel, cement, fertilizers, and plastics are enough to put the Paris Agreement objective out of reach.[18]

Powerless history.

Ever since economic development spread across the globe, history has slipped by leaving only miniscule traces on the curve of global CO2 emissions. The First World War followed by the Spanish flu caused a 17% decline, and the crisis of 1929 caused a 25% decline. However, the 1979 oil crisis and the 2008 financial crisis only had modest effects (-6% and -1%). Even the confinements of 2020, which affected up to 4 billion people, only lowered global emissions by 5% and they rebounded strongly in 2021. Despite these facts, we regularly tout various events as hypothetical catalysts for breaking free from fossil fuels. For example, much commentary has been made about American elections and their supposed importance for the climate. Following the vote on the Inflation Reduction Act, Paul Krugman boldly declared that it was "a major step towards saving the planet"[19], perhaps forgetting that the United States only represents 13% of global emissions and that Biden's climate plan made no provision for sobriety. Recently, in an essay for le Grand Continent[20], philosopher Pierre Charbonnier explains how the invasion of Ukraine has the potential to be the catalyst for the much-anticipated transition. But Russian gas sold to the EU only represents 1.5% of global emissions and the demand for hydrocarbons remains strong : the closing of a few gazoducts will obviously not do much to change the evolution of global temperatures.[21] All these commentaries connecting news, however tragic they are, and climate change demonstrates a serious lack of understanding of what is at stake.

Of course, climate change is an historic phenomenon, but since it is the sum of all human action on the planet, now, it largely escapes history. While it's easy enough for a historian to explain climate change, identifying what

11. According to the International Energy Agency and the Word Steel Association, hydrogen steel is expected to account for just 8% of the world's steel by 2050 See: https://worldsteel.org/wp-content/uploads/Fact-sheet-Hydrogen-H2-based-ironmaking.pdf

12. Wang et al., « Efficiency stagnation in global steel production urges joint supply- and demand-side mitigation efforts », Nature communications, 2021, vol. 12 p. 2066.

13. Calculation based on European Union data for 2020. It takes 55 kWH to produce one kilo of hydrogen and 50 kilos of hydrogen to produce one ton of steel. https://www.europarl.europa.eu/RegData/etudes/BRIE/2020/641552/EPRS_BRI(2020)641552_EN.pdf
It is important to note that hydrogen is an indirect greenhouse gas: by combining with OH- radicals in the atmosphere to form water, it disrupts the chemical reactions that break down methane. Matteo B. Bertagni, Stephen W. Pacala, Fabien Paulot & Amilcare Porporato, "Risk of the hydrogen economy for atmospheric methane", Nature Communications, vol. 13, 2022.

14. Cuihong Chen et al, "A Striking Growth of CO2 emissions from the global cement industry driven by new facilities in emerging countries", Environmental Research Letters, vol. 17, 2022 ; https://www.iea.org/reports/cement ; In the early 2000s, the majority of cement was still produced in vertical kilns, a legacy of the Great Leap Forward. In 2020, 99% of Chinese cement was produced in modern rotary kilns. See : Andrew Rabeneck, "The transformation of construction by concrete", Robert Carvais et al. (eds.) Nuts and Bolts of Construction History, vol. 2, pp. 627-636; Xiaozhen Xu et al, "Modernizing cement manufacturing in China leads to substantial environmental gains", Communications Earth & Environment, vol. 3, 2022.

15. https://www.mckinsey.com/industries/chemicals/our-insights/climate-impact-of-plastics

16. Yunhu Gao & André Cabrera Serrenho, « Greenhouse gas emissions from nitrogen fertilizers could be reduced by up to one-fifth of current levels by 2050 with combined interventions », Nature Food, vol. 4, 2023, p. 170-178.

17. For a rebuttal of the arguments against renewable energies: see Cédric Philibert, Eoliennes, pourquoi tant de haine, Paris, Les petits matins, 2023.

18. "Residual" emissions declared by countries vary widely between Belgium (9%), France (18%) and Australia (30%). The reality is likely to be at the higher end of this range. See : Holly Jean Buck, Wim Carton, Jens Friis Lund and Nils Markusson, "Why residual emissions matter right now", Nature climate change, March 9, 2023.

19. https://www.nytimes.com/2022/08/01/opinion/can-inflation-reduction-save-the-planet.html

20. Pierre Charbonnier, La naissance de l'écologie de guerre, Grand Continent, mars 2022.

21. In 2021, gas accounted for 30% of European emissions, which represented 9% of global emissions. 45% of gas consumed in the European Union was Russian.

could stop it is beyond the scope of historical imagination. Faced with the Titan of climate change, the social sciences often propose "solutions" without having gauged the depth of the problem. Technical challenges are pushed aside and left to the expertise of the IPCC's Working Group III, whose work of producing scenarios with often confused in th e public with energy forecasting. We act as though decarbonizing is a simple problem of investments, a problem of social engineering and political will.

Is all this so terribly depressing that it should be told? On the contrary : acknowledging that it is impossible to decarbonize entire sectors of the global economy in time for our climatic goals should put the left back at the center of the political game. Instead of debating like in the 1990s and 2000s around the respective meritof the carbon tax or pollution rights, let's acknowledge that it will be impossible to decarbonize global steel, global cement, and aviation before 2050. This will force in the political debate the real issue of climate change : agreeing on democratic and equitable means of reducing consumption. Let us focus on the fair and efficient distribution of material goods on a global scale: redistribution was the left's core issue from its inception, and this is the link connecting historical socialism to the eco-socialism dear, and rightfully so, to Paul Magnette.[22]

22.   Paul Magnette, *La vie large*, La Découverte, 2022

02

Unlocking the energy of the modern world

A Post-carbon world: models, rifts and narratives of a new world

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There Is No Climate Impasse. How to navigate the Anthropocene's political triangle

One of the most surprising things about the climate and ecological issue is that, in reality, it is not at all difficult to imagine a decarbonized world, a world in which the socio-economic structure takes its pressure off the environment while also ensuring a decent standard of living for as many people as possible. The current policies of inaction, delay, denial, and relativization, as well as the growing number of disasters and conflicts, are not due to a lack of objective possibilities: they are taking place at a time when there is no shortage of the knowledge, techniques, and institutional mechanisms needed for a rapid and thorough transition.

Imagination isn't enough in politics, but let's take a moment to indulge it. The world ideally rebuilt around the climate imperative is a world where public resources (water, soil, air) are protected by a binding legal and democratic framework, where we no longer burn fuels to heat ourselves or produce consumer goods because a renewable substitution has been achieved, where public transportation infrastructure is reliable, evenly distributed and efficient, where food systems are largely plant-based and local, where industrial processes are decarbonized and able to optimally reuse resources, where social distinction through consumption is marginalized, and where social integration is achieved through knowledge. Though described in this way, the world that has achieved a peaceful relationship with the planet is by no means a utopia. Rather, it is the fulfillment of very real possibilities, and largely in line with techno-scientific promises to improve everyday life and the democratization of public space. In other words, it's a new stage of modernity,

which Robert Boyer describes as "anthropogenic"[1] rather than blindly competitive. But it is certainly not a subversive challenge; the state, the division of labor, risk forecasting, the streamlining of collective experience, the ideal of justice and even competition between States are still there, at the center of history, but they are simply fulfilling new functions dictated by the present.

Today, we're engulfed by the visual and narrative imaginings of catastrophe, with a few truly utopian scenarios emerging here and there of a return to nature or the virtual abandonment of the industrial world. These possibilities, which are both the least desirable and the least realistic, leave little room for a cultural imagination in which the scenario rapidly outlined above would prevail. With the exception of the Solarpunk movement, for example – which is difficult to find in major film productions, on Netflix, in advertising, or in mainstream political communication – the very idea of a sustainable, shared world does not seem to be taking root in the collective consciousness. Is this an ideological defeat that is reflected in cultural representations? We know to what extent the modernist dream of the city, of emancipation through consumption, of freedom of movement, was promoted throughout the 19th and 20th centuries thanks to the relentless production of images and dominant narratives.[2]

We know that in order to bring a reality into existence, it must first be represented. So why are we not bombarded daily by a media arsenal of images, narratives, characters and symbols that together form a visual system where wind turbines, regenerative farms, zero-emission buildings and high-speed trains abound; and why isn't the social model of sharing, efficiency and sobriety the subject of a vast communication campaign, or even, let's just say it, propaganda? Why is there this surprising under-investment, including from those who are supposed to be promoting the transition, in the imagining of a post-fossil world? The climate movement, in particular, often limits itself to an accusatory catechism which, while naming the right enemies (the economic and political system that supports fossil fuels), continues to invoke protecting the planet or living things as a cause in itself, a principle of action as vague as it is devoid of any grasp of reality and interests.

And so, we find ourselves in a situation where a substantial proportion of the population knows that the socio-economic model they live in is unsustainable, but has no idea what the world we need to move towards would look like. How can anyone want this world? In the absence of such a vision, the obsolete world of fossil freedoms (cars, planes, meat, suburban housing, etc.) retains its power of attraction, and worse, becomes a bastion to

1. Robert Boyer, Les capitalismes à l'épreuve de la pandémie, Éditions La Découverte, 2020, p. 200.
2. Kristin Ross, Fast Cars, Clean Bodies. Decolonization and the Reordering of French Culture, The MIT Press, 1996, p. 274.

be defended in a culture war.

This paradox, of a world that is objectively desirable but subjectively undesired, is perhaps best explained by the enormity of the obstacles standing in the way of this symbiotic democracy. Even if we assume that the end goal is achievable and enjoys consensus, the socio-economic obstacles holding us back from this potential would likely lead to defeatism and discouragement. We certainly know how to imagine a landscape transformed by the ecological revolution, but we don't know how to mobilize people to demand it, nor how to build the social bloc that would drive it. The pull of this ideal would therefore be canceled out or diminished by the idea that this desirable and possible – even necessary – world is ultimately far-off and highly unlikely. Perhaps, then, the time has come to better understand these obstacles, and to show that they can be overcome, so that the cultural and political vision of a post-fossil world can finally have a place in our daily lives. It bears repeating: there is absolutely no climate impasse, only our inability to believe in our transformational power.

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It must be said first and foremost that this path is complicated by structural obstacles, which are related to the collective expectations and forms of political action that predominate in the social world where the climate crisis is occurring. One of the main obstacles can be summed up as the debate between gradualism and radicalism. On the one hand, there is a group of players who advocate caution when it comes to transformative action: in order to avoid upsetting too many interests, and therefore jeopardizing the subsequent stages of the transition, we must proceed cautiously, and first reap the rewards of bipartisan measures that raise little or no opposition.

Gradualism advocates a socially realistic strategy, whose aim is to avoid alienating the electorate and to slowly but surely create an audience that will be receptive to the transition's benefits. Radicals, on the other hand, stress the absolute imperative of transition and its urgency, and are willing to temporarily disrupt existing interests in the name of an imperative that puts survival at stake.[3] The balance between gradualism and radicalism drives much of today's political discourse on climate, determining how much space these positions receive in relation to capitalism, the state, and social movements. There is a kind of hypocritical gradualism, which boosts the credibility of fossil-fuel interests on the assumption that even these cannot be overly offended; conversely, there exists an incantatory radicalism, which is oblivious to the social levers of transformation on which it can truly rely. More than anything, this polarity tends to create the conditions for an artificial wait-and-see attitude, as each

side uses the other's existence as an excuse to not start down a path of transformation that, whether slow or fast, is at least tangible.

This debate is itself rooted in a more meta-political reflection on the nature of the challenge facing us. One of the climate challenge's destabilizing features is that it tends to make things absolute. In the past, political conflicts involved fairly well-identified social groups – orders, religious groups, classes, nations – which came into conflict within a material environment considered to be stable, but the climate crisis has introduced a form of politicization in which humanity as an abstract category is implicated, and where the theater in which we used to battle is now part of the plot. This has led to the decline of theologico-political categories of thought such as salvation, or the whole lexicon around the end of the world. This is not to say that intra- and international socio-economic inequalities are obsolete – far from it. But that reflection on the internal divisions of the social world needs to be revisited in light of an experiment that, in part, goes beyond its framework.

The Anthropocene's advent is disrupting social allegiances and interests, as well as the coalition and opposition mindsets we have inherited from the past, putting them back into play. The most visible consequence of this shift is that the official political space, made up of parties, promises, and agendas, finds itself at odds with a new imperative that has no predetermined social clientele. There is no "geosocial class", to use Latour's term.[4] There really isn't even a socio-ecological bloc that is visible and also attained critical mass; and so there is no legitimate voice for the issue.

This question, in turn, raises another. If this new set of political questions is to take root in society, and therefore allow us to respond to them, one of the prerequisites is the existence of a healthy public space, supported by a functioning school system and a reasonably independent media economy. In other words, we need a public that is sufficiently well educated and integrated to ensure that the transformations currently underway do not appear as aberrations, as a source of anomie, or worse, as threats. The republican dream of generalized education and the democratization of skills for decoding the world makes perfect sense in the context of an epistemological and social crisis such as the one we are experiencing. From this point of view, we have to admit that the political climate crisis has come at the worst possible time (or, more radically, that its unrestrained development is a consequence of the breakdown of the public sphere). In most so-called developed countries, investment in human capital is experiencing a negative dynamic, and this tends to increase inequalities with regard to accessing essential knowledge,

3. Alyssa Battistoni, "There's No Time for Gradualism", in The Wire, 2018. See https://thewire.in/environment/climate-change-earth-no-time-for-gradualism.

4. Pierre Charbonnier, Bruno Latour et Baptiste Morizot, "Redécouvir la terre", in Tracés. Revue de Sciences humaines, n°33, 2017, pp. 227-252.

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thereby compromising the collective capacity to navigate the Anthropocene.[5] The press, especially in France, is largely in the hands of a financial oligarchy that has no qualms about exploiting it for its own immediate interests.[6] Social networks can fuel this situation of anomie by blurring the boundary between information and noise. Under these conditions, it is unlikely that the public space needed to form a social ideal of transition will emerge. If we must try to find a link between the structures of the capitalist political economy and the ecological crisis, this is undoubtedly the angle we should be looking at.

The fourth and final aspect of these structural factors which hinder the development of a real politicization of the climate is the more or less deliberate uncertainty regarding the benefits of ecological transformation. For many – including, surprisingly, ecologists – the transition is as much a risk as it is an opportunity. Although there is agreement, with the exception of lobbyists, on the need to make the transition away from fossil fuels, there is currently no agreement on the modalities of energy and technological substitution, nor on the extent of the leverage offered by the sobriety chosen. Often enamored of an Eden-like dream of a quiet and trouble-free life, environmentalists are reluctant to endorse the renewable energy shift: wind turbines take up space and require materials, battery factories and lithium mines pollute, the development of new industrial sectors and the technological innovation that supports them are too similar to the solutions of the past, and so on.

The transition's obvious imperfection, the fact that it sometimes displaces more than it undoes environmental degradation,[7] obfuscates the stark, obvious, massive need for decarbonization as well as the materials economy, and even more so the socio-economic opportunity it underpins. Historically, environmentalism in Europe was born as a critique of industrial modernity, and the fact that today's climate policies look like its renaissance is shocking to its key players. In other words, there is a certain ambiguity, even and above all in those segments of the political arena that are in a position to defend the transition. Do we see the French and European Green parties flooding the political arena with images of a post-fossil world?[8] Do we see them asserting the intellectual and political authority to project themselves into a secure future? No. Failure to do so makes it very easy for the transition's opponents to accuse it of all kinds of evils: raising energy prices, threats

to security of supply, threats to jobs and growth – everything can be blamed on the transition if it is not presented to the public with the appropriate energy.

These four obstacles, these four conditions unfavorable to the transition so to speak, no doubt temper our initial observation that there is no climate impasse. If there is in fact an impasse, it is not due to technical or institutional feasibility (we have the machines and the normative framework needed to achieve it readily at hand, and there is no fundamental anthropological impossibility), or even objective desirability, but rather the mobilization of interests. The failure of political vision comes down to the deterioration of overall social conditions and the inability to create and disseminate a clear message that is sufficiently universal to have a catalyzing effect on collective expectations and practices. But this observation only makes the failure of vision all the more regrettable – infuriating even – as it could very well make up for the current lack of mobilization for the transition.

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To convince ourselves that the climate impasse is only relative, or subjective, and therefore believe in our powers of transformation, it is essential for the political community to be aware both of the nature of the obstacles to be overcome, as well as the fact that they can be overcome. In order for a certain level of confidence in this transitional path to emerge and spread, the climate war must, in other words, appear for what it is, and appear to be winnable. Describing the front line, if we wish to continue this metaphor, is therefore necessary to identify the possible tipping points between status quo and transformation, as well as the forces that need to be engaged for each one.

The transition to a decarbonized and sustainable system of wealth production and distribution, as well as public liberties, fundamentally depends on the art of managing the dilemmas it creates. We are now facing these dilemmas on a daily basis: we are wondering how to maintain employment and human development without resorting to infrastructure inherited from the past; how to finance this transition without overburdening household budgets; how to structure the reindustrialization of national economies without jeopardizing international cooperation through excessive protectionism; how to integrate new consumption, travel, and food habits into people's ordinary experiences without causing a culture war or feelings of marginalization. These dilemmas are at the heart of new social movements such as the Yellow Vests in France, revolts over the price of basic goods that are sweeping the world, and international conflicts over technological innovation.

To relieve pressure on natural environments and preserve global public resources such as the atmosphere, the

5. Peter Achterberg, Willem de Koster, Jeroen van der Waal, "Science confidence gap : Education, trust in scientific methods, and trust in scientific institutions in the United States", in Public understanding of science, n°26, 2017, pp. 704–720.

6. Olivier Godard, "Le climato-scepticisme médiatique en France : un sophisme moderne", in Cahier du département d'économie de l'école Polytechnique, n°20, 2011, p. 33.

7. Maeve Campbell, "In pictures: South America's 'lithium fields' reveal the dark side of our electric future", Euronews, 2018.

8. Greens / EFA, "Stand with Ukraine: Let's stop fuelling war!". Voir https://act. greens-efa.eu/ukraine.

oceans and, more broadly, the basic ecological functions that ensure the planet's habitability, requires, in other words, a political art of compromise between nations, between social classes, between sectors of influence. We are beginning to see the implementation of this political art in the industrial and climate strategies of the USA, China, and the EU, but these strategies have not yet reached their full speed and critical mass; that point at which they impact society as a whole. This is why we find ourselves in what might be called a "phony climate war": we know that the battle has begun, that the old order will not return, but we remain caught in the middle, the winners and losers have yet to be declared, the heaviest blows have yet to be dealt. The recent State of the Union address by European Commission President Ursula Von Der Leyen attests to this in-between state of affairs: the historic horizon had been defined by the Green Deal and a first round of funding spurred by the war in Ukraine (RePowerEU, NZIA), but the rise of European right-wing groups warning of a destabilizing transition and calling for a slower roll-out of measures is causing a chilling effect within the establishment.[9]

By artificially increasing the transition's political cost and stirring up fears of an ungovernable or undesirable post-fossil society, Europe's right-wing groups are increasing the future cost of disasters. This is why a lucid analysis of this transition, in its various industrial, financial, scientific and geopolitical dimensions, cannot take the form of a neutral comparison of costs and benefits. It must performatively demonstrate how the transition can be managed in such a way as to lower its socio-political cost, by building a coalition of social interests that will benefit from, and ultimately, demand, it. The proliferation of self-congratulatory discourse around the great march towards innovation and green industrial development reflects the imbalance between the ease of defining a technical and industrial perspective on decarbonization, and the difficulty – within the current political framework – of defining the scope of this coalition. The EU, and perhaps the USA as well, is devising a conversion program adapted to the climate constraint, but which is not designed to respond to the demands for justice driving society and the workforce. In other words, it's a plan that risks spinning its wheels.

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Once again, breaking free of these incantations means abandoning a fatalistic view of the transition. Whether we see it as the inevitable march of history, according to the new green teleology, or as a radical socio-economic impossibility, as in the case of the fossilized right-wing around the world, the drawback is the same: social forces are still left out of the equation. We therefore need to consider each of the three major historical turning points

unfolding before our eyes around the climate problem in order to better understand the front line we need to fight on – and how real social forces can mobilize around it.

These three pillars are geopolitical, socio-economic, and cultural – for lack of a better term.

We can begin with the geopolitical – or international – level, as this is the most encompassing. The history and challenges of the climate crisis are very much a question of war and peace, a question that involves the very foundation of modern states, namely the principle of security. Since the Age of Enlightenment and the birth of the modern political economy, most political elites have accepted that the best substitute for war is trade, and that the expansion of commercial channels makes it possible to both better connect human beings and to further domesticate nature.[10] Mercantilism, as conceived by Hume and Smith, and later by Bentham and Spencer, as well as by socialist-inspired theorists such as Saint-Simon and Marx, has the fantastic quality of simultaneously unifying humankind and transfiguring a nature regarded as dangerous through productive forces.

The modern theodicy of progress is largely motivated by the dilemmas of the territorial state, i.e. the need to create cooperation between nations on a single, finite planet, while at the same time preserving a domestic advantage. With the development of fossil fuel technologies during the 19th century, this trade utopia became an industrial utopia, and humanity's historic vocation was almost universally identified with productive effort, which was seen as a peace-making and civilizing virtue. The trend towards eliminating violence by substituting production for war took root in the international system in the form of global trade regulations, technology transfers and development aid schemes. But this ideal has now paradoxically become the main obstacle to climate action because it closely links the stability of the international system to the pursuit of total productive mobilization. This link between international stability and fossil intensity also manifests itself negatively: denouncing energy supply contracts, for example, or refusing to import goods in the name of climate, or choosing partners in the name of environmental principles, is tantamount to declaring war – or at least calling into question the international order as it was shaped after the Second World War.

In this context, industrial transition strategies are creating a new geopolitical dilemma, which can be summed up as follows. The climate challenge requires a high level of international coordination because it is in humanity's shared interest, because CO_2 emissions and climate are indifferent to inter-state territorial boundaries, and because it is necessary to negotiate equitable burden-sha-

9. Andy Bounds, Climate regulation is driving support for populism, says EU parliament chief, in The Financial Times, 2023.

10. Istvan Hont, Jealousy of Trade. International Competition and the Nation-State in Historical Perspective, Harvard University Press, 2010, p. 560.

ring among nations. But insofar as decarbonizing the economy must be integrated into the quest for legitimacy by those seeking power (it must be possible to get elected on a climate agenda), each nation tends to want to capture the socio-economic benefits of this transition for itself – and to blame the downsides on others. The result of this dilemma is plain to see in the dominant political discourse on these issues, whether it's Emmanuel Macron and his new slogan of "l'écologie à la Française", or the recent speech by Rishi Sunak in the UK, who makes climate action conditional on the development of national green tech industries.

This geo-ecological dilemma is now shaping international relations, as evidenced by the economic conflicts between the USA, the EU and China, which have been fueled in particular by the IRA and the Green Deal, but also by the attitude of the Global South's pretenders towards a sustainable development path in the context of the war in Ukraine. This is the premise of the journal GREEN, Second Issue, War Ecology.[11] Today, climate geopolitics are caught between the Apollonian universe of major international agreements that are as generous and universal as they are incantatory on the one hand, and, on the other, the Dionysian side of geo-economic rivalries sparked by the popularity of ecological protectionist strategies.

To date, however, the democratic and social movement has not really proposed a doctrinal synthesis that would enable it to integrate its political strategy into this set of historical constraints. In order to overcome the international climate dilemma, a balance must be struck between exerting pressure on economic and political partners who are overly dependent on fossil fuels, and the equally necessary assistance that the most developed countries must provide to others to accelerate their decarbonization. The current trend of "ecological protectionism", for example, which is being upheld across almost the entire political spectrum, can only be coherent if it corresponds to the emergence of an inter-state coalition determined to disseminate decarbonized production standards through regulatory and customs instruments. This raises the question of whether the EU has sufficient economic clout to do this, or whether it needs to ally itself with other partners to achieve this, and if so, which ones. Along with this strategic use of economic power, which risks creating frustrations, and possibly backlash, rich countries must overcome their reluctance to engage in technology transfers and adaptation assistance, i.e., more positive measures that could both temper the rivalries aroused by punitive measures and anticipate future risks.

The balance between these two spheres of action must be defined by strategic rationality, that is, a balance between promises and threats.

11.   GREEN. Géopolitique, réseaux, énergie, environnement, nature, n02, War ecology: a new paradigm? year 2, Paris, Groupe d'études géopolitiques, 2022.

On the socio-economic front, much has already been written to fuel the debate on the compatibility between the end of the world and the end of the month. I have developed elsewhere a reflection on the historical process that led to the seizure of the social state's structures by fossil growth and, beyond that, by the creation of a social vision that sees emancipation through consumption as both a tool to distinguish oneself and a lever for socio-political negotiation.

Three points can be made here, similar to what was stated above about geopolitics. Firstly, it is a historical legacy that needs to be reinvented; secondly, the matter fundamentally takes the form of dilemmas to be resolved; and thirdly, there is no definitive theoretical and political synthesis.

With regard to the first point, it is now clear that in the context of social democracies, where the state budget is intended to assume the cost of transition and exposure to new risks, the worsening of the climate crisis represents an additional threat to its stability. As soon as the climate issue is raised, we can see everywhere a phenomenon of blackmail with regard to the financing of social benefits: how can we slow down the rate of production of cars or aircraft in this context, since the state requires revenue? More broadly, how can we question the drivers of growth if the energy transition is a growing budgetary burden?

The same dilemma applies to the question of employment: how can we accept job loss in the highest-emission sectors if a political platform for transition has to be built for the middle and underprivileged classes who are already suffering from unemployment and insecurity? It is quite striking to note that the climate crisis is taking place in a context where the weakening of public services is already a relative, rather than an absolute, phenomenon: the effectiveness of public services is declining because needs are growing faster than resources (NSP report), and we know how much this trend has been used in the past to create a narrative about their structural inefficiency. A similar mechanism of using the climate issue to call into question access to public rights and infrastructures is already underway, and it clearly requires an urgent response.

As in the case of international relations, the dilemmas are real but not unsolvable. First, it is possible to loosen the stranglehold these dilemmas create by showing that moving away from the modes of production and consumption that are most damaging to the climate and biodiversity has significant co-benefits, particularly in terms of health. But this is not enough to restore balance. The second argument, which is now ubiquitous, is that the process of creative destruction that leads to closing carbon-intensive sectors in order to open up alternative production and consumption channels creates wealth.

But balance is not yet fully restored here either, especially as the transition phase itself is fairly costly if new training and retraining courses for the workforce have to be financed and supported. If we are to stay within planetary limits, we need to make a serious change to the scale of the material flows that structure our economic reality. In other words, this means implementing sobriety mechanisms through the discipline of individual behavior and the development of mechanisms for sharing and cooperation. In this context, industrial renewal and green growth can only have a limited effect on the general structures of the national economy. The degrowth theory presents itself as an answer to this question but does not provide any thorough insight into the mechanisms that allow us to give absolute priority, in the economy as well as in collective representations, to self-limitation.

The reason why there is not yet a theoretical and strategic synthesis for navigating the transition's uncertainties and risks is that the political spectrum is currently split between a bloc that strives to highlight the transition's economic benefits (it brings growth, jobs, innovation, competitiveness – in other words, everything that classical economic doctrine recommends) – and an opposition bloc that is essentially busy criticizing economic pathologies and vested interests. The major flaw of the former, which can mainly be found in the center and among some ecologists, is that they promise to reinvent the classical political economy around decarbonization, even if it means making things easy for themselves by only seeing those aspects of the objective crisis that can easily be incorporated into a pre-existing doctrine.

As for the latter, their limitations differ according to their political culture, whether socialist or ecologist. Among the former, in France, the Insoumis movement tends to view the ecological crisis as an exogenous crisis: it comes from somewhere else, from private interests, from foreign influences, from economic structures outside the social body, or the "people", who can never be wrong. This is obviously an important limitation, as it prevents us from analyzing the reasons why the fossil fuel coalition extends to large sections of this famous "people", why cars, barbecues, gas heating, and Easyjet weekends are an internal enemy to be eliminated. Under these conditions, the timely promotion of ecological planning by this movement is at odds with the general political discourse, making it difficult to read. On the side of the environmentalists, the impasse is the opposite: above all, this movement focuses on a critique of consumer behavior, which has long since led to the rejection of the social groups most dependent on constrained emissions and the prospect of distinction through consumption – the very people who need to be welcomed back into the ecological coalition.

There is no magic bullet for solving these dilemmas, or for striking the right balance between the very real opportunities offered by the transition and the equally predictable upheavals it will cause. Nevertheless, it is possible to better present the different options in terms of technological choices, industrial strategies, support and adaptation mechanisms; in other words, to reconstruct a project for the state and public services centered around this transition. It is also possible, to an even greater extent since 2022, to link the necessary transition to larger-scale risks, particularly the ideological influence of Russia and international players intent on prolonging fossil civilization's existence, to reconstruct the ecological imperative as a principle of security and stability, and thereby make it a defining element of legitimacy and political authority, at the heart of the state and its missions, at the heart of producing the collective future. In other words, a principle in whose name a few temporary and controlled sacrifices can be made, if they are properly distributed during a period of deep crisis. In this way, climate policies are part of a broader narrative of combating the far right as well as reinventing nationality and borders.

The third and final angle of this climate policy triangle is cultural. I use this term to echo what has come to be known as the "culture wars", i.e. the development of very strong social identities which are vehemently opposed to one another, and which are obviously exploited by political players to advance their agenda. We get a glimpse of this culture war in France in the never-ending debate between Fabien Roussel and Sandrine Rousseau on the topic of meat consumption, but it's fast becoming the core of a wider social divide over the transition. During the Yellow Vest movement, and in parallel with the emergence of a socio-economic conflict over the distribution of the ecological effort, we already caught a glimpse of some aspects of the ecological culture war with certain social groups expressing a sense of abandonment – seeing themselves as peripheral, removed from decision-making, knowledge and communication centers. This moment had already left the impression that the ecological transition could only resonate among an urban cultural elite, to the detriment of those who have been left behind.

The first point to note about the cultural battle being waged over ecology is that the historical strategy of European environmentalism has failed. This was accurately characterized by the idea of a "culture war", the idea being that a gradual modification of behavioral norms, consumer habits and social expectations would take place under the aegis of an avant garde – not unlike the emergence of forms of politeness as described by N. Elias. But if ecology is a highly cultural issue, and if this dimension of the climate war is intensifying before our very eyes, it's precisely because the transformation of social norms is never a peaceful, uniform process: in the present case, the fact that the cultural avant garde in question happens to be primarily comprised of rather privileged individuals

means that the "ecological" way of life tends to be associated with these privileges, and in turn elicits resistance from less privileged groups.

In the United States, this culture war has become an absolutely central element in political life, at least since Trump's presidential campaign. In 2016, for example, billionaire Charles Koch, who made his fortune in oil, expressed his concern about climate policies that he felt would severely affect the working classes dependent on cheap energy. Society, and the climate transition, are therefore caught in the middle of an alliance between fossil fuel elites and the working classes, whose interests converge by force of circumstance, and whose most obvious expression on a day-to-day basis is this repeated insistence, on the right and in the media ecosystem it sustains, to characterize any climate action as a crime against the traditional values of the average person. President Macron's nod to car culture in his recent media appearance ("I love cars") is yet another manifestation of this cultural battle: it is now almost impossible not to appease the habits of the fossil age in order to avoid a painful backlash against the transition.

What is even more striking is that much of this cultural battle focuses on the transition's aesthetic aspect. It's true that the development of wind power, and the increasingly prominent place of these modern windmills in the visual environment of rural residents represents an absolutely enormous transformation of everyday life. Criticism of this aesthetic nuisance has therefore become a central element of right-wing and far-right campaigns, which can claim to be about preservation of the environment while at the same time giving guarantees to the fossil fuel coalition.

The great advantage of fossil fuels was that their tremendous concentration, and the fact that they were extracted outside our borders, made them virtually invisible. And so, by combining the stimulation of fears about transition with an appeal to traditionalist values and NIMBY selfishness, the far right has become a popular electoral choice among the social groups most dependent on fossil fuels. The strictly socio-economic element is in fact combined with an absolutely central element of identity politics.

Europe must prepare itself for the coming culture war. Recently, the president of the European Parliament, Roberta Metsola, asked U. Von Der Leyen to slow her environmental regulations program, citing fears of a populist wave set off, once again, by fears of destabilization. In other words, right-wing parties are reorganizing around resistance to climate policies based on an ideological foundation that has an economic dimension, but which is primarily expressed in the level of cultural frustration among the middle and working classes (or, rather, their

manipulation).

What strategy should be used to confront this culture war? The most obvious point is that it is imperative for those involved in and who are promoting the transition to get rid of the cultural stereotypes that are generally attached to it: that of an educated, urban bourgeoisie that buys into the green lifestyle as a way of setting itself apart. Conversely, it makes no sense to appease adherents of the opposite stereotype, because it's more of a stereotype than a coherent social reality. In her recent short book, Léa Falco offers a key theoretical and strategic insight: that which she calls "ecology by design" means that changing habits cannot take the form of explicit acquiescence, but must involve reorganizing modes of production, mobility, and consumerism by default.

A few examples are: meat has to be more expensive and of better quality to limit demand, bulk goods must be made widely available by distributors, electric cars must be cheaper and more convenient to use than internal combustion cars, public transport must be even less expensive and more convenient than private vehicles, and so on. Ecological principles must be integrated into the normative and organizational architecture of material infrastructure in exactly the same way that energy intoxication was imposed in the past by default. This means that citizens do not need to adopt a strong cultural stance, and the battleground shifts from the cultural to the political arena (because political battles need to be won in order to impose the standards described above on industry).

In other words, we must abandon the culture war, which is currently structured in such a way that it cannot be won by the social-ecological bloc.

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There is no climate impasse, but there are many social actors who are highly successful in inventing and performing it. There are also others, who are less powerful, who yield to the convincing power of this strategy out of self-interest or based on imagined interests. This confrontation, which is unfolding at the international level as well as the socio-economic and cultural levels, only allows very limited progress to be made for the time being. What the post-fossil, or socio-ecological, coalition lacks is the ability to set the terms of the debate as it understands them: transition is a question of international justice and security, a matter of fundamental equality between social groups within the division of labor, and if it engages each and every one of us in accordance with our habits and value systems, it cannot be the work of an active minority.

In the current historical context, a number of factors lend weight to this strategy. As mentioned, they are: the development of industrial transition strategies, especially since the adoption of the IRA in the USA; the growing

conflicts over the cost distribution of the transition, which are likely to awaken social forces; and the start of the Ukrainian conflict, which gives the climate imperative an international security dimension. But as indicated at the beginning of this text, the socio-ecological coalition still lacks the soft power that could propel it more quickly into the collective imagination, enabling it to counter fatalism. This vision is one in which transition is neither a renunciation or a set of uncertainties, but rather the realization of still dormant modernizing trends around equality, security, and science in the service of the common good, and taking control of our collective destiny.

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When The Ecological Divide Becomes Impossible to Ignore. Why transition policies will increasingly shape European political systems

A long-avoided divide

Until now, Europe has differed from North America in its near total absence of political platforms that emphasize climate skepticism, or at least the rejection of transition policies, as a means of mobilizing voters. In the United States, as we are well aware, a number of Republican leaders, including Donald Trump, have championed climate skepticism and expressed their hostility to policies designed to combat climate change. Recall Trump's deliberately confrontational comments on the eve of the 2020 presidential election when he visited California, which had been hit by particularly catastrophic and deadly wildfires: "It'll start getting cooler", in response to concerns about climate change. Remember as well, that one of the former American president's first major decisions was to withdraw the United States from the Paris Agreement in 2017, and that he devoted some of his time in office to undoing the environmental policies implemented by the Obama administration. These are not isolated positions within the Republican camp – far from it. During the first televised debate between the main candidates in the Republican primary this past August 23rd, the moderator asked for a show of hands when asking: "Do you believe human behavior is causing climate change?" As Arkansas governor Asa Hutchinson alone began to raise his hand, Ron DeSantis, who was Donald Trump's main challenger at the time, opted to interrupt the situation by stating that "We're not schoolchildren". But ultra-conservative entrepreneur Vivek Ramaswamy seized the opportunity

to assert that "the climate change agenda is a hoax", adding "the reality is that more people are dying from bad climate change policies, than they are from actual climate change". In Canada as well, climate issues and transition policies have been polarizing and divisive. While the Liberal Party of Canada (LPC) presented itself as the standard bearer of decarbonization and climate change policies, the Conservative Party of Canada (CPC) adopted a stance against carbon taxes and, more generally, ambiguous rhetoric on climate issues. As a result, at its convention in March 2021, PCC delegates narrowly rejected (54%) a motion to acknowledge the existence of climate change and tackle it. Such a stance is undoubtedly no stranger to Conservative victories in provinces such as Alberta, which draws a major share of its revenues from oil and gas extraction, and whose population shows little enthusiasm – to put it mildly – for decarbonization policies.

Viewed from Europe, this type of political stance has long appeared to be a "North American" quirk. No major governing party, no major political influence, had made an explicitly climate-related (let alone climate-skeptical) case in the public arena, or even positioned itself clearly and squarely in opposition to transition and decarbonization policies. Until now, ecology has remained a rather secondary theme in electoral debates, largely due to the lack of opponents, within the framework of an apparently soft consensus. In France, for example, none of the presidential elections have been polarized and shaped by environmental issues, which has contributed to the low returns for green candidates. Despite its stated ambitions and the impact it would have on European economies, the European Green Deal hardly aroused any major public controversy when it was adopted in 2020. In France, for example, compare this with the heated debates surrounding immigration, the wearing of headscarves, or social reforms such as marriage for all, and it's easy to see that the ecological transition has not, for the time being, aroused the same passions. But all that is undoubtedly changing, as the climate issue seems set to become a major division in Europe as well.

Until now, climate skepticism and climate relativism in Europe have only been supported by a faction of right-wing populist groups. Indeed, this political movement has been, and continues to be, divided on the climate issue. Some organizations have clearly asserted their climate skepticism and opposition to decarbonization policies. As early as the late 1990s, for example, the Dutch PVV (Party for Freedom) party was claiming that there was no scientific proof of human responsibility for climate change. Similar statements have been made by the Austrian FPÖ, the Danish People's Party, the Brexit Party and the German AfD. In their 2019 platform for the European elections, German populists also claimed that the fight against global warming was preventing access to cheap energy, and defended combustion-powered vehicles, es-

pecially diesel-powered ones.

But this position was, in fact, a minority one within the right-wing populist movement. There is even a minority in favor of policies to combat climate change. As for the majority of this movement's elements, they have adopted a cautious, "moderate" stance on the climate issue; they acknowledge the reality of climate change without making it a central point of their respective platforms. This approach is typical of parties such as Belgium's Vlaams Belang, the Czech Freedom and Direct Democracy Party, Italy's Lega Party, Greece's Golden Dawn and France's Rassemblement National. The latter has long pursued a strategy of avoiding divisions on this issue: in its 2017 presidential platform, it supported cutting the amount of fossil fuels used by half in 20 years, as well as banning shale gas drilling.

Given this backdrop in Europe, ecology, and the climate issue in particular, have not really emerged as a significant political divide. This is not to say that all the political players were "ecologists" or that they were concerned about the climate issue, or, of course, that implementing decarbonization policies was not a battleground for diverging interests, but to emphasize that this division was in some ways neutralized in the context of an apparent (soft) trans-partisan consensus on the need to act in favor of the climate and, more importantly, in the absence of combatants, i.e. political forces explicitly adopting, in the manner of American Republicans, climate-skeptic positions or, at the very least, an oppositional attitude towards decarbonization policies.

Division over transition policies

This soft consensus is breaking apart before our very eyes. The appearance of the Farmer-Citizen Movement (BoerBurgerBeweging, BBB) on the Dutch electoral scene is a sign of things to come. Founded by Caroline van der Plas, a former member of the Christian Democrat party, the BBB is a new kind of "single issue party": like the ecologists, it focuses on environmental issues, but for the first time on the opposite side of the divide, directly opposing anti-pollution policies. The BBB was formed in reaction to the "Nitrogen Plan", which calls for 50% reduction in these emissions by 2030, forcing the intensive farming model to be reconsidered and Dutch cattle herds to be drastically reduced. The Farmer-Citizen Movement has been able to feed off the anger of the farming community, but its spectacular success in provincial elections shows that it has succeeded in attracting support far beyond the circles directly concerned by the "Nitrogen Plan"; with 19% of the vote in the March 2023 elections, it has established itself as the leading electoral force, coming out on top in every province of the country. It is, of course, far too early to say whether the BBB will be able to maintain such results, particularly as provincial elections are traditionally an intermediate ballot in which voters can express their disapproval and express their opinions with the ballot. But this surge in support for the BBB, which came at the expense of Mark Rutte's Liberals, is nevertheless a signal that has greatly concerned a number of European political players. It demonstrates that ecology can become highly polarizing and divisive when translated into public policies that create winners and losers. In a way, whatever one may think of the measure, this was already illustrated by the Yellow Vests movement in France as a reaction, let's not forget, to a proposed "carbon tax". Beyond opposition to the "Nitrogen Plan", it's interesting to note that the BBB stokes the rural/urban divide, playing on the supposed contempt for rural populations held by the upper classes of major metropolises. In keeping with a strategy of turning stigma on its head, and with a consummate sense of stagecraft, Caroline van der Plas attended the opening of Parliament on a tractor. To further our discussion, it is also important to note that the BBB's position is not limited to this opposition, but embraces other themes: rather liberal on the economy (tax cuts, deregulation), conservative on social issues (against eliminating the five-day reflection period before an abortion can be performed), anti-migration (in favor of a stricter asylum policy) and tinged with Euroscepticism. Behind these issues we can discern the ideological profiles of the voters the BBB is seeking to rally behind its agenda. As we will see later, this combination of positions undoubtedly reflects quite well the reality of political demand in the Netherlands.

The emergence of a climate-relativist political position ("it's exaggerated", "we're overdoing it", "there are other priorities") and/or one opposed to concrete measures implemented as part of the transition does not necessarily require, far from it, the creation of new political forces. In most cases, it will involve well-established political par-

ties repositioning themselves on these issues. We can see this today in a country like France, where the Rassemblement National (RN) seems to be taking the turn towards climate-relativism, and increasingly adopting a stance that is hostile to most transition policies. Of course, the RN's collective message is not explicitly climate-skeptical and, for the moment, it does not dispute the need for policies to combat climate change. Nevertheless, it should be noted that some of the RN's top leaders have recently taken public positions in this direction: for example, RN deputy Thomas Ménagé, interviewed in the middle of this summer's heatwave on France Inter, declared: "We don't want to fall into a punitive ecology, we don't want to fall into degrowth. (...) We don't want to guilt the French, and we can't solely rely on IPCC data (after, the journalist seemed surprised by this statement). It's not just a matter of automatically following what can be done with the IPCC data, it's also a matter of having a political vision that takes global warming into account, but as Marine Le Pen said, they sometimes tend to exaggerate (...) it's also our role to temper things so that if we blindly follow the IPCC's data, we don't run the risk of undermining the quality of life of the French people...". Far from expressing a singular point of view, these remarks reveal the RN's new doctrine. The speaker uses the word "we", has not been criticized by his party, and refers to Marine Le Pen herself. Indeed, she seems to have significantly modified her position on climate issues. Abandoning her strategy of dodging the issue, she delivered a speech on May 1, 2023 that was very hostile to many aspects of transition policies. During the last presidential election, the RN's fight against wind turbines, which it accused of destroying landscapes and being an "ecological scam", had to some extent paved the way for this repositioning. But in her speech given to mark May Day, she took things a step further. The "ecological transition" is vilified in its entirety as "the playground of climate hypocrites". According to her, "for the past 30 years, ecology has been hijacked and has been quietly implementing the highly ideological concept of degrowth", she continues, "the ecological revolution we're being sold [...] is a leap into the nettles of punitive ecology [...] into the thorns of new taxes [...] it's a revolution whose first sacrificed victims will be the most fragile, the poorest". Calling this transition a "theory", an "apocalyptic vision", a "suicidal folly", she takes particular aim at the "hunt for the internal combustion car", claiming that the aim of this policy is "not to ban internal combustion cars, but to ban cars altogether", because "understand my dear friends, behind this very ideological approach lurks the idea of the demise of industrial activity and indeed of all human activity". It's clear to see what the RN's current strategy is: to oppose "ecological transition" policies in their entirety, and most of the measures that underpin them. Renewable energies, particularly wind turbines, and the scheduled end of internal combustion vehicles, have become key areas of conflict. Various arguments are used to discredit these policies. A certain climato-relativism is on display,

which consists of portraying scientists – the IPCC in particular – as excessive and too radical. Presenting these as "theories" is another way of relativizing their content and reality. Transition policies are also presented as socially unjust and detrimental to the quality of life of the French. They are also presented as anti-ecological, with RN leaders claiming that wind turbines and electric vehicles will only exacerbate environmental problems. Finally, they claim that these policies are pointless, since technical progress and science will provide the solutions and enable us to meet the climate challenge.

This strategic repositioning is not an isolated occurrence in Europe, nor is it confined to the populist right. Several traditional right-wing parties seem to have developed tension around transition policies, decarbonization objectives and the European Green Deal. Without attempting to offer an exhaustive review of these developments, we will limit ourselves to a few examples taken from recent events. In a noteworthy interview given to leading media on September 12th, the President of the European Parliament, Roberta Metsola, distanced herself from the "Green Pact". Clarifying that she was speaking "as President of the Parliament, not on behalf of the EPP", she expressed concern about the impact of "overly restrictive" and costly regulations, which she felt could fuel populist votes. It is this type of concern that has led to both the PPE and some of Renew's liberal members to call for a pause and even a moratorium on implementing the Green Deal. Political leaders, particularly from the center and the right, perceive, with varying degrees of clarity, that the ecological transition has the potential to become a major source of political division, encouraging the rise of right-wing populists at their own expense. It is this kind of electoral anticipation that seems to have convinced British Prime Minister Rishi Sunak to announce, on September 20th, that his government was slowing down the transition's pace to adopt "a more pragmatic, proportionate and realistic approach" approach. Among the main decisions announced were the postponement by 5 years (from 2030 to 2035) of the ban on cars running on petrol and diesel, the relaxation of conditions for eliminating gas-fired boilers, and the abandonment of an energy efficiency measure for homes that was weighing on property owners. Struggling in the polls, the Prime Minister seems to have convinced himself that such a shift was necessary after the surprise defeat of the Labour candidate in a local election in West London. The result was interpreted as a rejection of a tax on polluting vehicles that had been applied to the whole of Greater London by the Labour mayor, Sadiq Khan.

The developments described thus far concern political stances. Using the examples of the Netherlands (BBB) and France (RN), they show how right-wing populist parties are seizing on transition policies to turn them into a major political division. They also show that traditional right-

wing parties (liberals and conservatives) are tempted to distance themselves from transition policies for fear of competition from populists on this divisive issue.

How transition policies divide society

The rift over transition policies that can be seen in political positions reflects a deeply divided public opinion on the issue. It is these fractures – which, as we shall see, run deep – that can be observed on the citizens' side that are the main factor in the political side reconfiguring its political stance. To analyze these rifts, we will rely on studies carried out in France in recent months. The French example allows us to understand how the climate divide is at work within the population, and what are the attitudes that shape positions on one side or the other of this divide. Of course, comparative studies will have to be carried out in other European countries to establish whether the French case can be generalized, but also, conversely, what are the specific features of each national context.

There is no consensus on the origins of climate change

What is essential here is to start from the way in which the problem to be solved is perceived by the population. If there is no consensus on a definition of the climate problem, there will be even less consensus on how to respond to it (and even simply on the need to respond to it). If we are to agree to change some of our behaviors and support transition policies, we need to recognize the reality of climate change and, equally important, the fact that it is caused by human activity.

But contrary to what we may believe, there is no public consensus on this issue. More precisely, the consensus is limited to the reality of global warming: according to our studies, only 2% to 3% of the public deny it (see Table 1 and Table 2). Radical climate denial therefore remains very much on the fringes. However, the origin of this change is already a fault line. Nearly a quarter of French respondents (24%) believe that "global warming is primarily the consequence of a natural cycle". This refusal to attribute the cause of climate disruption to human activity, particularly to greenhouse gas emissions, is how climate skepticism manifests itself in French society; the skepticism does not concern the phenomenon itself, but rather its origins. Despite extreme climatic events in recent years, climate skepticism seems to be on the rise. Be that as it may, we can easily recognize that it feeds the initial resistance to environmentalist rhetoric and the implementation of transition policies. It is also significant that a similar proportion of citizens (21%) believe that "the seriousness of global warming is often exaggerated", despite the fact that the question was asked this past July, during a summer that saw record-breaking heat, severe drought, and devastating wildfires across Europe.

The population typology employed by Cluster 17 allows us to explore in greater depth the distribution of climate skepticism. Without going into too much detail here, this typology is based on 16 clusters, which were created on the basis of people's attitudes and values. These attitudes and values were identified on the basis of a 30-question test featuring deliberately divisive metrics. We believe that this test clearly identifies the system of divisions that shape a society. As for the clusters, they group together individuals who share the same positions on the primary divisive issues: identity, immigration, attitudes towards elites, economic redistribution... In short, this typology has been designed to provide a detailed understanding of citizen demand, particularly on divisive issues that involve people's deeply held attitudes and values.

When applied to the questions we're interested in here, segmentation by value clusters immediately reveals the extent to which climate-skepticism (denying human origin) and/or climate-relativism (believing we're exaggerating) are not randomly distributed in the social space (cf. tab. 1 and tab.2). In certain clusters, these two attitudes are totally or almost totally absent: Multiculturalists, Social-Democrats, Progressives, the Solidarity-minded, Centrists, and the Outraged. In others, on the contrary, these attitudes are widespread (Liberals, Conservatives), or even in the majority (Social-Patriots, Identitarians). Generally speaking, there is a very strong association between a group's position in the overall spectrum of divisions and the likelihood of it having a significant proportion, or even a majority, of climate skeptics.
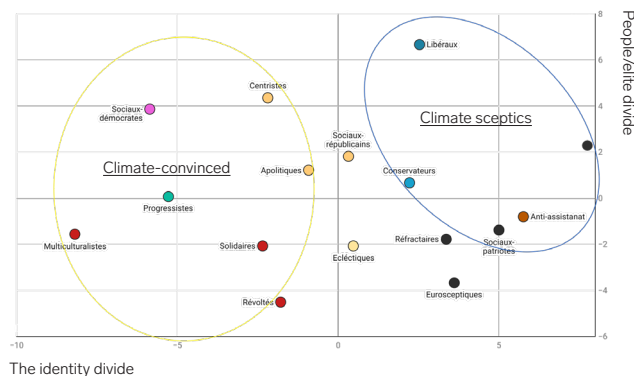
Therefore, the further to the left a group is on the identity axis that structures the space of division, the more "climate-convinced" it will be, i.e. inclined to recognize the human origin of climate disruption (graph 1). This observation means that one's attitude towards the climate is part of wider systems of opinion, and in this case, being open to cultural diversity and progressive on social issues goes along with support for the scientific consensus on climate change. Put simply, progressive attitudes and pro-ecology attitudes go hand in hand. This is reflected in the fact that the group furthest to the left on the divide – the Multiculturalists – is also the only one to 100% acknowledge the human origins of climate change (cf. tab.

1). The question regarding the severity of global warming confirms this relationship (cf. tab.2). The most left-wing groups on the identity axis are also – with the notable exception of the Centrists – the most inclined to believe that "the severity of global warming is generally underestimated": 69% on average vs. 27% among the rest of the population. Logically, they are also the ones who express the greatest sense of ecological urgency, in that a non-negligible fraction of them call for "the environmental issue to be the government's top priority, ahead of all others (the fight against inflation, the fight against crime, or the war in Ukraine, etc.)" (cf. tab. 3): 38% versus 12% among the rest of the population.

At the opposite end of the spectrum, climate-skeptic and climate-relativist positions reach significant levels in groups on the right and extreme right of the divide, i.e. groups characterized by high levels of social conservatism and strong identitarian positions. Three of these groups – the Conservatives, the Identitarians and, even more so, the Liberals – are located fairly high up in this space, because while they are conservative in terms of values, they are also rather elitist and seek social stability (vertical axis). Moreover, these clusters are mainly made up of older middle- and upper-class individuals. They have long been the pillars of the right-wing coalitions, and largely contributed to Nicolas Sarkozy's success in 2007. With the exception of the Social-Patriots, these clusters are therefore more akin to the traditional right than to "populism". This is an important point if we are to understand the traditional right's difficulties in positioning itself on climate issues.

Overall, these four groups are diametrically opposed to the eco-progressive coalition previously described. In addition to harboring a number of climate skeptics, as we have seen, they frequently consider that "the severity of global warming is generally exaggerated": 40% versus 11.5% in the rest of the population (cf. tab.3). Moreover, only 4% of them consider that "the environmental issue should be the government's top priority", compared to 26% of the rest of the population. Cultural conservatism and identity-based values foster a climate-skepticism and climate-relativism which naturally feeds a particularly pronounced rejection of transition policies.

Table 1. Among the following statements, which do you agree with most:

Clusters	There is no climate change	Climate change is mainly caused by a natural cycle	Climate change is mainly caused by human activity
Multiculturalists	0%	0%	100%
Social-Democrats	3%	6%	91%
Progressives	0%	6%	94%

Solidarity-minded	1%	5%	94%
Centrists	0%	17%	83%
Outraged	0%	16%	84%
Apolitical	2%	24%	74%
Social-Republicans	3%	21%	76%
Eclectics	1%	25%	74%
Conservatives	3%	39%	58%
Liberals	0%	39%	61%
Réfractaires	1%	22%	77%
Eurosceptics	8%	23%	69%
Social-patriots	7%	43%	50%
Anti-welfare	1%	24%	76%
Identitarian	8%	44%	48%
Total	3%	24%	73%

Table 2. In your opinion, the severity of climate change is:

Lines	Generally underestimated	Generally correctly assessed	Generally exaggerated	Completely made up	Underestimated/ Correctly assessed	Exaggerated/ Made up
Multiculturalists	85%	14%	1%	0%	99%	1%
Social-Democrats	62%	36%	2%	0%	98%	2%
Progressives	57%	40%	3%	0%	97%	3%
Solidarity-minded	66%	23%	10%	0%	90%	10%
Centrists	28%	65%	7%	1%	93%	7%
Outraged	77%	15%	7%	1%	92%	8%
Apolitical	15%	61%	24%	0%	76%	24%
Social-Republicans	33%	51%	10%	6%	84%	16%
Eclectics	41%	57%	3%	0%	97%	3%
Conservatives	18%	43%	35%	4%	61%	39%
Liberals	11%	54%	29%	6%	65%	35%
Réfractaires	30%	51%	17%	1%	81%	19%
Eurosceptics	46%	14%	40%	0%	60%	40%

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Social-patriots	28%	26%	38%	8%	53%	47%
Anti-welfare	29%	55%	15%	0%	85%	15%
Identitarian	19%	21%	58%	2%	40%	60%
Total	38%	39%	21%	2%	77%	23%

Table 3. In your opinion, the environmental issue should:

Lines	be one of the government's main priorities along with other issues	be the government's top priority above all other issues (fighting inflation, fighting crime, the war in Ukraine, etc.)	should not be one of the government's main priorities
Multiculturalists	55%	45%	0%
Social-Democrats	64%	33%	3%
Progressives	68%	30%	2%
Solidarity-minded	61%	38%	1%
Centrists	91%	4%	5%
Outraged	53%	42%	5%
Apolitical	80%	7%	12%
Social-Republicans	73%	17%	10%
Eclectics	74%	23%	3%
Conservatives	67%	7%	26%
Liberals	68%	4%	28%
Réfractaires	68%	18%	14%
Eurosceptics	60%	31%	9%
Social-patriots	71%	3%	25%
Anti-welfare	75%	19%	6%
Identitarian	56%	3%	41%
Total	68%	18%	14%

Distrust of elites and conspiracy theories fuel rejection of transition policies

While climate skepticism is largely a matter of cultural conservatism, the rejection of transition policies is also rooted in another attitude that is totally independent of the first: distrust of elites, which often goes along with acceptance of conspiracy theories. Over the last few months, the climate crisis and transition policies have become one of the preferred playgrounds for creators of eco-conspiracy narratives, most of whom come from the anti-vax sphere, particularly on social media. In France, since the summer of 2022, messaging on social media has been spreading, denouncing, for example, the "IPCC ideologues" who are allegedly manipulating data, an alleged plot by the elites to create a "climate dictatorship", or the threat of a "carbon pass" that would be the "ecological" counterpart to the "health pass". We would be remiss to underestimate the potential for such statements to disseminate and win support. Our surveys show that a significant proportion of the population is inclined to share this view of the climate crisis and ecological policies. For example, 42% of those polled agreed with the suggestion that "the elites are planning to establish a climate dictatorship". Varying the wording slightly does not alter the results: 42% still agree that "the climate crisis is a pretext used by world governments to limit people's freedoms" (see tab. 4).

Analysis of the responses by clusters confirms that the reasoning behind climato-conspiracy differs in part from that of climate-skepticism. Axis 2, the opposition between the people and the elite, tends to overwhelmingly determine responses. This explains why an elitist group such as the Liberals, despite its climate-skeptic leanings, is one of the least likely to subscribe to conspiracy theories. Conversely, the Revoltés, although "climate-convinced", are mostly in agreement with this type of anti-elitist narrative. Broadly speaking, the more a cluster is located in the south-eastern part of the graph (combining identitarianism and anti-elitism), the more it will carry a generalized distrust of the dominant climate crisis narrative, and therefore of the policies pursued by institutions. From our perspective, it is important to emphasize that these clusters are mainly made up of individuals from working-class and lower-middle-class backgrounds, and that three of them (Réfractaires, Euroskeptics and Social-Patriots) make up the Rassemblement National's core electorate.

Table 4. The climate crisis is a pretext used by world governments to limit people's freedoms

Clusters	Completely agree	Mostly agree	Mostly disagree	Completely disagree	Agree	Disagree
Multiculturalists	1%	8%	23%	68%	9%	91%
Social-Democrats	2%	5%	14%	79%	7%	93%
Progressives	5%	6%	36%	53%	11%	89%
Solidarity-minded	13%	24%	25%	38%	38%	62%
Centrists	1%	9%	19%	71%	10%	90%
Outraged	27%	30%	34%	9%	57%	43%

Apolitical	18%	27%	30%	25%	45%	55%
Social-Republicans	11%	14%	34%	41%	25%	75%
Eclectics	4%	29%	40%	28%	32%	68%
Conservatives	17%	37%	35%	11%	54%	46%
Liberals	5%	18%	40%	37%	23%	77%
Réfractaires	26%	31%	33%	11%	57%	43%
Eurosceptics	37%	38%	18%	7%	75%	25%
Social-patriots	48%	28%	15%	10%	76%	24%
Anti-welfare	31%	24%	32%	12%	55%	45%
Identitarian	37%	33%	21%	9%	70%	30%
Total	19%	23%	27%	31%	41%	59%

A prevailing sense of injustice regarding the distribution of effort

The acceptability of transition policies comes up against this climate-skepticism and climate-conspiracy in part, but also, more broadly, against people's perception of them in terms of equity and social justice – all these dimensions being somewhat intertwined. The prevailing public belief is that efforts to combat climate change are, and will continue to be, unfairly distributed.

This is reflected in questions about the distribution of costs. And so, a statement such as "energy sobriety is only imposed on the people, but not the elites" receives overwhelming approval: 76% (cf. tab. 5). A cluster-by-cluster reading of the results shows that people's ecological sensibilities have no influence on their responses. The only groups to disagree with, or at least be divided on, a statement of this type are the three most elite clusters: Social Democrats, Centrists and Liberals.

Similarly, a statement such as "the poorest are the ones paying for the climate and energy crisis when it's the richest who are responsible for it" receives even higher support: 79% (cf. tab. 6). Only two (very elitist) clusters out of sixteen, the Liberals and to a lesser extent the Centrists, have reservations about this type of statement. All the others support it at rates often reaching 90%.

What do these results tell us? That any appeal for sacrifice, or simply for even modest contributions to the fight against climate change, is likely to come up against this kind of narrative. To put it very simply, it's easy to see how difficult it would be to justify an eventual ban on diesel vehicles in urban areas – as planned by the ZFE in

France (see below) – or even simply a ban on the sale of internal combustion vehicles (starting in 2035 in the European Union), while at the same time allowing yachts and private jets to operate. You do not need to be an expert in CO2 emissions to see that it is not the biggest polluters who face the most restrictions. It is far from certain that greater climate justice would be enough to bring about widespread adoption of more sober and ecologically responsible behavior, but it is certain, however, that any failure on the part of public officials to set an example (such as taking airplanes for short trips) and any exemptions with regard to the behavior of the wealthiest individuals will inevitably be leveraged by whole sections of the population to refuse any effort to combat climate change; all the more so, given that free riding (or the stowaway attitude) is the most common attitude in this respect.

Table 5. Energy sobriety is only imposed on the people, but not the elites

Clusters	Completely agree	Mostly agree	Mostly disagree	Completely disagree	Agree	Disagree
Multiculturalists	64%	28%	5%	4%	92%	8%
Social-Democrats	22%	35%	29%	14%	58%	42%
Progressives	40%	28%	25%	7%	68%	32%
Solida-	71%	20%	6%	2%	91%	9%
Centrists	15%	25%	42%	19%	39%	61%
Outraged	74%	12%	13%	1%	86%	14%
Apolitical	32%	42%	23%	4%	74%	26%
Social-Republicans	40%	42%	14%	4%	82%	18%
Eclectics	49%	25%	16%	10%	74%	26%
Conservatives	46%	36%	17%	2%	82%	18%
Liberals	24%	31%	23%	22%	55%	45%
Réfractaires	63%	26%	7%	3%	90%	10%
Eurosceptics	51%	25%	13%	11%	76%	24%
Social-patriots	71%	19%	3%	7%	90%	10%
Anti-welfare	48%	25%	12%	14%	74%	26%
Identitarian	54%	29%	10%	8%	82%	18%
Total	48%	29%	15%	8%	76%	24%

Table 6. The poorest are the ones paying for the climate and energy crisis when it's the richest who are responsible for it

Clusters	Completely agree	Mostly agree	Mostly disagree	Completely disagree	Agree	Disagree
Multiculturalists	75%	20%	5%	0%	95%	5%
Social-Democrats	29%	44%	16%	11%	73%	27%
Progressives	56%	32%	9%	3%	88%	12%
Solidarity-minded	72%	17%	10%	1%	89%	11%
Centrists	17%	40%	29%	15%	57%	43%
Outraged	64%	27%	8%	1%	92%	8%
Apolitical	46%	30%	10%	14%	76%	24%
Social-Republicans	38%	43%	16%	2%	81%	19%
Eclectics	41%	36%	16%	8%	77%	23%
Conservatives	39%	34%	23%	4%	73%	27%
Liberals	14%	30%	39%	18%	44%	56%
Réfractaires	63%	24%	11%	1%	87%	13%
Eurosceptics	79%	15%	5%	0%	94%	6%
Social-patriots	73%	18%	7%	1%	92%	8%
Anti-welfare	64%	25%	9%	3%	88%	12%
Identitarian	43%	32%	18%	7%	74%	26%
Total	50%	30%	15%	6%	79%	21%

The stowaway strategy

Although deep-seated attitudes, such as climate-skepticism or climate-conspiracy, are an essential dimension of the relationship with transition policies, the second dimension to be taken into account is the cost of these measures and, even more so, the level at which each individual is asked to contribute to them. When it comes to climate, as in other areas, most people seek to minimize costs, whether these costs are economic or psychological, and whether they involve paying a tax, making an effort, or giving up a pleasure. From this point of view, the ecological transition is particularly conducive to a "stowaway" strategy: letting others pay the full costs of the transition, while enjoying the collective benefits of limiting global warming.

This is undoubtedly one of the reasons why so many citizens refuse to make any sacrifices whatsoever to combat global warming. We attempted to measure this with a question inspired by Dutch transition policies. After losing a court case against civil society for "climate inaction" (the Urgenda case), the Dutch government was ordered to adopt effective measures to combat greenhouse gas emissions. Mark Rutte's government, though known to be pro-car, was forced to drastically lower the speed limit on freeways from 130 to 100 km/h between 6 a.m. and 7 p.m.

This prompted us to test the following proposition in a survey: "Highway speeds should be limited to 110 km/h to limit greenhouse gas emissions". From the point of view of understanding the relationship between citizens and transition policies, such a suggestion is particularly informative for a number of reasons. It has no cost other than longer journey times (for those who travel by car on highways). It has no negative economic impact – on the contrary, driving slower reduces fuel consumption, so it has a positive externality in this respect. It is very egalitarian and has the advantage of making direct polluters contribute, via a reduced effort, in this case those who drive at over 110 km/h on the highway. Yet, even when presented as contributing to the reduction of GHG emissions, such a measure is overwhelmingly rejected: by 67% of those polled (including 37% who strongly disagree, cf. tab. 7).

The distribution of responses by clusters allows us to better understand how opinions and willingness to contribute to the transition are combined. Values do have a significant influence on the willingness to make an effort in favor of the climate. As such, the three groups in favor of this measure all consider the climate issue to be a priority (Multiculturalists, Progressives and Social Democrats). All other groups are (generally speaking) clearly opposed to this speed restriction. And this rejection logically reaches particularly high levels in groups with climate-skeptic and/or climate-conspiracy leanings: 87% among Social-Patriots, 88% among Liberals and even 91% among Identitarians. As we can see, any restrictions, even in the absence of direct financial cost, tend to be rejected, in an especially strong and resolute manner, among segments of the population characterized by climate-skeptic or climate-conspiracy leanings.

Table 7. Highway speeds should be limited to 110 km/h to limit greenhouse gas emissions

Clusters	Completely agree	Mostly agree	Mostly disagree	Completely disagree	Agree	Disagree
Multiculturalists	53%	31%	16%	1%	84%	16%
Social-Democrats	19%	32%	28%	20%	52%	48%

	Very favorable	Somewhat favorable	Somewhat unfavorable	Very unfavorable	Favorable total	Unfavorable total
Progressives	19%	43%	26%	12%	62%	38%
Solida-	17%	22%	31%	30%	39%	61%
Centrists	12%	27%	40%	21%	39%	61%
Outraged	17%	18%	46%	19%	35%	65%
Apolitical	7%	23%	36%	35%	29%	71%
Social-Republicans	10%	17%	31%	42%	27%	73%
Eclectics	13%	35%	40%	12%	49%	51%
Conservatives	6%	32%	31%	30%	38%	62%
Liberals	2%	10%	36%	52%	12%	88%
Réfractaires	8%	15%	19%	58%	23%	77%
Eurosceptics	13%	22%	22%	43%	35%	65%
Social-patriots	4%	9%	29%	58%	13%	87%
Anti-welfare	10%	16%	34%	40%	26%	74%
Identitarian	3%	6%	24%	68%	9%	91%
Total	11%	22%	30%	37%	33%	67%

No wind farms in our backyard

Varying the wording of questions about wind farm installations offers another way of identifying stowaways on environmental issues. If the question about wind farm construction is asked without any context, it receives the support of more than half the population: 59% (cf. tab. 8.). However, all it takes is to specify "near your home", and the share of support drops by more than 20 points, to 37% (cf. tab. 9). And even then, the survey does not allow us to identify the answers of only those concerned, i.e. respondents living in rural areas where such projects are more likely to be implemented.

Table 8. When it comes to new wind turbines are you...

Clusters	Very favorable	Somewhat favorable	Somewhat unfavorable	Very unfavorable	No opinion	Favorable total	Unfavorable total
Multiculturalists	43%	42%	12%	1%	3%	85%	12%
Social-Democrats	30%	49%	15%	7%	0%	78%	22%
Progressives	22%	34%	42%	0%	2%	56%	42%
Solida-	26%	38%	31%	5%	0%	64%	36%
Centrists	20%	58%	16%	4%	2%	79%	20%

	Very favorable	Somewhat favorable	Somewhat unfavorable	Very unfavorable	No opinion	Favorable total	Unfavorable total
Outraged	20%	23%	10%	47%	0%	43%	57%
Apolitical	5%	47%	34%	12%	3%	52%	45%
Social-Republicans	13%	35%	31%	20%	1%	48%	51%
Eclectics	20%	54%	10%	15%	0%		25%
Conservatives	6%	69%	17%	8%	0%	74%	26%
Liberals	6%	27%	39%	28%	0%	34%	66%
Réfractaires	13%	32%	21%	34%	0%	45%	55%
Eurosceptics	33%	35%	25%	7%	0%	68%	32%
Social-patriots	14%	16%	19%	51%	0%	30%	70%
Anti-welfare	23%	37%	31%	9%	0%	60%	40%
Identitarian	13%	14%	22%	48%	3%	27%	70%
Total	21%	38%	22%	18%	1%	59%	40%

Table 9. Wind turbines near your home

Lines	Very favorable	Somewhat favorable		Very unfavorable	No opinion	Favorable total	Unfavorable total
Multiculturalists	18%	53%	13%	9%	7%	71%	22%
Social-Democrats	14%	43%	19%	17%	7%	57%	36%
Progressives	20%	41%	19%	9%	11%	61%	28%
Solidarity-minded	12%	29%	23%	28%	8%	41%	51%
Centrists	10%	33%	30%	20%	7%	44%	49%
Outraged	12%	27%	20%	10%	32%	39%	29%
Apolitical	6%	20%	31%	30%	13%	26%	61%
Social-Republicans	14%	30%	18%	29%	9%	44%	48%
Eclectics	23%	37%	21%	15%	4%	59%	36%
Conservatives	3%	17%	26%	52%	2%	20%	78%
Liberals	7%	20%	25%	41%	7%	27%	66%
Réfractaires	6%	20%	15%	47%	13%	26%	62%
Eurosceptics	14%	16%	9%	50%	11%	30%	59%

Social-pa-triots	6%	12%	16%	58%	8%	18%	74%
Anti-wel-fare	6%	9%	17%	54%	13%	16%	71%
Identitarian	3%	8%	14%	71%	4%	11%	85%
Total	10%	27%	20%	35%	8%	37%	55%

On this subject as well, adopting a NIMBY attitude is not unrelated to one's value system. The clusters that remain mostly in favor of wind power, even close to their homes, are generally the same as those that supported speed restrictions on highways: Multiculturalists, Progressives and Social Democrats (with the addition here of the Eclectics, a cluster that is also sensitive to ecological issues). As with the previous question, groups characterized by conservative and identity-based value systems are particularly hostile to wind power (cf. tab. 9). Rejection among them is not only very high, but also very resolute, as revealed by the proportion of "very unfavorable" responses often exceeding 50% (even though these are often not individuals directly concerned). On this subject too, segmentation by value system reveals major divisions: the gap between Multiculturalists and Identitarians on wind farm installations reaches the remarkable level of 70 points.

The relationship to flying as an indicator of the spread of free-riding (including among groups sensitive to ecological issues)

The plane is an interesting object, as its use is less commonplace than that of the car and remains more frequent in the middle and upper social classes. For example, when asked if they were "ready" to "limit themselves to four airplane flights in their lifetime" – a measure proposed by Jean-Marc Jancovici – 55% of respondents answered in the affirmative (tab. 10).

But the distribution of support deserves particular attention, as it doesn't fit in with the previously observed pattern. In this instance, holding a progressive social values system is not enough to inspire support for such a proposal, while conversely, being conservative or even climate-skeptic is not necessarily predictive of rejecting the measure. And so, Social Democrats and Progressives, two groups who believe in the urgency of climate change, are mostly "not ready" to reduce their use of airplanes, while the Solidarity-minded, Réfractaires, Euroskeptics, Social-Patriots, and Anti-welfare are overwhelmingly willing to do so. It's clear that what we're seeing here is mainly a difference in socio-economic status, which comes with very different lifestyles and, more specifically, very different ways of using airplanes. Progressives and, even more so, Social Democrats are among the groups with the most economic and cultural capital, and therefore also among the most frequent flyers. And although their value system

encourages them to adopt eco-friendly behaviors, they are nonetheless the most reluctant to limit their use of airplanes. Conversely, the clusters that represent the most working-class groups, even among those who tend to be climate skeptics, are "ready" for this type of commitment, since it has no impact on their actual habits and practices. Philippe Coulangeon and his co-authors already made this point in their book La conversion écologique des Français (The Ecological Conversion of the French). Describing the group of "eco-cosmopolitans" – so named because their habits reflect sobriety and environmental awareness – the authors point out that, paradoxically, "the use of airplanes is high: more than a third have used them twice or more to travel in the past year...". Such an observation highlights the difficulty of giving up certain pleasures and lifestyles in order to limit one's carbon footprint, even in groups displaying a certain level of ecological awareness.

Table 10. Limiting yourself to 4 airplane voyages in your life

Lines	Very ready	Somewhat ready	Not quite ready	Not at all ready	Ready	Not ready
Multicultu-ralists	51%	28%	15%	6%	79%	21%
Social-De-mocrats	23%	17%	19%	41%	40%	60%
Progres-sives	21%	24%	17%	38%	45%	55%
Solida-rity-minded	58%	18%	4%	20%	76%	24%
Centrists	22%	13%	26%	40%	34%	66%
Outraged	43%	8%	37%	12%	51%	49%
Apolitical	25%	32%	8%	35%	56%	44%
Social-Re-publicans	32%	16%	12%	39%	49%	51%
Eclectics	52%	18%	18%	12%	70%	30%
Conserva-tives	30%	19%	15%	36%	49%	51%
Liberals	21%	9%	10%	60%	30%	70%
Réfractaires	50%	19%	8%	22%	69%	31%
Eurosceptics	63%	13%	10%	15%	76%	24%
Social-pa-triots	45%	16%	7%	32%	61%	39%
Anti-welfare	45%	27%	13%	15%	72%	28%
Identitarian	22%	18%	4%	56%	40%	60%
Total général	36%	19%	13%	32%	55%	45%

The suburban ideal is more powerful than the climate crisis

Asking the French whether they are "ready" to "give up living in a detached house" reveals their attachment to the "suburban ideal" and to lifestyles that we know are not the most compatible with sustainable development and the reduction of greenhouse gas emissions.

When questioned about this possibility, 77% of French people said they were "not ready" to "give up living in a single-family home" (tab. 11). This result is all the more noteworthy given that it is even higher than the proportion of French people currently living in single-family homes: 66% vs. 41% in Germany or 31% in Spain, for example (source INSEE, tableau économique de la France 2022). Even the most ecologically-minded groups (Multiculturalists, Progressives) are not prepared to forego the single-family home. As for the most conservative and identitarian groups, their opposition to such a possibility is nearly 90%. We can therefore understand the political risk of stigmatizing the "suburban lifestyle", and how such stigmatization can galvanize groups who are already reluctant to support transition policies in the first place. As with other issues, direct and personal interests exert a strong influence here. For instance, respondents living in smaller communities naturally express a greater attachment to single-family homes: 96% of those living in communities with fewer than 3,000 inhabitants say they are "not ready" to give them up (tab. 12).

Table 11. Give up living in a single-family home

Lines	Very ready	Somewhat ready	Not quite ready	Not at all ready	Ready	Not ready
Multiculturalists	20%	22%	29%	29%	42%	58%
Social-Democrats	19%	13%	30%	37%	33%	67%
Progressives	17%	20%	21%	42%	37%	63%
Solidarity-minded	25%	16%	15%	44%	41%	59%
Centrists	28%	5%	19%	48%	33%	67%
Outraged	51%	9%	12%	29%	59%	41%
Apolitical	9%	5%	17%	69%	14%	86%
Social-Republicans	7%	3%	8%	82%	10%	90%
Eclectics	21%	4%	30%	45%	25%	75%
Conservatives	8%	4%	18%	71%	12%	88%
Liberals	10%	4%	5%	81%	14%	86%
Réfractaires	26%	4%	22%	48%	30%	70%

Tableau 12. Renoncer à vous loger dans une maison individuelle

Lines	Very ready	Somewhat ready	Not quite ready	Not at all ready	Ready	Not ready
Moins de 1000 euros	16%	4%	13%	67%	20%	80%
Entre 1000 et 1500 euros	22%	5%	21%	53%	26%	74%
Entre 1500 et 2000 euros	15%	7%	21%	57%	22%	78%
Entre 2000 et 3000 euros	21%	11%	14%	54%	31%	69%
Entre 3000 et 5000 euros	9%	7%	17%	67%	16%	84%
Plus de 5000 euros	9%	7%	9%	75%	16%	84%
Total général	15%	8%	17%	60%	23%	77%

The car, a highly flammable object

To conclude this non-exhaustive review of areas causing tension with regard to the objectives of decarbonizing our societies, it is impossible to ignore the automobile. Given the place it occupies in our societies and lifestyles, it is a crucial issue for transition policies. As we know, the European Union has set 2035 as the date for banning the sale of internal combustion engine vehicles. Replacing them with electric vehicles is at the heart of transition policies. Similarly, the 2019 LOM (Mobility Orientation Law) requires French metropolitan areas to implement ZFEs (Low Emission Zones) aimed at excluding the most polluting vehicles (particularly diesel-powered) in order to improve air quality in urban areas. Such policies are particularly divisive, and the cultural battle is far from won by the pro-environmentalists.

In the study we carried out on eco-conspiracy, we demonstrated that mistrust of electric vehicles was overwhelming: 68% of those surveyed agreed with the statement that "electric cars are a scam". The only overwhelmingly pro-electric groups were those that hold both pro-climate attitudes and trust in the system: Social Democrats and Progressives. In contrast, the identitarian and anti-system segments – largely made up of the wor-

king and lower-middle classes – are staunchly hostile to electric cars. It is important to emphasize, however, that, contrary to what is sometimes misinterpreted in public debate, attitudes towards electric vehicles are not based solely on purchasing power. Buying an electric vehicle is not just a question of means, but also of desire. How else to explain the fact that 62% of the group with the most economic capital, the Liberals, consider "the electric car to be a scam"; not to mention the Identitarians – a cluster composed mainly of middle-class people – who share the same rejection of electric cars at 87%. Such responses undoubtedly demonstrate a real attachment to traditional cars and internal combustion engines, and no doubt express a sort of "principled" rejection, both political and aesthetic, of one of the main symbols of energy transition policies.

It is therefore no great surprise to find that 59% of French people say they are "not ready to give up the internal combustion car (gasoline and diesel engines)" (tab. 14). On this issue too, powerful ideological divisions are at work. Progressive groups who consider climate policies to be a priority are overwhelmingly opposed to the use of internal combustion engines. On the other hand, the attachment to internal combustion engines is very high in all groups characterized by value systems marked by conservatism and identitarianism.

Given this context, the prospect of banning the most polluting combustion-powered vehicles (ZFE), and diesel-powered cars in particular, can understandably become a major source of social and political tension. At present, the ban on diesel vehicles in major city centers is rejected by 70% of French people. When it comes to such restrictions, even multiculturalists are divided (no doubt because the measure is seen as mainly penalizing the working classes). And, of course, there is strong consensus opposing the measure among all the anti-system and conservative groups, with the Social-Patriots and Identitarians rejecting it by over 90%.

Before worrying, or even penalizing, we mustn't overlook the fact that these initiatives – whether we like it or not – inevitably have a stigmatizing aspect: they point the finger at suburban and rural populations using diesel vehicles (often the working classes) as being responsible for pollution and global warming. They perpetuate the stereotypes that pit the bicycle-riding urbanites against the diesel-powered country folk. When we analyze the way they are received in the public opinion by clusters, we have to admit that these points of conflict are likely to encourage the electoral alliance of the small conservative right with a large faction of the anti-system working classes, forming an ecological backlash that could contribute to reconfiguring European political systems.

Table 13. La voiture électrique est une arnaque

Clusters	Completely agree	Mostly agree	Mostly disagree	Completely disagree	Agree	Disagree
Multiculturalists	22%	33%	33%	12%	55%	45%
Social-Democrats	7%	21%	45%	27%	27%	73%
Progressives	8%	25%	46%	20%	34%	66%
Solidarity-minded	37%	41%	17%	5%	78%	22%
Centrists	7%	37%	37%	19%	44%	56%
Outraged	64%	18%	14%	4%	82%	18%
Apolitical	17%	57%	22%	4%	74%	26%
Social-Republicans	35%	35%	23%	7%	70%	30%
Eclectics	18%	46%	23%	12%	64%	36%
Conservatives	34%	36%	21%	8%	70%	30%
Liberals	25%	37%	26%	12%	62%	38%
Réfractaires	45%	32%	16%	7%	77%	23%
Eurosceptics	47%	34%	16%	3%	82%	18%
Social-patriots	64%	27%	8%	1%	91%	9%
Anti-welfare	45%	38%	8%	9%	83%	17%
Identitarian	63%	24%	10%	3%	87%	13%
Total	34%	34%	23%	10%	68%	32%

Table 14. Give up internal combustion cars (gas and diesel)

Lines	Very ready	Somewhat ready	Not quite ready	Not at all ready	Ready	Not ready
Multiculturalists	45%	20%	19%	15%	66%	34%
Social-Democrats	39%	24%	25%	12%	63%	37%
Progressives	39%	23%	28%	9%	63%	37%
Solidarity-minded	30%	18%	27%	26%	48%	52%
Centrists	33%	34%	16%	16%	68%	32%
Outraged	17%	40%	12%	31%	57%	43%
Apolitical	7%	32%	24%	37%	38%	62%
Social-Republicans	17%	10%	20%	52%	28%	72%
Eclectics	20%	21%	42%	17%	41%	59%

Conserva-tives	11%	14%	31%	44%	24%	76%
Liberals	15%	18%	21%	45%	33%	67%
Réfrac-taires	16%	16%	7%	60%	32%	68%
Eurosceptics	7%	2%	25%	66%	8%	92%
Social-pa-triots	5%	23%	18%	54%	28%	72%
Anti-wel-fare	20%	29%	26%	25%	49%	51%
Identitarian	9%	10%	10%	71%	19%	81%
Total	20%	21%	22%	37%	41%	59%

Conclusion: the coming showdown

There are several lessons to be drawn from these figures and studies. First and foremost, and most regrettably, they show that the ecological transition does not enjoy consensus. On the other hand, the data we have presented helps us to understand why ecology is increasingly divisive, and why it is likely to be even more so in the years to come.

It is increasingly divisive because it comes up against interests and inherently involves transforming lifestyles, which a non-negligible proportion of the population rejects. As we have seen, the majority of individuals are not "ready" to contribute – or for the most part not very much – to reducing the intensity of climate change. As a result, those who feel – whether correctly or incorrectly – the most threatened by the phasing out of internal combustion vehicles, by possible fuel taxes, by the installation of wind farms, or simply stigmatized by their (suburban) lifestyle, will be more likely to identify with rhetoric and positions hostile to transition policies.

But what our segmentation into value groups also shows is that our relationship with ecology is deeply rooted in more global divisions. It is therefore highly correlated with the opposition between multiculturalists and progressives, on the one hand, and conservatives and identitarians, on the other. All our results demonstrate that ecology is not an isolated issue, separate from other divisive issues that are scattered randomly across the social space. Ecology is therefore not a divide in itself in the sense that it imposes its own divisive logic independent of other existing divides. This is illustrated by the distribution of climate skepticism and climate relativism. There is virtually no climate skepticism or climate relativism in the most progressive groups, whereas these attitudes are widespread, as we have seen, in the most conservative and/or identitarian groups. The same type of relationship can be observed when it comes to acceptance of transition policies. Admittedly, most individuals are reluctant to contribute, and almost everyone finds it difficult to give up sources of satisfaction or pleasure, or even simply highly polluting habits, such as flying. But for roughly equal costs, values systems are determinant, as evidenced by the majority support of Multiculturalists for almost all measures aimed at decarbonization. Conversely, climate skeptics and climate relativists are, logically, the most radically opposed to any effort to combat climate change.

All this helps to explain why climate-skeptic or climate-relativist positions are on the rise among right-wing populists. This (re)positioning along the new climate divide corresponds with a demand largely originating from within their original electoral coalition. This division is, in fact, well aligned with their other key dividing lines: anti-immigration, anti-Islam, anti-elites and even, to some extent, anti-system (cf. eco-complotism). It also offers a major advantage: it enables them to join forces with most of the traditional right-wing clusters. Indeed, because of their cultural conservatism and attachment to lifestyles that may seem stigmatized by environmentalist discourse, they are often even more hostile to transition policies than populist voters. What we are seeing is the emergence of a potential conservative coalition combining social conservatism, nativism and – this is new – climate skepticism or climate relativism.

On the other end of the spectrum, the clear divisions and alignment of conflicts should lead to the emergence of an equally powerful eco-progressive coalition. When it comes to identity and social issues, this coalition is completely opposite: tolerant of foreigners, progressive on social issues and, of course, eager to make climate change a public policy priority. In a country like France, the clusters that make it up are mostly from the political left (in all its stripes), but also in part from certain "moderate" segments. In order to prevail, it will have to make the ecological transition acceptable by integrating it into a global plan for a desirable society.

Whether we want it or not, the showdown between these two models seems hard to avoid, and the fate of the climate transition depends in part on its outcome.

Adam Tooze • Shelby Cullom Davis chair of History, Columbia University; Director of the European Institute

The storytelling of industrial policy in the United States

There's a sense that we're at a turning point in the energy transition: we are now in a position to launch it in earnest and we are collectively trying to make sense of what this means. One of the places that we go to when we are trying to make sense of a situation, a classic and a familiar one, one with a happy ending, is a romance narrative. Looking at the United States, we can draw an ideal template of a romance, as voiced by Ezra Klein in his pieces arguing for a liberalism that builds and supply-side progressivism. This narrative consists of three phases. The first is the inevitable attraction; the second is the moment of tension where everything could go terribly wrong; and the third is the moment of resolution.

The first stage is the one I think almost all of us feel in our bones: the climate problem demands a focus on technology, and that may be horrifying in its implications. It takes us back to things we always ought to have cared about intellectually. We've had a sense of the various moments in the past where States had ways of addressing this through mechanisms of planning and uninhibited interventionism. So we think the current climate problem is going to drive us towards that point. But then something shattering happens, which is an act of fate: the moment at which the climate policy issue surfaced to the front of world politics was precisely the moment at which neoliberalism and the market revolution seized control of the policy agenda.

It's one of the really cosmic coincidences that the first international meeting on climate policy took place on Monday and Tuesday the 6th and 7th of November 1989. Wednesday was a day off in world history and on Thursday, the Berlin Wall fell. This is one of these weird moments, where two ships sail past each other. Out of this example, Klein constructs this story of the 30 year hiatus, which in the American case is driven by neoliberal ideology. Narratively speaking, king Exxon separates the lovers, the New Deal and its green climax.

The joy of the current moment in American policy is that we're out of this hiatus. There was a major turn last summer when the democrats passed the Inflation Reduction Act (IRA). In contemporary America, this combination of infrastructure bills and massive investments constitutes something of a New Washington Consensus. This is compounded by other facts as well: there's more at stake than simply the questions of technical industrial policy and climate. Industrial policy sets forth the promise of resolving the class question.

Americans can't talk about class in a direct way – but what people do talk about is the middle class, so there is an effort to construct a vision of American politics that centers on the American middle class. An important project, which is very influential in foreign policy thinking, is the foreign policy for the American middle class. This is quite unprecedented. Social Democrats in Europe have never said : "We are going to formulate a foreign policy for the European working class".

In the US, the green industrial policy is part of the effort to build that constituency-based diplomacy. And what articulates these two elements together is China. It cannot be emphasized strongly enough how central it is to the American international policy imagination, how progressive protectionism can blend industrial policy and the middle class question together. What this does conveniently is to put paper over all the cracks in the wall. That's what a good narrative does.

Yet, in terms of volume, it is nowhere near as big as the hype suggests. Broken down over a 10-year period and put in relation to the enormous number that is American gross domestic product, it is one-tenth of a percentage point of American GDP. Even if we take the highest estimates – not the number used to get the bill to pass through Congress, but the one fantasized about, driven by private investment that congressmen estimate at 1.3 trillion dollars, over 10 years. That is 130 billion on a GDP that is currently 20 trillion dollars.

When it comes to its anti-China component, like much anti-China policy right now, it's just not obvious how we're going to manage it, given the position the Chinese have established across so many strategic areas – literally, our cell phones and all their successors for the foreseeable future do not exist without China. It is a fair description of the current state of the world, a kind of expressive policy

We come to learn how to criticize the politics of right populists – Meloni and Trump – as expressive. We should also acknowledge that progressives have the same tendency, the same desire: they needed to do something,

America needed to pass some kind of green legislation. We needed to feel the force of it: this is the only green legislation they're ever likely to pass any time soon. They needed to get it done.

Thus we need to be a little less positivist, a little less naive in our reading of what this data and what these numbers are, because they are political in the richest sense. They terrify the Europeans. This was symbolic politics, and the aim of the game was to demonstrate that America is back. The Chinese are watching and they're amused by the way in which the IRA is energized, supercharged. So much so that it unhinged the European conversation.

EU Past Industrial Policy

This narrative may fit Europe too. We can almost say that the EU is the child of the neoliberal state: it's pretty obvious how the Europeans had the idea of carbon pricing. It was the Environmental Defense Fund, an American neoliberal think tank, which sold the idea of carbon pricing to the Bush senior administration. It couldn't get it done in the end under Clinton, but the idea traveled to Brussels.

It's also true that the EU, which was founded around industrial policy, adopted massively more stringent State aid rules than the United States. One of the things we always underestimate when we say: "the European response of the IRA blows the unity of Europe apart and increases the disparities", is that the IRAl is doing the same thing inside the United States because the Americans do not have any limitation on what states, cities and counties can subsidize. In the United States, the IRA is a massive polarizer along a variety of very complex lines, all built into the American model.

How much do we actually buy this narrative? Does it really make sense? Because if it is its neoliberal version, there are reasons to be skeptical about the Emissions Trading System too. We can see it as an exercise in symbolism with no tangible effect. Even though it was the most sophisticated carbon pricing mechanism in the world, did it do anything? It didn't matter. And it clearly wasn't designed to, not in the fine print.

So it's a triumph of neoliberalism, a village version of it: it looks good when you have to show to the liberal inspectors that you're doing it the right way. If you look at prices rates, you may see that they are trivial numbers, they do not make any difference. Everyone has bunches of certificates and is making money, hand over fist, and selling them into this market. It's a giveaway system, a funny kind of neoliberalism.

With respect to their industrial policy, Europeans sometimes say «we went through this period when we didn't invest in the industry». It's a bit weird, because if you get into an airplane, the chances are you're either sitting in one of two aircrafts, either a Boeing, product of American industrial policy depending on oil, or an Airbus, product of Europe's largest industrial project. This isn't an incident, but a consequence of Europe's investment in defense. Defense was at the center of the European industrial policy conversation until the early nineties. Today, Airbus is a remnant of that era because aerospace is tied to the defense and the military industrial complex. If we look at other areas, for example at the energy sector from an American point of view, Europe's energy sector doesn't look as though it had a unified policy that added up to anything. Europe had three energy policies: first, the most advanced and comprehensive nuclear program in the world, which was built in conjunction with the Americans on the basis of licensed American technology; second, the dash for gas, which is an industrial policy decision on the part of a series of European states and major turbine and compressive producers; third Europe's oil majors, like Total and Shell, were huge players in the new world of global oil in the 1990s, especially in the post-Soviet space that had opened to exploration.

So since Europe's old imperious energy complex exploded out into the world in a new way, just as high speed rail started to take off thanks to European companies, it sounds a bit strange to say, from an American perspective, that Europe doesn't have an industrial policy – especially if you think of the agonizing embarrassment of America's effort to build a single high speed rail line in California.

We may also consider cars. The Europeans are slow in developing electric vehicles relative to the Chinese. There is a fascinating set of data on the adoption of the Prius, the first mass marketed post-internal combustion vehicle. It was made by the Japanese and the Californians – it's the California market, which drove the Prius and hybrid mobility into reality and into people's imagination. Tesla didn't happen by accident: it succeeded by being more attractive than the Prius. Tesla has performance. If you're a venture capitalist in California, you can't drive a Prius, it's a sloppy car. You need a powerful vehicle and that's what Tesla builds. But this is important to recognize that there was this space in the automotive imagination which the Japanese and the Americans built.

What were the Europeans doing? Where were the Europeans, "who had no industrial policy?" What they were doing was perfecting the turbo charge. This is a huge industrial achievement, to shut the diesel to a 40 mile per gallon, like six liters per 100 kilometers. We now know it's a dead end, but it used to be huge, pursued with determination and considerable government backing by the entirety of the European automotive industry.

So you can see what I'm trying to do; I'm eroding this narrative, that there was no love between industry and Europe. It wasn't the clean love that we're going to end up with, it was messy and ill conceived.

Europe's deceased energy market, and the rise of China

Did Europe have a green energy policy that worked? Yes, but not the Emissions Trading System but the so-called German model of feed-in tariffs.. The funny thing about the German model narrative is that it totally exaggerates the role of the Germans. They started it, but if you look at the data, by the end of the first decade of the 21st century, Spain and Italy were making very major contributions to this push. It was an industrial policy that was working, and we all know the narrative that is now spun about this industrial policy failure - we let the Chinese take the entire solar business. There is an element of truth to that, yet saying the Chinese killed the European solar industry is a bit like saying that someone who dies of a heart attack just before being hit by a 10-ton truck should watch his diet.

It did not matter how big the Chinese industry was. The Europeans were about to kill their own solar industry, through a combination of subsidy withdrawal and macroeconomic pressures. Funding costs were going to kill the two bits which were the most dynamic – Spain and Italy – because they're part of the Eurozone periphery. As the Spanish and Italian governments came under pressure, they had to reduce their subsidy schemes: the Europeans killed their own. So industrial policy again: we had the love affair, it was all going well and then somebody made a series of catastrophic decisions with regards to what to invest in the relationship, deciding that maybe they just didn't have time for it. They were going to dramatically reduce the macroeconomic influence.

Thus it's not so much that Europe was ruled by a coherent powerful neoliberal regime, but that it was witnessing an incoherent strategy. It was in the grips of an inconsistent set of imperatives that were pushing in different directions. There was a neoliberal architecture, functioning in the form of the ETS. But for the first phase of its life - the first decade - it was something like a facade for corporate industrial interests to pursue independent strategies. The policies were there, yet they were not coordinated. So at this point, the narrative created an impasse. This so-called neoliberalism paradigm attracted contradictions. At some point, it came apart. The ban on the Alstom/Siemens merger in February 2019 was the final straw.

Yet for a decision like that to be a final straw, there's a variety of other reasons to take into account. The February 2019 decision was cataclysmic, because it was taken against the backdrop of Trump fear and China fear, that had been built up over the previous years.It was then further catalyzed by the unprecedented Covid pandemic, which I think taught two lessons. One was that it took a coherent industrial policy to make industrial policies: everything harked on the success of the vaccines. We were confronted with the fact that macroeconomic destiny came to hinge on highly structured medical trials. In California, everything began to binge on that and the collaboration between laboratories was essential to the whole world.

The other imperative was simply this one: Berlin and Paris had to come up with some kind of rationale for the large-scale recovery plan. At that point, ecological neutrality in the broader sense of the word went out the window: you don't just simply say we need an investment package, you say we need an investment package in digitization and green. Once you've done that, you can swing Angela Merkel's modernized CDU beyond the decision and you're off to the race. This was a critical shift.

Will it be fast or effective enough, whatever industrial policy emerges from the plan? We constantly need to be critically aware of the gap that can open up between discourse and the formulation of policy. And how do we pay for this green industrial policy? How do we ensure profit sharing as well as risk sharing? How, to avoid being irrelevant, do we help foster a global version of these policies?

We know what's happened since Russia's war on Ukraine. The Biden administration confirmed that the Americans may be back, but that they were not the same old Americans. These are new Americans and their new rules change the terms; that decision launched a mutiny from national governments across Europe.

The cost of decarbonization

The transition toward a carbon-free economy will necessitate huge investments. To do some stabilization of the climate over the next 20 to 30 years, we are talking about trillions of dollars per year for the next 30 years. Four trillion is a kind of consensual number - 4 to 5% of the global GDP. That's the amount of defense spendings during the Cold War. The Federal Republic of Germany did 3% annually without flinching in the seventies and eighties. We need to get there, and we are consistently falling short, not by an order of magnitude, but by multiples - we are way off.

Could we do this? Is this sustainable? Let me introduce one of the great narrativizers of the capitalist world: Mckinsey made an estimate of the viability of decarbonising Europe two years ago and according to their figures, a carbon price would be enough to pay for it. Breaking it by sector (business, building, power), a carbon price of

100 euros per ton would cover the amount of all of the investment in Europe.

Geoeconomics of decarbonization

Let's begin to explore the uneven and combined impact of this kind of price and energy shock on the global energy economy and on the world economy at large. Imagine if we are in this world where the case for a massive shift to renewables is becoming very hard to argue against in places of proper carbon pricing like Europe - and let's just say, for the sake of arguing, in China - what would happen?

If you're China and Europe, the case against green shift is pretty undefendable: it will be cheaper and it gives you better energy security. So China, Asia, the Eurasian bloc begins to decarbonize. The consequence of that is that demand decreases in the longer terms for fossil fuels. Fossil fuel produces a spike for the remaining demand. Yet the carbon pricing in Europe and China prevents the rebound effect from happening and you don't get a surge in demand for the cheap fossil fuels available.

But the consequence of a scenario where the global demand for fossil fuels is shrinking is well-known. The last producers stand on their own and influence prices – Saudi Arabia, for instance. This leads to a lateral damage, a bunch of high cost fossil fuel producers. A group of researchers simulated the accumulated macroeconomic gains and losses by country. Europe and China would make huge gains from this shift - whereas the United States would incur losses. This is not bankruptcy, we're talking about a 2 to $4 trillions loss over a matter of decades, the American economy is 20 trillion. So what we're talking about is concentrated losses for key interest groups. Another paper the same group published last year spelled out the stranded asset losses. Anglo-American fossil capital is severely hit by this process. The analogy here would be to the grain price shock in European agriculture in the 1870s and 1880s. What you got out of that is a segmentation of agricultural markets By the 1930s, essentially the agricultural markets of the world were pulled apart into self contained lots which persist to this very day.

A global energy transition within the Eurasian system would require banks to offset the cost, but we can usually imagine that emerging in America. It's a little known fact, but in the fifties and the sixties – in fact, from the thirties onwards – oil imports to the United States were banned, because at the time American oil producers out of Texas, Oklahoma and Pennsylvania were high cost producers. We think of America as being a low oil cost country. That's only because they don't charge any tax. The Europeans and the Japanese were getting the truly cheap oil, but they were lending huge amounts of tax on top of it. So America, between the 30s and the 60s, operated a high cost closed protectionist oil economy - its multinationals of course operated both sides of the fence. One could imagine some kind of scenario like that as a potential future. It implies conflict.

We can already see the argument beginning, or rather the efforts to defuse the argument between the European and the Americans. The White House wants to communicate that Europe and the United States declared peace in the Green Energy War, so they want to begin negotiations on a critical Minerals Agreement. They want a clean energy incentives dialogue to achieve incentive alignment – a euphemism for «defusing the IRA». The Trade and Technology Council should coordinate EU and US actions against China; a global arrangement on steel and aluminum, that was first noted at COP 26 in Glasgow, should be concluded this year.

Then, the US is looking globally. They want to do a global partnership on infrastructure investment. This is Europe and America's answer to «One belt, One road». It is a classic: lots of talk and virtually no money.

Is the US a reliable partner?

The rivalry with China

The question that Europe needs to ask is the reliability and cost of this potential deal. If you look at the losses already out there in the American portfolio, in terms of stranded assets, if you look at the scenario for decarbonisation and its impact, should anyone in their right mind trust the Americans as a partner in decarbonisation?

The answer is on the basis of the underlying structures of the situation: the world's largest exporter of fossil fuels - which is what the Americans are - is an unlikely partner for Europe in the long term. The liberal Americans know this too and are working really hard to make up for this. European realists should look at this and see what's being sold to them. The other element that a European realist really has to oversee is the China factor. If you look at every single one of those proposals - the raw material proposal, the Trade and Technology Council, the aluminum and steel agreement, the G7 initiative on infrastructure, the shift in the World Bank leadership, they are all part of the American grand strategy of trying to find allies into a containment strategy of China.

It's a completely explicit strategy on their part. For Europe that poses quite fundamental dilemmas. Many organizers of the continent have from their position a pessimistic sense of Europe caught between a rock and a hard place. Europe has quite a lot of agency here, and needs to think about what its options are and center those options in relation to the scale of the problem.

This is where how you define the problem comes onto the stage again, because if you start from the position of a European employment policy, or an industrial future for Europe, or from the point of view of European integration as your key object of interest, you are headed down in one direction where China appears obviously as the major threat to the survival of what's left of the industry in Europe.

The fight against climate change

If we look from a climate perspective, the whole problem is that it's rather different. If we're neutral as to how Europeans are going to earn their living: in the end, it doesn't really matter where the steel is made, as long as it comes in when we buy it. If we adopt that position, it's contentious, looking at this from the point of where the action in the energy transition is. The answer is unambiguous.

According to Bloomberg data of the investment in renewable energy last year, it amounts to 1.1 trillion globally – more than twice the investment in fossil fuels. That's the good news. But half of that investment is in China. It's even more dramatic when you look not at the total output and the total investment, but the upstream investment in the battery factories: 90% was in China over the last five years.

They're completely predominant in sector after sector, batteries, solar panels, electrolyzers. Surely these markets are going to hugely expand in other countries, but we have to recognize China's existing position and its implications. There's a climate consequence: you just have to look at the global pattern of emissions today as opposed to in 1990 to understand the reality of it: China by itself is responsible for more emissions than the entire G7 put together. And the other growth from 1990 to today is in the G20 - Indonesia, Pakistan, Turkey and the Middle Eastern States.

I'm not saying this from the point of view of a climate justice argument. I'm saying this from the point of view of political pragmatism: "where can you actually solve this problem and what if you have a broader and Western understanding of where we stand in the world?"

Right now we are waiting for the moment when Chinese GDP will overtake that of the United States. We ask ourselves whether China will ever catch up with the United States in terms of military power, meanwhile China's emissions overtook those of the United States in 2004. The Kyoto Protocol actually sort of knew that this was going to happen, and they understood the way the balance was going to shift. China pulled more concrete in three years in the early 2010's than the United States in the entirety of the 20th century.

This is not balanced by Western industry; it's a trivial additional element to a story, which is Asian-centered, driven by one of the most epic developments of urban civilization in history. We should credit the Chinese for what they've done. 600 million people moved into cities in the space of 25 years. It's like every American industrial revolution rolled into a single generation at our current level of technology.

That's what drives the balance in a fundamentally different way. And the fundamental point is that we no longer control our own destiny – by «we», I mean Europe and the United States. Consider for instance a warming world. With a gain of 4 to 5 degrees, all the tipping points are activated. In the sort of scenarios that we're headed towards, with all the difficult choices with regard to decarbonisation, to adaptation, to loss and damages, these choices will fundamentally be made in Asia – at this point, they are driving the whole process.

Europe and the United States should realize that they are not free riders, but passengers on a train being driven by others.

Laurence Tubiana • CEO of the European
Climate Foundation

For a European Project for Peace, Democracy, and the Climate

Introduction

The most sweltering temperature in 120,000 years.[1] A devastating invasion that has been redefining the European space for the past 18 months as Russia now brings its threats to Poland's doorstep. From arms to energy, Ukraine and the climate crisis dominate the European Union's day-to-day and are reshaping the political landscape.

Taken together, these challenges will shape the new face of European peace.

For the Ukrainian people, as well as for our shared European aspirations, we must start working today on the idea of peace, not only as a utopian ideal but as an urgent necessity. Rising tensions and the amplification of war messaging have turned our societies upside down. Now, more than ever, is the time to reflect on and debate peace, to define its contours and build a movement for peace, climate, and democracy. While Ukraine must preserve its territorial integrity, true peace will be achieved through a project of European consolidation and expansion. It must resonate far beyond the geographical limits of Europe.

This war cannot be summed up as a fight for territory: it is intrinsically linked to energy challenges, fossil resources, and the climate imperative. We are at a historic turning point, when the idea of a Europe that is peaceful and the pillar of a liberal order has been weakened. Consequently, Ukraine's reconstruction within Europe

and the end of fossil fuel use are intertwined. Post-fossil Europe must anchor energy and climate peace at the core of its ambitions.

This vision arises from a critical obstacle: today, European dependencies are being used as weapons. Europe is unavoidably emerging from an era when it depended simultaneously on the United States for its military security, China for its supply chains, and Russia for its gas, oil, and coal. These basic assumptions of European security have been shattered. It is therefore necessary to revisit our European security concepts and lay new foundations.

As Spinoza said, "Peace is not an absence of war, it is a virtue, a state of mind, a disposition for benevolence, confidence, justice."[2] To make the transition from security to peace, our political and diplomatic models must be revised. If this vision is to be supported by creating human and climate security, it is, in a sense, a new Monnet Project: the new project of European democratic and ecological peace that must – urgently – be set into motion.

By redefining peace as not simply the absence of conflict but as the preservation of our planet and the well-being of its inhabitants, the European peace project offers a vision. This direction offers European citizens a raison d'être, leading them to a new status quo where the post-fossil era will not just be an ecological necessity, but also a new foundation for social healing and future prosperity. The Green Deal – made possible by the last European elections –will perhaps face its greatest challenge next year. Can we both secure our gains in the event of an electoral setback while continuing to encourage all our citizens to want a Europe that is climate-friendly, clean, and at peace?

One thing is certain: the weak showings of the far-right in Spain this summer show that the climate skepticism fully embraced by Vox, which promoted "drought as opportunity"[3], never carries as much weight at the ballot box as we may think. Even if doubt and denial remain roadblocks within institutions and in day-to-day politics, progressive forces must capitalize on this more nuanced observation, and offer a positive vision that would enable us to emerge from the current crises from the top down. This is the hope outlined here.

In the shadow of fossil fuels, a new Monnet Plan?

From Ukrainian reconstruction to the European Political Community, a new Monnet Plan is taking shape in the shadow of fossil fuels. The Monnet Plan, established in the aftermath of World War II, recognized even then the role of energy (coal) in reconstruction and European peace.

1.   July 2023 Is Hottest Month Ever Recorded on Earth, Scientific America, July 2023.

2.   Spinoza, Traité théologico-politique, 1670.

3.   How Climate Change Is Fueling The Rise Of Spain's Far Right, Politico, April 2022.

By mutualizing resources – including coal and steel – between nations who were once enemies, the plan's aim was to prevent any future conflict by making war "not merely unthinkable, but materially impossible", as Robert Schuman's declarations stated in 1950.[4]

Today, in the midst of another type of crisis, the problem presents itself differently. To shift from a narrow vision of security to a more complete notion of peace, it is essential to forge a new project that goes beyond access to and control of resources, and is less rooted in the idea of sovereignty and centralization. Renewables can free us from this model, and the reconstruction of Ukraine is already showing this. A return to its pre-war status quo, steeped in fossil fuels, was completely unthinkable. Such a model would not only compromise its sovereignty, but would also alienate potential investors for a cohesive, modern vision of a reconstruction project. For a real recovery to take place, a paradigm shift was essential.

Collaborative initiatives, such as the German-Ukrainian partnership[5], are rapidly installing solar panels on essential Ukrainian infrastructure. The green energy grid – with sun and wind at its heart – not only promises a sustainable future, but also offers immediate relief from today's challenges by decentralizing Ukraine's energy system and already making it more resilient against Russian strikes.

Ukraine's green renaissance is already under way. Solar energy, for example, is actively strengthening the health sector. Confronted with Russian assaults on hospitals, which cut some off from electricity, certain NGOs have begun to install solar panels on these buildings, providing them with reliable, economical, and ecological energy. After being destroyed by a missile strike, Horenka Hospital, near Kiev, was brought back to life thanks to green technologies.[6]

From Horenka to the entire country: such a vision requires the collective effort of the European community. It calls on European nations to support and finance renewable energies at the necessary scale throughout the entire country, including through concessional loans and insurance mechanisms to secure the volume of investment required. Renewable energies are the pillars of a modern economy, attracting international, public, and private capital and bringing Ukraine in line with its European counterparts. This is the transformation that the Ukrainian government and its people are waiting on Europe for. The foundations are laid; all that remains is for European partners to fully commit themselves. And if Ukraine's ecological transition echoes its European ambitions, the same dynamic triggered by the invasion cataly-

zed a historic moment of European political redefinition.

The nascent European Political Community has demonstrated an appetite and imagination for this plan, along with a potential future eastern expansion of the EU. It is difficult to fathom the full scope of such a project. Ukraine would be the fifth largest member of the bloc, and the poorest. New members – including Ukraine as well as potentially Moldova, Bosnia-Herzegovina, Montenegro, North Macedonia, and Serbia – would benefit from EU funds. More broadly, Ukraine's accession would weigh heavily on the EU's finances, particularly in the areas of CAP and regional spending, which together represent more than 60% of the seven-year EU budget.[7] The risks of a Europe moving at different speeds are very real, but its energy and climate dimension could become one of its driving forces.

Over the last few years, through Covid and the invasion, the Green Deal has shown at multiple turns its capacity for institutional and political mobilization. The supranational dimension of the EU's climate policy contributed to stimulating the climate ambitions of 27 nations, and the EU's climate policy proved to be more resilient than the policies of national governments: for now, governmental changes have not brought about any real changes in direction or serious questioning of climate laws.

This resilience also stems from an awareness in Brussels and most European capitals that European leadership is essential to meeting the objectives laid out in the Paris Agreement, even if the EU only represents about 7% of global greenhouse gas emissions. This is because its carbon footprint represents 10% of the global carbon footprint, a third of which comes from imports.

This is also due to the fact that, as the largest single market in the democratic world, EU legislation and norms act as a global driver for climate action. Overall, and across the continent, today's leaders have completely integrated the fact that the invasion of Ukraine also targets democratic Europe, and Europe transitioning to zero carbon development, as the implementation of the RePowerEU plan demonstrated.

Europe must therefore stay the course and pursue decarbonization independent of any geopolitical or geoeconomics turbulence. And if Europe has largely maintained a steady engagement in regards to climate action, we are approaching a turning point which requires greater vision of the necessary transition to a net-zero emission society.

Internal fractures are a threat to the European climate agenda

4. Robert Schuman Declaration, 9 May 1950.

5. Ukraine and Germany launch joint project to equip critical infrastructure with renewable energy sources, Ministry of Energy of Ukraine, May 2023.

6. Building Ukrainian resilience: the green reconstruction of Horenka hospital, Green Peace, February 2023.

7. The 'monumental consequences' of Ukraine joining the EU, Financial Times, August 2023.

This resilience of Europe's climate objectives also reflects the challenges they constantly face. Even as the Green Deal is entering the implementation phase at the national level, identifying the concrete shape of this Monnet Project is proving to be a difficult task. At the moment when I am writing these lines, in the relative calm of a political summer break, obstacles continue to arise: in early August, the Polish government filed an appeal with the EU Court of Justice against the Carbon Border Adjustment Mechanism (CBAM) and the ETS reforms.[8]

At the same time, and following months of normalizing, the price of European liquified natural gas (LNG) saw a sudden increase of 40%, fueled by strikes at LNG installations in Australia and major maintenance projects on Norwegian infrastructure. We are therefore not out of harm's way of a difficult winter. Europe seems to be on the right path to fill its storage capacity before it has to dip into its reserves this autumn, but the situation underscores the fragility of global energy markets and potential supply chain vulnerabilities, reminding us to what point fossil energy markets – even with stable and allied nations – are interconnected and susceptible to unforeseeable fluctuations.[9]

How do we stay the course? The challenges taken together could be summarized in the following way: First, it is obvious that the creation of a post-fossil plan is not limited to energy production and fundamentally affects sectors such as finance, transportation, and industry. This relationship is complex and multidirectional and will require major investments as well as solid and steady political and public support in order to overcome the many concrete obstacles in Brussels and within member states.

Secondly, Europe's search for other sources of fossil energies after the invasion has itself fueled instability and harmed Europe's climate credibility. We must fully envision an alternative based on networks and investments in clean energy and green hydrogen production – particularly with close neighbors in Africa, the Middle East, and Central Asia – as an alternative to the current model of energy diplomacy based on gas and oil.

Finally, in a moment of global polycrisis, Europe has been even more rattled by energy price shocks, inflation, supply chain crises, socioeconomic inequalities and division, and the fear of democratic backsliding: all of which are potential barriers to decarbonization.

The European Commission's 2023 Strategic Foresight Report also offers a sober assessment of the challenges ahead. In particular, it highlights that additional investments of more than €620 billion will be needed annually to meet Green Deal and RePowerEU objectives; this is in addition to the €578 billion the EU already plans to spend – at least 30% of its budget – on climate-related actions for the 2021-2027 period.[10]

Within this context, the basis of a post-fossil peace must be reinforced by European societies, at a time when the often anti-European or anti-climate extreme right is on the rise. In order to counter hostile reactions and make climate action more resilient and diverse, ambitious climate policies must be based on citizen participation in ways that reflect public policies. It is through local mobilization and public discourse that the hold that climate deniers have on this debate can be fought. It is through efforts for a just transition that conservatism, which profits off the status quo (€4 trillion in revenue in 2022 for the oil and gas sector), can no longer invoke social justice and purchasing power.

Poland is an excellent example of this tension. Even while attacking the CBAM and ETS reforms in relation to its energy system, which is still highly dependent on coal, the invasion of Ukraine has nevertheless radically transformed the perception of danger related to fossil fuel dependence and has produced a promising increase in investments for new clean energy infrastructure.[11] This is an inflection point.

In Poland, as elsewhere, a large number of obstacles to this investment in infrastructure should be lifted at the national level, and national energy and climate plans, as well as national spatial plans for renewable energies recommended by the Commission, currently being developed through 2024, will be major concerns if society wants to address today's challenges.

Preventing energy poverty and tackling social justice problems head on rather than as an ex-post remedy, must be the guiding principles for a political vision that is both sufficiently inclusive and up to the challenge. A concrete example: the European objective of quadrupling the installation of heat pumps by 2030 (compared with 2022) must be underpinned by considerations of equity and justice, to ensure that less affluent households have access.

This summer, the fierce political debate in the United Kingdom around the introduction of ultra low emissions zones also demonstrated how automobiles will once again, and will always be, a powerful tool in the hands of populist movements to derail the climate agenda[12] despite the fact that renewable energies are proving to be increa-

8. Poland Challenges EU Carbon Border Tax In Court, Bloomberg Tax, August 2023.

9. European gas prices jumped nearly 40% on Australia supply fears — and analysts expect further rises, CNBC, August 2023.

10. Communication From The Commission To The European Parliament And The Council, 2023 Strategic Foresight Report, Sustainability And People's Wellbeing At The Heart Of Europe's Open Strategic Autonomy, Commission européenne, July 2023.

11. Poland's renewables capacity growing but coal still dominates – report, Euractiv, May 2023.

12. London's expanding clean air zone sparks economy-vs-environment fight, Reuters, July 2023.

singly affordable. From the Yellow Vests in 2018 to the hostile reaction in Germany in 2023 against bans on gas heating[13], which threaten to spread to European policy as a whole, these are well-known dynamics and should be better anticipated.

In order to achieve the ecological transition at the European level, it is essential to adopt a decentralized approach and to closely involve local authorities and civil society. Initiatives such as Eurocities[14], which includes together more than 200 European cities and 130 million citizens, show the way. By giving priority to the citizen and the local level, institutions can move beyond a purely transactional logic, in which the EU is seen only as a source of subsidies, to rebuild a shared vision of Europe's common destiny.

The war in Ukraine has already allowed progress to be made in this area – as Poland has shown. Other Central European countries, such as the Czech Republic and Slovakia, have demonstrated successful integration after an initially mixed start.

Involving citizens and local authorities is therefore crucial to developing concrete ecological transition initiatives adapted to the realities of each territory. This bottom-up approach is essential. Nevertheless, it must be part of a coherent, voluntary European framework. Indeed, the global geopolitical context is forcing Europe to radically rethink its industrial and energy strategy.

Linking industrial, trade, diplomatic and climate policies

The passage of the Inflation Reduction Act (IRA) in the United States has transformed the climate, trade, diplomatic and geopolitical debate. The invasion of Ukraine is happening against a backdrop of instability and tension between the United States and China. The growing emphasis on investment policy and increased protectionism is redefining global economic rules in real time. The previous principles of globalization and free trade have been replaced by a new status quo, whether one sees this as a "new Washington consensus" or something else.

The recent adoption of the Inflation Reduction Act in the United States presents the EU with new competitive challenges. This means massive investment in renewable energies, clean infrastructure and green supply chains. This is the only way for Europe to successfully achieve its ecological transition and preserve its strategic autonomy. It is no longer just a question of decarbonization, but of the paths that are vital to Europe's industrial security and competitiveness.

13. Thermal turnaround: German government settles dispute over heating law, Politico, June 2023.
14. https://eurocities.eu/

The European Union's response through the Net-Zero Industry Act (NZIA) and the Critical Raw Materials Act (CRMA) are a start. More broadly, we will see an ongoing quest for the right balance between protectionism and free trade, interventionism and liberalization, centralization and national solutions, regulatory consistency and bureaucratic simplification. It's a tremendous challenge.

On the international stage, Europe's role has been complicated by the Russian invasion, which is sometimes perceived in the wider world as a European problem, or as the West stirring up global turmoil. The 2022 European "gas rush" in Africa to replace Russian gas has prompted accusations of hypocrisy and unfairness, particularly from the countries of the Global South. Europe's increased isolation from emerging economies – if left unaddressed – could have negative consequences for the international climate agenda, especially at a time when confidence has been eroded. U.S.-China tensions are complicating the situation. Europe must define its own role outside of the 'Thucydides trap' and continue discussions to preserve the political space necessary for climate action. In order to achieve this, Europe should develop a more sophisticated dialogue on how its decisions – for example, the EU's deforestation-free supply chain law or the CBAM – will impact its international partners.

European climate and energy diplomacy must focus on aligning interests with key international partners, integrating issues such as trade, investment, liability and regulation, as well as the joint development of sustainable supply chains for transition minerals and energies such as hydrogen.

As green industries require critical materials from Africa, Asia and Latin America – sectors often dominated by China – Europe's vision of a new, green industrial revolution must set itself apart by establishing a new kind of diplomacy with regard to raw materials, as well as trade rules guaranteeing sustainable extraction and respect for human rights. Europe can also learn from its global partners, by integrating their views and best practices into the development of new standards. Several African and Latin American countries that export materials critical to the industrial transition are considering their own transition away from fossil fuels. Europe must commit itself to responding to these initiatives, by breaking with the extractivist model and working out with them a new model of "global" social contract. By joining forces with Europe, exporter countries must capitalize on their resources by extending their value chains, thereby retaining a greater share of added value and developing co-investments.

Conclusion

The Green Deal remains the world's most comprehensive climate plan. The European economy is separating

growth from carbon emissions. Despite pandemic and war, Europe is staying the course on climate.

Although the gas lobby has won some battles, Europe's clean energy transition is moving forward, and will not retreat. As Ursula von der Leyen recently pointed out, Europe has now produced more electricity from the sun and wind than from oil and gas for the first time in its history. While emissions continued to increase worldwide in 2022, the European Union was able to reduce emissions by 2.5% despite the turmoil.

Europe is already showing the way towards a post-fossil peace.

While Europe has committed, through the Green Deal and substantial budgets, to playing a leading role in the fight against climate change, it has yet to translate this commitment into concrete action, particularly in financial terms. Despite undeniable progress in decarbonizing its economy, many challenges remain to fully align European and global financial flows with the resilient, low-carbon trajectory, in accordance with the Paris Agreement. The context of monetary and fiscal restraint makes this task even more daunting.

However, there are ways of mobilizing the financing needed for green infrastructure and filling the regulatory gaps that fuel public distrust: strengthening dedicated European channels, combating greenwashing, and harmonizing public tools with climate objectives. Europe also has a key role to play in reshaping the international financial structure and securing the means for a low-carbon transition in the countries of the Global South.

The challenge is to translate Europe's political and eco-nomic commitment to climate change – climate funding of €23 billion in 2021 and official development assistance of €67 billion in 2020 – into an effective and sustainable cooperation agenda on climate and development.

Though resilient, Europe's climate objectives are constantly facing obstacles, from challenges – including legal ones – to the Green Deal to the volatility of fossil fuel prices.

In order to stay on course towards decarbonization, Europe must make massive investments beyond the energy sector, develop real alternatives to fossil fuels based on renewables, and overcome the socio-economic divides that have been exacerbated by the current polycrisis and that risk halting progress.

Europe can lay the foundations for post-fossil peace by building a society around socially just climate objectives. Faced with geopolitical and economic challenges, and the transformative impact of the Inflation Reduction Act in the United States, Europe must continue to be a climate leader by developing a green industrialization strategy based on international partnerships for sustainable and equitable supply chains in order to restore trust and ensure a just transition on a global scale.

But in order to fully assume this leadership role, Europe's partners are looking for investments more than anything else, a promise that is difficult to keep given current circumstances. To echo a point already made in these pages, this vision of post-fossil peace will inevitably require a different conception of investment and debt, and a conception of green investment that puts our climate debt ahead of our financial debt, in order to truly serve future generations[15].

15. Laurence Tubiana, Elliott Fox, Réparer un monde cassé : un nouveau consensus pour la finance globale, le Grand Continent, June 2023.

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A New Model For The Ecological And Social Revolution in Africa

An observation: rural farmers left behind

Africa is at a crossroads. Without proactive social policies to improve the population's well-being, there will be no economic development and no ecological revolution. Failure to take this fork in the road would see us move, whether slow or fast, towards chaos – reaching far beyond Africa's borders.

In Africa, just as elsewhere, the ecological transition must go hand in hand with a social transition, towards greater justice. Despite bearing the least amount of responsibility, the most marginalized people are most vulnerable to climate change due to the lack of resources needed to adapt. Small farmers in sub-Saharan Africa are among the first to be affected by climate disruption, which impacts soil activity first and foremost. According to French agricultural research institute INRAE, climate change has already reduced their productivity by 20% since 1980, particularly in the tropics where conditions are more extreme and soils more fragile. This affects three quarters of farmers – the largest number – who still produce nearly 80% of what we consume in sub-Saharan Africa.

Africa is therefore one of the regions which faces the greatest number of challenges. With its population set to double over the next twenty-five years, despite the demographic transition that is underway, the decline in productivity and soil fertility over the past 40 years has reached untenable levels for rural African farmers, who are among the continent's most overlooked population. Rural areas have been largely neglected. Cities have been given pre-ference in the name of political stability and progress without small farmers in mind; but these farmers have reached the limit of their capabilities and can no longer absorb the rural exodus. This trend has continued despite efforts to adapt, which have led to improved techniques – agrochemicals, as well as combining agriculture and livestock farming – and to an increase in the population since 1960, thanks to the expansion of crops on pastureland and forests.

For those left behind, whose numbers will continue to grow, the future will be one of migration out of the continent – since internal migration to cities or the richest countries has already taken place – which has been kept in check as best as possible until now. For those who stay, the future will be one of resource conflicts that will degenerate into "interethnic", regional, and intercontinental conflicts, all under the specter of terrorism. Such conflicts have already broken out between farmers and herders in the Sahel and Central Africa – or between mining rivals, as in the DRC and Rwanda.

To paint an even darker picture, we are witnessing increased resentments and identity-based divisions, which are sometimes exploited by populists. They are the result of a lack of prospects for the future and the demand for a better life. Young people – who did not experience the African independence movements of the 1960s, but rather lengthy authoritarian regimes– are now rebelling, both in cities and in rural areas. If democratic momentum is derailed and concrete solutions are not forthcoming, the continent's fragile geopolitical equilibrium will be threatened – and conflicts could even spread beyond the continent. And yet, these two axes of public policy are complementary rather than antagonistic. This is particularly true in Africa, where social practices and the collective consciousness have, to some extent, resisted the commodification of human relations and the damage caused in the wake of the liberalization of trade flows.

The failure of development policies

Let us return to cities and "development" failures. African economies, agriculture, and institutions are currently at an extremely weak point that is hard to imagine getting worse. Consider the explosion of menial, informal jobs, the complete lack of industrial jobs, and the wealth held by the political elite and the administrative class, who are increasingly unwilling to share with the impoverished rural populations from which they come.

What's more, economic extroversion and resource predation have continued under independence despite attempts – which were often nipped in the bud – by a handful of African leaders who were educated during this period. Later, a new world economic order increased trade openness on the pretext of a perfect and unassai-

lable theory: under unbearable competition – high agricultural and industrial productivity, subsidies – it smothered any hope of endogenous development, while failing to ensure a livable position as a satellite. Africa has found itself in a state of dependence that is only getting worse.

Theories in favor of liberalizing flows nevertheless left the free movement of people in the shadows. This oversight was managed after the fact by Western countries within the framework of an "every man for himself" policy in Africa, and did not hesitate to support authoritarian regimes – who acted as guardians of preliminary flows. We could hold up a mirror and point out that between 1850 and 1930, no fewer than 60 million Europeans migrated to overcome the rifts created by industrialization and demographic growth.

A method that should be revived: foster solidarity through the commons

What future, and more importantly, what ecological revolution, what "economic and social progress", what environmental protection, can we envision for the continent when we can no longer blanket Africa with 2 billion tractors, cars, and air conditioners at a time when populations, and in particular small farmers, are becoming increasingly impoverished – with no access to water, no indoor toilets, no electricity, no motorized vehicles, and no industry either? Finding answers – from the local to the global – to the major issues that are currently threatening the survival of populations and world peace is our main challenge. The human community is no longer blind: with a third transition, that of digital technology, everyone knows everything all the time. And poverty is becoming increasingly unbearable for those who have nothing as they are faced with those who have everything. Rich countries have no shortage of poverty and the needy, and clearly do not know how to share their abundance.

What is needed is more jobs and a more dignified life for all people, meaning civil human rights, which will happen through redefining priorities and basing public policy on the endogenous strengths of a continent that has no shortage of them. For this to happen, it is imperative to bring about a change that makes development, environmental sustainability and the well-being of all not only compatible, but, more importantly, complementary. This would be a truly "sustainable" future, meaning tolerable for all – and one that can be "supported", in Africa as well as the West.

This is not a matter of abandoning so-called modern well-being – even though this has been aided by colonization, exploitation and a quasi-religious hold on people's minds – but, in order to base public policy on a long-term strategy rather than a mad dash into the future, we need to redefine human well-being in terms of a different relationship with the living world. To accomplish this, we need to return to the best traditions of times past, when human beings knew that they were living beings among others, an idea now lost in our materialistic world. Faced with the threat of collapse, the stakes are high; an enviable and desirable future must be re-established, in the South as well as the North. In Africa, endogenous forces already exist to channel this new momentum. I have referred to them as the common goods or the commons to be developed. These forces bring into full play the different levels of democratic subsidiarity adapted to each of the issues at stake. The commons to be promoted fall between the market, which is too inefficient, and the State, which is too weak and further weakened by structural adjustments and its dependence on the interests of multinationals and major powers.

In some places, life is based on the common good. This is illustrated by social practices, collective symbols, and dynamic family solidarities – whose current perversion is tribal solidarity. This local solidarity could be used within the framework of a bottom-up democracy committed to inclusivity and the ability of local practices to be reproduced. What's more, we need to capitalize on the inventiveness and creativity of our young people, who, with limited resources, are reinventing African low-tech every day. Digital technology and mobile communications have proven to be powerful tools for accessing information; we need to cultivate economically and socially useful applications.

On the economic side, large-scale public policy should be financed through common money – freed from the comfortable but counterproductive parity of the euro – and through the unused savings of the middle classes, guaranteed by international public financing and backed by regional integration schemes. The latter would be more relevant than integration on the scale of inherited colonial borders alone.

Universal access to sustainable, decentralized energy – solar, wind, geothermal, hydraulic – is a very attainable objective in this context, and an obvious factor in sustainable endogenous development, alongside the well-being of populations. The ability of small-scale farmers to move towards more productive techniques without the use of motorized equipment or aggressive agrochemicals, based on ancient agricultural practices and diverse land use patterns, is no longer in question – even though these practices are threatened by private acquisition and international land grabbing. Through these techniques, a more climate-resistant plant heritage could be developed than is possible with the standard technical packages of the "green revolution", as well as a heritage that is less dependent on the energy-intensive inputs from multinationals.

At the same time, the continent's wealth of biodiversity and the environmental benefits provided to the world by its vast primary forests and small-scale farmers are still undervalued; farmers today are too poor to degrade their land through agrochemical and mechanical means. The continent, particularly the sub-Saharan region, is almost carbon neutral, but it is under greater threat from climate change – but it is forced to remain so due to the effects of poverty and global environmental constraints.

Implementing African solutions: new public policies for the continent through international "rational solidarity"

In my most recent book[1], I outlined the major elements of an African solution within the current context, based on the strengths mentioned above.

First and foremost, the only significant source of jobs is in rural areas; the agricultural sector is the only way to reconcile the growing scarcity of fossil fuels with the well-being of all people – meaning that it would help achieve social justice. This requires small farmers to intensify their land use using agro-ecological methods in order to double their current low yields, enabling them to feed the population as well as themselves. Through agro-ecological and agro-forestry science, the combination of low-tech and high-tech knowledge and techniques allows for infinite use of the sun's energy and the air's nitrogen, optimization of water use, resistance of biodiversity to climatic hazards and parasites, sustainable exploitation of the soil's mineral elements via plant roots, and improving organic fertility and carbon-fixing capacity.

Secondly, building on this foundation, local sourcing and consumption must become the rule in both the south and the north, encouraging the transformation of local resources into artisanal and industrial products. The current growth of multiple dependencies must be reined in. This ambitious program has certain conditions: it's what I call neo-protectionism, or rather "just trade" – not dogmatism, but economic pragmatism. With regard to these crucial issues, we must protect Africa's farmers and processors from unsustainable competition from developed countries, by taking advantage of a protectionist tax system. Furthermore, consumers – who are already well attuned to these issues – need to be encouraged to prioritize this general interest, and the poorest urban residents need to be supported in the face of soaring food prices.

Lastly, there needs to be massive public investment in rural modernization and the agro-ecological revolution for small-scale farmers – in other words, a "doubly green" revolution. Life in rural areas must finally mean education, health, and sustainable electrification; this will also require a rapid demographic transition and progress in education coupled with progress in women's rights – through the education of girls and boys, at least through the secondary level and in decent conditions.

To contribute to this enormous ecological investment, the environmental benefits provided by the continent, in particular by its rural population, must be fairly compensated: not by further deforestation, but by reforestation; not only by massive carbon sequestration in soils and vegetation, but also by developing sustainable energies. Let's not forget the commitments that developed countries have been making to the UN since 1970, which have barely been honored: 0.7% public development aid, the use of Green Funds, Loss and Damage Funds and Biodiversity Funds.

In my view, this is the solution for Africa, at a time when the 2030 development goals – the end of food insecurity and the end of poverty – remain non-binding and will probably not be met by the agreed date. What is needed is a far-reaching change, a transition like that called for by the United Nations Secretary General. Global crises – banking, health, war – have shown the global system's vulnerability, especially for African countries. The spread of conflict in the Sahel and Central Africa is hardly cause for optimism: critical lines have been crossed. Western support for authoritarian regimes seen as stable and complacent doesn't help matters – because young people are champing at the bit and ideas are circulating.

More broadly speaking, this is a battle of ideas. We need to counter the pervasive illusions of "development" that lacks human development perpetuated by multinationals; we also need to counter the general lack of understanding about the daily lives of half of Africa's population, who are considered backward – a misconception that has been perpetuated by decades of agribusiness glorification. Finally, we must defend ourselves against ecology-bashing, defeatism, and retreat.

If the right of all people to a dignified life was not already a sufficient argument for change, if the responsibility of each and every one of us for the fate of a billion human beings who are still in a state of survival were not enough, we would have to hammer the point home that such a change must be made, if only in the name of international "rational solidarity".

1. Une solution pour l'Afrique : du néoprotectionnisme aux biens communs, Odile Jacob, Paris, 2022.

03

After the fossil space
The scales of living: case studies, practices and projects for the city of the future

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A heritage in question

Despite being extremely short on the geological timescale (+/-150 years), the Fossil Crescent's industrial history[1] – the likely cause of our civilization entering the Anthropocene – left deep and lasting traces on all regions involved.

For the first time in human history, the massive mining of riches buried deep beneath the ground gave rise to a built heritage of unprecedented technological and structural richness.

The depletion of one world (the soil) fed the wealth of another one (the above ground).

This state of affairs, which is inherently unbalanced and unambiguous, is now seen for what it is: human activity has become self-destructive.

Heated to a temperature of 1,100 degrees for about twenty hours, coal is turned into coke. This new fuel, indispensable to the rise of a productivist civilization, led to the emergence of materials with remarkable properties. By reaching temperatures between 1,450 and 1,750 degrees, molten coke allows sand to be turned into glass, iron ore into steel, and limestone mixed with clay into cement.

The pollution caused by transforming these raw materials is colossal.

The massive use of fossil energies exponentially fuels the extraction/ combustion/ production/ consumption cycle, promising unlimited growth. The link between growth and higher quality of life is such a given that the coming environmental disaster, even when pointed out, will be largely ignored.

1. Paul Magnette, *Le croissant fossile Aux origines de l'anthropocène*, le Grand Continent 8 février 2022.

Glass, steel, and cement are the materials of modernity which allow cities to grow and spread, bridges to span rivers, railway stations to handle the transport of people and goods, shed roofs to naturally illuminate production lines, and buildings to stretch skywards.

At a time when this extraordinary and brief industrial era is drawing to a close, and the post-modern and neo-avant-garde globalist babblings of the late twentieth century are fading, the regions impacted by this dizzying epic are becoming poorer, more fragile and, in some cases, even dying. Heirs to this meteoric development, the architects and urban planners in the first quarter of the 21st century are reassessing their approach.

The unprecedented scale of the environmental problems arising from our entry into the Anthropocene suggests that a portion of the energy to be expended to ensure the future of our built and unbuilt environments should be focused on repairing and rehabilitating the damage that man has inflicted over the past +/-150 years. Landscapes that have been transformed, made artificial, abused and polluted will be given targeted care and will once again become our primary cultural anchor, our roots. Built elements, meanwhile, will be revived, revitalized, repurposed, recycled and/or rehabilitated. The amount of grey energy embedded deep in the foundations, beams, columns, slabs, bolts and other reinforcements of this singular heritage is an invaluable war chest – and perhaps our lifeline.

Remarkably, the urgency and scale of the environmental crisis we're facing means that all levels of intervention, with no hierarchy in terms of the intrinsic value of the object concerned, are involved in this rescue strategy. Everything is important; nothing is small, nothing is big. As such, the action to be taken is a form of democratic generosity.

Landscape architects, botanists, urban planners, architects, engineers and designers will be called upon in a coordinated fashion to ensure the relevance and consistency that this new task requires. Only multi-disciplinary teams working together will be able to establish the links between the various components of the thought process and the actions to be taken.

The richness and diversity of the heritage that needs to be rehabilitated requires us to separate notions of form and function. We do not build to house a given program, but instead reveal the unstable balance of possible relationships between a pre-existing site and its potential use. This instability reveals the interplay that results from imperfect assembly, which in turn reveals levels of interpretation, variation and uncertainty in the way space can be made useful. Form is freed from its singular relationship with function, and vice versa.

As a result, an abandoned industrial site is transformed into an urban park, a slag heap into a recreational trail, an urban highway into a public space, a factory into a museum, a warehouse into a multi-purpose center, a boiler room into a training facility, and a woodshop into offices.

This exercise naturally and happily leads us away from the banalization and standardization imposed by a set of constraints.

The recycling of pre-existing locations gives us a glimpse of a new kind of spatiality. One that is between a collage and a bricolage – expertly executed, of course.

The industrial era's built heritage is generally located in dense, urban environments, which today are rather run-down and in need of revitalization. Factories, workshops and other associated buildings requiring renovation are an integral part of the area's history as well as its spatial and social evolution.

The very fact that this heritage is "located" amplifies the impact of a redevelopment project on its environment. A precise and forward-looking analysis of contextual changes strengthens and clarifies the decisions to be made at the level of the more targeted project. Conversely, a precise and forward-looking analysis of the more specific intervention site strengthens and clarifies the decisions to be made at the level of a broader context.

Like the beating of a heart, these numerous back-and-forths between the different levels of intervention help to breathe new life into the architectural, urban and landscape project. Life begins again.

The significant amount of energy required to manufacture steel, cement and concrete is inversely proportional to the efficiency of the resulting construction systems. The properties of steel and reinforced concrete have opened the door to the manufacture of three-dimensional post/beam/slab skeletons whose structural efficiency and spatial openness are unprecedented in architectural history.

These skeletons are in no way the remains of a bygone era, but perhaps its most valuable legacy. Open-plan design offers infinite possibilities for rehabilitating our modern heritage.

Out of the tragedy of an inefficient system of production springs the limitless efficiency of a spatial organization system!

The built boundary between interior and exterior has always been related to managing the thermal comfort of occupants. Open plan design, made possible by the evolution of construction systems and the ingenuity of archi-

tects and engineers, relegates the thick load-bearing wall to the bottom of the list of available options for constructing this protective shell. Why choose an opaque option when complete transparency is available?

This nearly total negation of the boundary between the interior and exterior worlds – a simple sheet of glass – clearly establishes man's dominance over his environment. The protective interior belongs to him, and the outside world, which he can observe with no limits or obstacles, belongs just as much to him, no matter how much energy is required to ensure the thermal comfort (heating or cooling) of this privileged and comfortable observation space.

Strangely enough, these technical, building, structural and functional advances are poorly suited to the Fossil Crescent's continental climate and rely heavily on fossil fuels extracted from the ground both here and elsewhere. The devastating disconnect between above and below ground knows no boundaries.

Surprisingly, these same technical, structural, stylistic and functional advances are particularly suited to the hotter, sometimes humid climates of the southern hemisphere. Open plan layouts and openwork facades provide for natural ventilation, while cantilevered construction provides much-needed shade. In the 20th century, a number of Western architects set out to conquer the world, while others from Africa, Asia and South America returned to their home countries, confident in their ability to locally reinterpret the modernist precepts acquired in European and American architecture schools.

Does globalization, and perhaps a certain level of guilt, still have a few surprises in store for us? After this brief, intense and very rich period of industrialization, we are now confronted with the severity of the environmental problems we must address, and are now seeking to develop building techniques based on the use of clay, straw and mycelium! Is the great rebalancing underway? Do our architect friends from the new Global South regard us somewhat mockingly?

The remarkable built and non-built heritage inherited from the Fossil Crescent's industrial history inevitably includes the ingredients of the moment of civilizational rupture that is humanity's entry into the Anthropocene era.

This particular observation forces us to take a critical stance. Passive preservation of a given era's built heritage is no longer an option. It is now our duty to use this targeted heritage to explore new relationships between space, as well as its use and manufacture, in hopes of making bearable our unbearable failure to adapt to living in the world.

Georgios Maillis • Bouwmeester of Charle-
roi, architect

Recreation – Metaphorical territories

The Fossil Crescent! It is a striking image and mirrors its ancient twin, the Fertile Crescent. If the one refers to a fertile region where the agricultural revolution was born, allowing for the development and manipulation of "living things" to increase our population, the other takes us into the depths of the Earth's geological stratum where ancient living material has slowly transformed into fossil material. In the 19th century, we began to extract this material from below ground and convert it into energy, the driving force of our Industrial Revolution.

When it comes to the fossil crescent, we are not far off from the stories of writer H.P. Lovecraft. A number of his literary works explore the underground terrors of ancient worlds that are hidden beneath vast swaths of Earth's surface that humans unknowingly walk upon. Something will happen that unleashes something that had been confined to the depths since time immemorial.

Two thoughts come to my mind when considering the fossil crescent. One concerns the reading I have done on the Fertile Crescent and Mesopotamian creation myths. Another concerns Le Corbusier's astonishment at the sight of the black mountains dotting our Belgian landscape – new forms that emerged from our Industrial period.

In the book The Oldest Cuisine in the World, historian Jean Bottero explains how the massive melting of snows is the origin of an immense river winding between the Caucasus Mountains and the Syrian Desert. The widespread drying-out caused by the last Ice Age transformed this single riverbed into a region drained by two waterways: the Tigris, to the east, and the Euphrates, to the west. It was on these alluvial soils deposited over thousands of years that a landscape shaped by man-made canals would develop. The planning, creation, and control of irrigation would allow two new human activities to emerge: agriculture and animal husbandry. This new environment would be the birthplace of the first cities.

Historians are still unable to explain the origins of this ingenious idea, which enabled man to control his environment and make it more fertile by using connecting canals. Ancient Mesopotamian myths attributed this seminal idea to the gods.

For 2,500 years, the minor gods worked to carve out waterways, build mountains and organize the great swamp. "Great was their task, burdensome their drudgery, unending their toil. It was a time when there were not yet human beings. It was a time when the minor gods made man, when they behaved like men, when they were entrusted by the supreme gods with the labors that would later become the lot of humans".

These minor gods began to complain and so the Mother Goddess, Belet, created man to take on the gods' toil. "Among the tasks and labor assigned to men to appease the gods, there are two radically new activities that the minor gods did not perform until then: agriculture and animal husbandry."

This agricultural transition – beginning with the foraging of wild plants and ending with the order of wheat fields – took place about 10,000 years ago. The domestication of living things led man to devote all his energies to organizing and investing in his lands in order to produce good harvests of wheat and look after his herds.

It is on these foundations that the first cities were built and new ways of living and thinking came to be. The first cities were located close to rivers on fertile land ideal for agriculture. These urban centers, no matter their size, were always closely linked to the surrounding cultivated areas: the countryside. This creation of a new landscape is first and foremost the result of a natural process spanning thousands of years, culminating in man's intervention in the management and optimization of irrigating vast tracts of land as a means of settlement and development. Even the materials used to construct buildings were local: either mud or baked bricks depending on the size of the architectural structure. These landscapes, which shaped both cities and countryside, would remain the norm for thousands of years, with the city at the center of vast, flourishing farmlands. This was a case of the Earth's superficial strata being organized and managed by a new civilization of sedentary men.

During his youthful travels to the Far East in the early

20th century, Le Corbusier sketched landscapes in which the architecture was influenced by historical and archaeological strata. This was a pivotal moment for the young architect which allowed him to develop and sharpen his eye thanks to his daily practice of drawing. For him, in addition to being a tool of presentation and representation, drawing was a tool for understanding the world. Some time later, when he traveled to Belgium with his experienced eye, he was surprised by the black mountains dotting the landscape. Our country, known for being flat, presented the architect with nearly perfect black cones which rivaled the massive dimensions of the pyramids. A new typology of landscape was appearing before him. Despite the century-old presence of these striking new forms, they were still largely undiscovered and confined to these regions that would go on to fundamentally change our societies.

We can easily understand the questions an outside visitor may have as they cross these territories marked by our industrial activity. These are landscapes that represent the exploitation of our subsoils in order to extract this dead fossil material in order to feed the machines of our civilization.

Coal extraction, which supplied the energy needed to power our industries, transportation and homes, significantly altered the topography and nature of our territory. Made up of mining waste, these artificial mountains were composed of shale and waste rock, creating a new distinctive feature characteristic of the transition from an agricultural to an industrial civilization.

Charleroi, also called the Pays Noir (The Black Country)

is one of the centers of Europe's Industrial Revolution. Built on one of the coal seams that would be industrially mined, the city, besides its fortress, saw its territory shaped in accordance with the rights granted to mining companies. It was these fossilized, subterranean deposits that would become the vectors of the region's development as mining sites required the construction of heavy infrastructure as well as roads and railways to connect industrial areas. Residential zones were then created to house workers and their families near their place of work.

Neighborhoods sprang up along and around the industries that would contribute to the region's and the country's economic development. Even though the fortress was built in 1666, Charleroi only became a "city" in the early 18th century.

The industrial exploitation of these sites had significant environmental impacts, from deforestation to the filling in of waterways. Like the agricultural activities of the Mesopotamian era, these mining sites created significant wealth. The fertilizing of soil 10,000 years ago led to establishing the Fertile Crescent's territories and first great cities. After the industrial revolution, it was through intensive exploitation of subsoils that caused the depletion and disappearance of living surface layers (also known as the organic horizon) that new human activities emerged. These activities produced enormous wealth and profits that both disregarded and disrupted the natural environment in the concerned areas.

The first Mesopotamian cities were built on and thanks to the living geological surface strata that make up arable land.

Figure 1. Unknown source.
Ca. 1940.

Industrial cities – such as Charleroi, the land of 60 mountains – were built through the extraction of deep, fossilized strata and the use of dead materials for their urban development. A true inversion of landscape design can be seen here. Charleroi is a young city compared to most medium-size European cities and is purely a product of the Industrial Revolution. Its spatial structure consists of scattered urban centers, heavy infrastructure linking these centers, slag heaps, as well as working and derelict industrial zones. All these structuring elements are intrinsically linked to human activity in the 19th and 20th centuries and understanding this is vital if we are to best position ourselves for the city's future development.

Today, the large industrial zones and slag heaps that used to punctuate Charleroi's landscape have undergone a transformation, accompanied by urban projects that have been implemented since the last political legislature. This area, which is typical given its industrial history, is being developed and shaped according to an urban and rural intensification plan.

The industrial approach, based on pragmatic engineering and economically efficient methods, has destroyed large areas of arable land. This intensification plan does not seek to once again upend this heritage.

On the contrary, this plan seeks to give meaning to this devastating industrial layer, transforming it into a stratum over which nature will regain its rights in order to best accommodate one of its smallest components, the human being.

The links between the Fertile Crescent and the Fossil Crescent raise questions about our relationship with the land. The Mesopotamians explained the creation of this landscape through the intervention of the gods.

This was their way of explaining the laborious and extremely long creation of fertile land linked to water.

This region of the world would see a civilization develop that would form the basis of our culture, however, since the Industrial Revolution, we no longer need gods to perform these impossible tasks on time scales beyond human comprehension. Our industrial civilization – like Lovecraft's ancient creatures who built gigantic cities and structures far beyond our comprehension – has succeeded in deliberately modifying and disrupting its environment on a planetary scale.

Thousands of years separate these two major revolutions. This time period, which is barely perceptible at the human level, is nothing compared to the geological timescale of our planet's formation.

And yet, this is our time. It is the time when human beings began to modify and organize these natural landscapes to create productive ones. These landscapes have a singular purpose: the development of our civilizations. Whereas the agricultural revolution was able to build on the long natural evolution of geological strata, the indus-
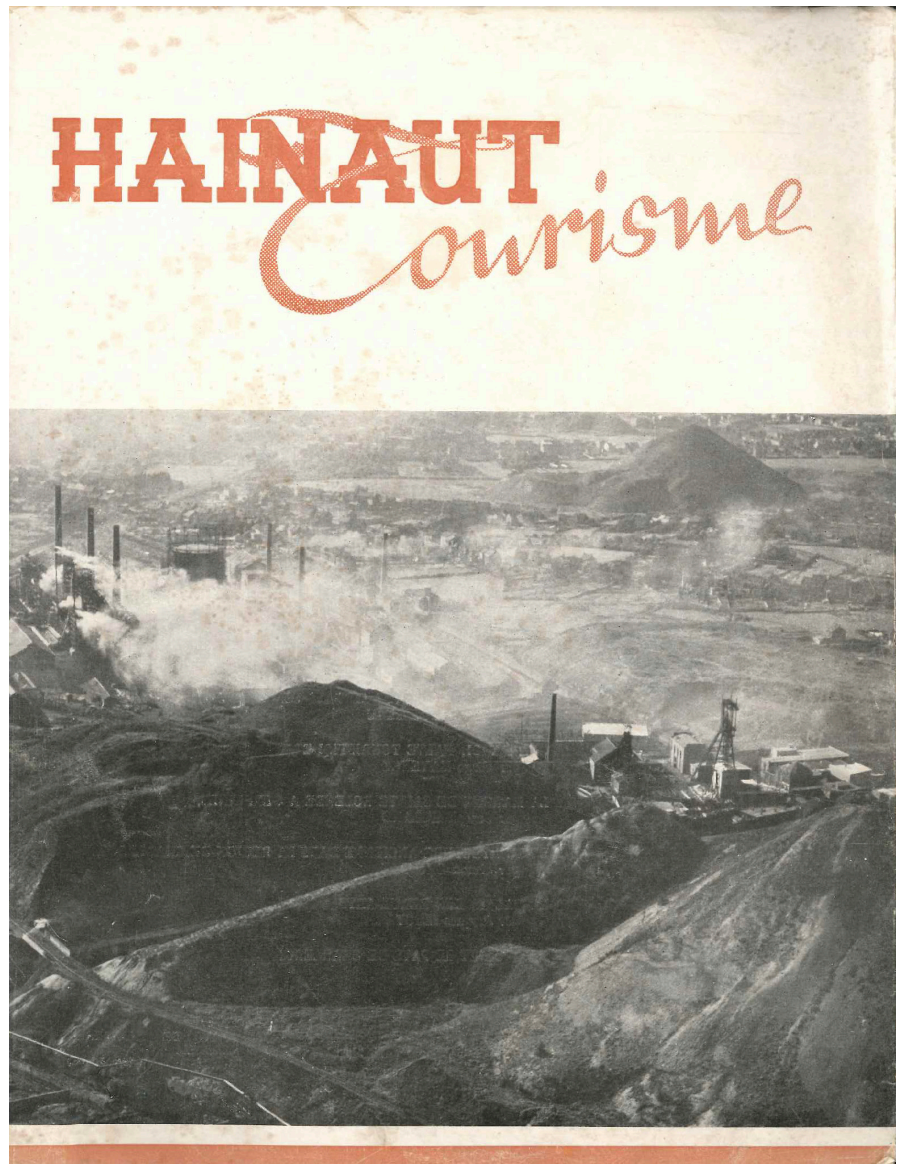
trial revolution is a period of great acceleration in human activity and the planetary changes we are witnessing today.

Man's back-breaking work in the Fossil Crescent must be put into perspective with the myths that describe the labor of the minor gods who shaped the region of the Fertile Crescent. A new mythology has emerged from the Industrial Revolution that no longer focuses on the creation of man and the world, but on new narratives linked to the ideas of progress and innovation, as well as the emergence of new social classes and their struggles. Recently, a new narrative is being written for this new period, known as the Anthropocene. It is a new narrative focused on the state we have put our environment into in such a short space of time, compared with the infinite age of our planet.

This is why we believe that, at the political level, Charleroi, like all cities born in this industrial period, can only be shaped by proposals as strong as the forces that created it. These must be proposals that are the polar opposite of the destructive forces that were put in place in the past centuries. Proposals that include the notion of humility. Humility that is proportional to our fleeting presence on Earth. The word 'humility' has the same root as the words 'human' and 'humus'. It is this layer that we destroyed during the Industrial Revolution, whereas it had been nurtured during the agricultural revolution.

It is this same lack of humility that drove Dr. Victor Frankenstein to surpass the natural limits of science and life to create, as a god would, a living being from pieces of corpses. The creature, in contrast with the hubris of his creator, Victor, suggests that humility is essential to live. The Fossil Crescent would appear to be the land where we have awakened these buried and forgotten monsters, reminding us of our humanity's fragility.

Bibliography: Bottéro, Jean. La plus vieille cuisine du monde. *Seuil, 2006. Bottéro, Jean. Kramer, Samuel Noah.* Lorsque les deux faisaient l'homme. *Mythologie méso-potamienne. Gallimard, Bibliothèque des Histoires, 1993.* Charleroi, Le projet métropolitain. *Publication de Charleroi Bouwmeester, 2022. H. P. Lovecraft,* Dans l'abîme du temps : Les montagnes hallucinées. *Folio Science-fiction, 2012. H. P. Lovecraft,* Dans l'abîme du temps : Dans l'abîme du temps. *Folio Science-fiction, 2001. H. P. Lovecraft,* Je suis d'ailleurs : La cité sans nom. *Folio Science-fiction, 2012. Radio Program Ameisen, Jean Claude.* Sur les épaules de Darwin Eclats de passé : Le croissant fertile. *Radio France, France Inter. 13 janvier 2018.*

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Great Landscapes in Progress. Euralens Centralité and the Chain of Parks and La Lisière de Saclay

Landscapes are often solely approached from the point of view of protection. Their transformation is therefore sometimes considered suspect. Typically, when landscape architects invoke "land" or "geography", we think of natural geography when it is above all human geography. Our territory is heavily shaped by human activity, practices and relationships.

The distinction between natural and artificial phenomena allows us to envision new transformations. The challenge is not to embellish a difficult legacy, but to benefit from the particular nature of the configurations encountered in order to address contemporary issues.

The conversion of industrial sites inherited from the 20th century, and the reclassification of agricultural and peri-urban land have, over the last few decades, led to major changes in the public space of the future. New challenges are already on the horizon: our urban peripheries will be faced with the decline of commercial areas.

The profession's renewal, led by Michael Corajoud in the 1970s, was responding to the need – some would say an urgent one – to break free from the status of a "gardener" who works for architects and engineers that landscape architects had been relegated to in the post-war period. The aim was to regain a role in the restructuring and development of territories, towns and public spaces. A few decades later, we can see the relevance of this stance, as landscape architects are now involved in multi-disciplinary teams.

Today, project directors seem to once again believe that landscape can be a decisive element for coherence in land-use and public-space studies. This conviction is increasingly echoed by local communities and politicians concerned, through metropolization, with producing long-term visions for their territory. It can also be found in smaller-scale operational development projects.

This unexpected and considerable progress nevertheless remains fragile and quite modest compared to the developments designed and implemented in the 19th century. Of course, contemporary circumstances differ from the 19th century. Industrial zones have grown, and many have changed. Cities have continued to sprawl, even though the 20th century did not build public spaces on the same scale as these developments. Today's challenges concern transformation projects. It is therefore crucial to reconfigure existing territorial or urban structures, change their use, and beautify them to create new areas of continuity and missing public spaces.

Our involvement in large-scale territorial redevelopment projects has led us to reconsider the parks system established by Frederick Law Olmsted (1822-1903) in the 19th century in the United States. We have discovered the strategic value of this vast legacy, such as Boston's "Emerald Necklace". These parks have shaped the city's urban structure.

Two of our agency's land transformation projects exemplify this approach: Euralens Centralité et Chaîne des parcs as well as la Lisière de Saclay. This American landscape architect's approach, with its geographical foundation, has proven to be a powerful guide for today's urban planning.

Frederick Law Olmsted's park system: geographical foundation and urban organization

Frederick Law Olmsted gave the landscape architect a role and responsibility that distinguished it from that of the gardener. Creating spacious landscapes which offer communal space accessible to all citizens responds to this need. Throughout his career, he developed models designed to counterbalance the burdens of urban life. To this end, he gave urban nature parks a specific purpose: to offer visitors immersion in a natural landscape, free from distractions that might interfere with the restorative experience.

Olmsted was also a writer, influenced by transcendentalist philosophers such as Thoreau and Emerson. His landscapes are characterized by a singular style, and the materials used are in no way those of ornamental gardens, or even the landscape gardens that were being created in Europe at the same time. He worked with woods, marshes, meadows, and bodies of water – all elemental materials deeply rooted in geography and nature. This landscape architect's work attests to his pursuit of cohesion,

in which the whole takes precedence over the individual element or setting. We see his elemental writing, in the sense of elements, as highly relevant to our current awareness of nature and its place in public space.

His parks system is based on a rigorous mapping of geographical structures: a river in Boston or ancient thalwegs that became open sewers in Washington. This park system forms a cohesive, intelligible whole because it is largely based on natural geography while at the same time integrating infrastructure and development elements. In cities, this geography is complemented and transposed by artificial elements. The latter are minor on a geographical scale – which retains its coherence – but they are immense and structuring on the scale of a city's new districts.

In Minneapolis, the parks system connects the Mississippi River to all the lakes of Minnesota, thanks to more artificial elements. The overall effect is one of a natural geography that extends over about ten kilometers. Sixty kilometers of urban frontage can be seen across a parks system that forms the city's true defining monument. Similarly, Olmsted's plan for Boston's parks system covers a radius of several dozen kilometers. The power of this landscape architect's work, in terms of implanting nature that structures the city, can be applied on a scale that is completely foreign to us. It is fascinating to take a good look at the dimensions of his designs.

Olmsted's proposed structural landscapes form a "system" in that their components work together, linking up across the different scales of intervention, from the management of the larger territory to the definition of major or secondary public spaces.

These interlocking scales of intervention, and their gradual implementation, testify to the extraordinary flexibility of these parks systems. Whether it's in New York, Boston, or Washington, a continuum of ponds, promenades, parks and parkways was developed over a fifty-year period and still forms the backbone of these cities today. One of the great distinctive features of these historical systems is the way in which they are superimposed on existing geography, transforming and extending it. This amplification of geography is closely linked to the management of water, roads and soil disturbance. From its very inception, it has been seen as a way to shape the metropolis of the future.

One cannot help but be struck by the way in which these landscapes were able to gradually integrate the upheavals brought about by growing industrial cities as well as changes in mobility and lifestyles. Today, we can appreciate the opportunity these landscape structures represent and once again draw inspiration from them.

They offer an effective model for organizing urban peripheries and disused areas. Their typology can be transposed, in the opposite direction, to provide the missing structure for contemporary urban sprawl. Geographical remnants, clusters of infrastructure, and industrial sites are all potential settings for such re-conquest.

Euralens Centralité and the Chain of Parks, mining basin, France, 2010

Our approach to the landscape in the mining basins of France and Belgium was inspired by this vision. The wastelands left by former mining operations, slag heaps and towpaths were transformed into a series of "places" and "links" to form vast chains of parks giving structure to existing communities as well as to their development through a process of re-composition.

The aim of the Euralens project was to take advantage of the opening of a branch of the Louvre Museum and a TGV station to revitalize the former mining region. The project called for creating a "central hub" for this geographical area of 400,000 inhabitants, centered on three municipalities – Lens, Liévin and Loos-en-Gohelle. This project was a continuation of the one begun when the mines ceased operations forty years earlier. Many of the sites had seen nature reintroduced and been transformed into recreational areas. But these sporadic initiatives resulted in a patchwork effect. Together with urban planner Christian de Portzampac, we were commissioned as landscape architects to imagine the redevelopment of this area. We championed landscape as a central means of triggering these major transformations, anticipating and initiating new living practices and approaches in the short term.

The last active mines, at 9-9 bis de Oignies, closed in December 1990. Most abandoned sites have been reclaimed by pioneer species of vegetation. These thousands of hectares of nature are now evolving separately from the city. Meanwhile, urbanization is continuing to fill in the gaps, sometimes agriculturally, between existing central areas. The expansion of low-density, dispersed housing developments is creating strong pressure on "empty" land. This tendency to fill them leads to a kind of saturation of these spaces, and the fabric becomes increasingly banal.

The first transformation was to change the way we look at these displaced spaces and lands. The scale and very nature of these areas call for a more "revelatory" rather than "compositional" approach, and the development of a landscape style that is as generous as it is "elementary". Far beyond the generic and vague idea of "wasteland", the extensive amounts of displaced soils left over from triumphant mining operations now represent real topographies, a new symbolic and physical horizon, and the concrete basis of a great ecological wealth.

As the 21st century begins, this territory, shaped by mining operations, can be viewed as an archipelago. Mining sites that have been abandoned for decades have left a network of voids, often reflecting former material transport networks. It would have been simpler – and some urban planners began to do so – to fill these voids with buildings. We preferred to see them as a potential network of connections and promenades which simply needed to be revealed. In order to make these transformations tangible, we needed to rearrange and prioritize them. A territory's development cannot be homothetically extended or contracted. Creating a public space or an urban project on the scale of a neighborhood differs from working on a conurbation, and even more so from working on a vast territory. The physical cohesion sought is specific to each scale of intervention, and connections are necessary to ensure continuity.

Careful attention to the complex nature of coalfield landscapes and their particular geography is central to the transformation of this territory. Like the slag heaps, we view the abandoned mine towpaths (networks of dykes and embankments, built so that wagons laden with materials could move around and cross roads on bridges) as potential parks, with their abundance of both spontaneous and cultivated vegetation. They become a network of connections and promenades to be revealed, strengthened and completed so that they can form a whole, folding in existing public parks and facilities as well as potential new ones. Derelict infrastructure and industrial sites form a neo-system of parks: a series of connected places and paths that enhance the living environment and invite new ways of getting around, particularly favoring soft mobility.

This integrative development pervades even the deepest corners of the territory, reaching into housing developments, through their scattered gardens and along their paths, before being applied to the whole of the former mining basin. A new centrality emerges for all three communities. This structuring landscape links in with existing parks, public spaces, and facilities and supports increased density in these mining towns. The Chaîne des Parcs is not "simply" a "green" feature of an urban project. It is one of the key elements of an overall territorial project.

Our revised interpretation of mining geography has therefore focused on highlighting the voids that characterize the area and making them the basis of its transformation. This vision resulted in a distinctive structure: an interdependent, hierarchical archipelago linked together by a foundational landscape network. Today, this "Green Archipelago" seems quite obvious, and has a unifying meaning that makes it immediately adaptable, but which requires us to rethink the way we look at our industrial heritage.

La lisière, Paris-Saclay campus, Greater Paris, France, 2009-

In 2009, as part of a team including urban planners Floris Alkemade (FAA) and Xaveer de Geyter (XDGA), we won the international urban design competition for the Paris-Saclay project. The project's aim was to expand and enhance this teaching and research site, making it a major hub in Greater Paris's future development.

The Saclay plateau stretches across 5,000 hectares of highly fertile land above valleys it is linked to by wooded hillsides. The École Polytechnique was built on the Saclay Plateau in 1973, as were other large-scale projects, which were sometimes isolated and difficult to understand in this immense territory. Its scale was quite intimidating: we were asked to consider a perimeter of over 30 kilometers.

This large-scale project reflects many of today's issues. The territory is fragmented, with both urban and agricultural areas juxtaposed in a way that makes them seem unaware of each other. Clearly, the composition of the buildings alone does not provide unity. The large buildings built by architects seem to float on this plateau, even though they are sometimes 200 to 300 meters long. A skyline that unites them and transcends their cumulative effect is needed. Greenery can provide this aspect to free-standing constructions and bring cohesion to the various parts of this archipelago.

We have opted to progressively manage urban development through its infrastructure, using Washington's western expansion between 1900 and 1950 as a reference point. As it happens, the southern part of the science campus overlaps almost exactly with the Georgetown University district. We researched these similarities using Olmsted's working documents: photos, drawings, cross-sections and time frames. Today, the trees have grown and the layout's legibility is extraordinary. It welcomes today's urbanization, giving it meaning, structure and quality of life. It therefore makes sense to propose projects that will be managed over a fifty-year period to create a landscape and an enhanced geography for the city of tomorrow.

The project calls for developing an "amplified geography", in some cases complementing existing landscape features along the edges: the aim is to extend and thicken hillside woodlands, extending them into the plateau's core. These green corridors accommodate a variety of transport infrastructure. Public spaces with multiple functions – ecological, recreational, productive – are thus created between the new neighborhoods and the large expanses of farmland. Extensive stormwater management systems, the restoration and expansion of natural environments, and even the management of soil left over from

large-scale construction projects provide the opportunity to create this vast system. Taken as a whole, they form a framework for the landscape, the boundary, which ensures the relationship between city and countryside.

This boundary is made up of existing landscaped areas (Palaiseau National Forest, the Normandie and Vauhallan Woods) as well as new areas. It is, however, a composite of spatial entities of different sizes, functions and management practices. The choice of building density for the development of the urban campus allowed almost 180 hectares to be freed up for the creation of this landscape on the edge of the plateau's protected agricultural and natural areas. This forms the boundary at the scale of the urban campus (Municipalities of Gif-Sur-Yvette, Orsay and Palaiseau). This boundary is not a dividing line that temporarily establishes a stable urban edge. It expands and enriches, becoming a place where two worlds that have long been pitted against each other – the city and the countryside – can be brought together. The combination of ecology and engineering is essential to the creation of this intermediate landscape. The boundary of the Mou-lon district (municipality of Gif-Sur-Yvette) is a showcase landscape for the campus as well as a public space able to enhance the relationship between the district's streets and its country lanes. The network of trees provides both an element of cohesion and a valuable source of ecological continuity and varied habitats. The northern boundary of the École Polytechnique and Corbeville districts (in the Palaiseau and Orsay municipalities) is wooded. The district's water management system occupies a significant part of its surface area: regulatory basins and wetlands are implemented according to precisely quantified needs to accommodate the district's water.

The initial tangible achievements of all these major strategies offer a glimpse of how landscape design can be used to create systems and processes capable of producing certain conditions for the development, attractiveness, and livability of contemporary urban areas. The realization of the Euralens and Plateau de Saclay development strategies strengthens our conviction that landscape is at the heart of territorial challenges.
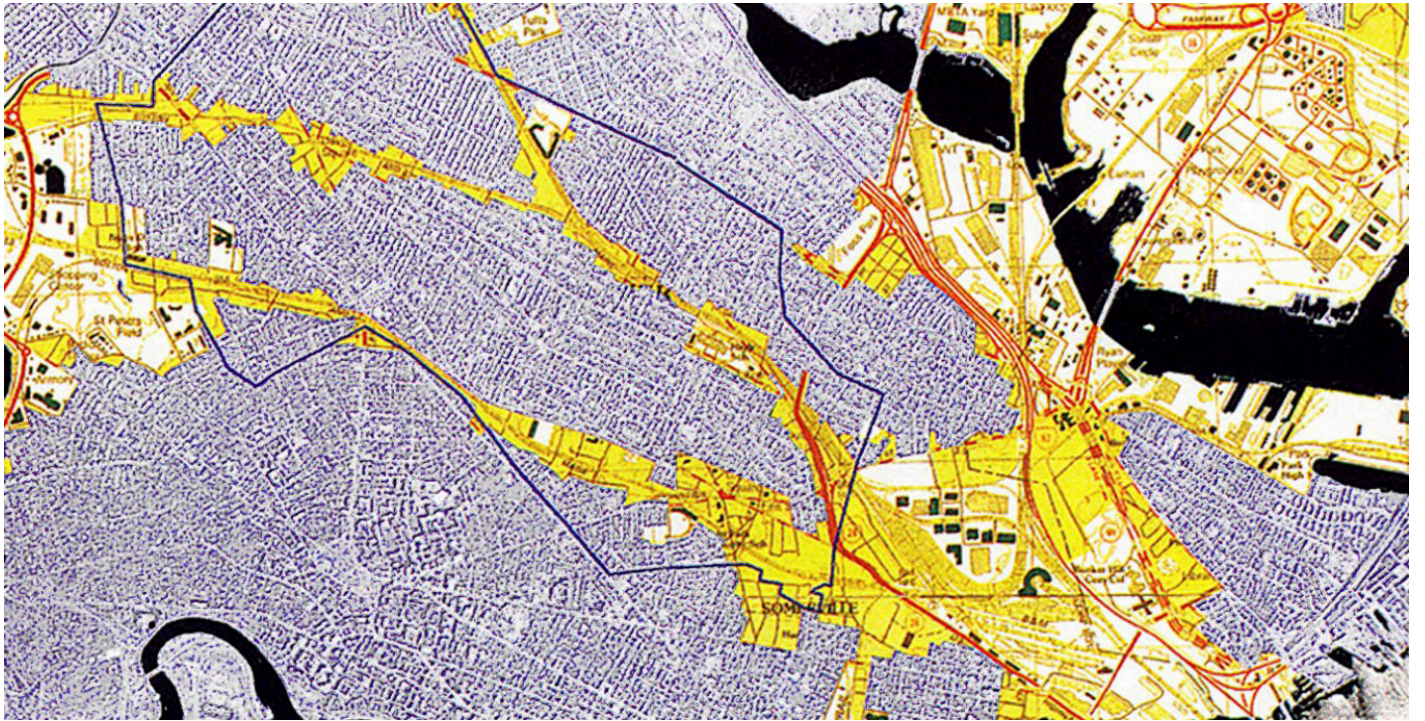
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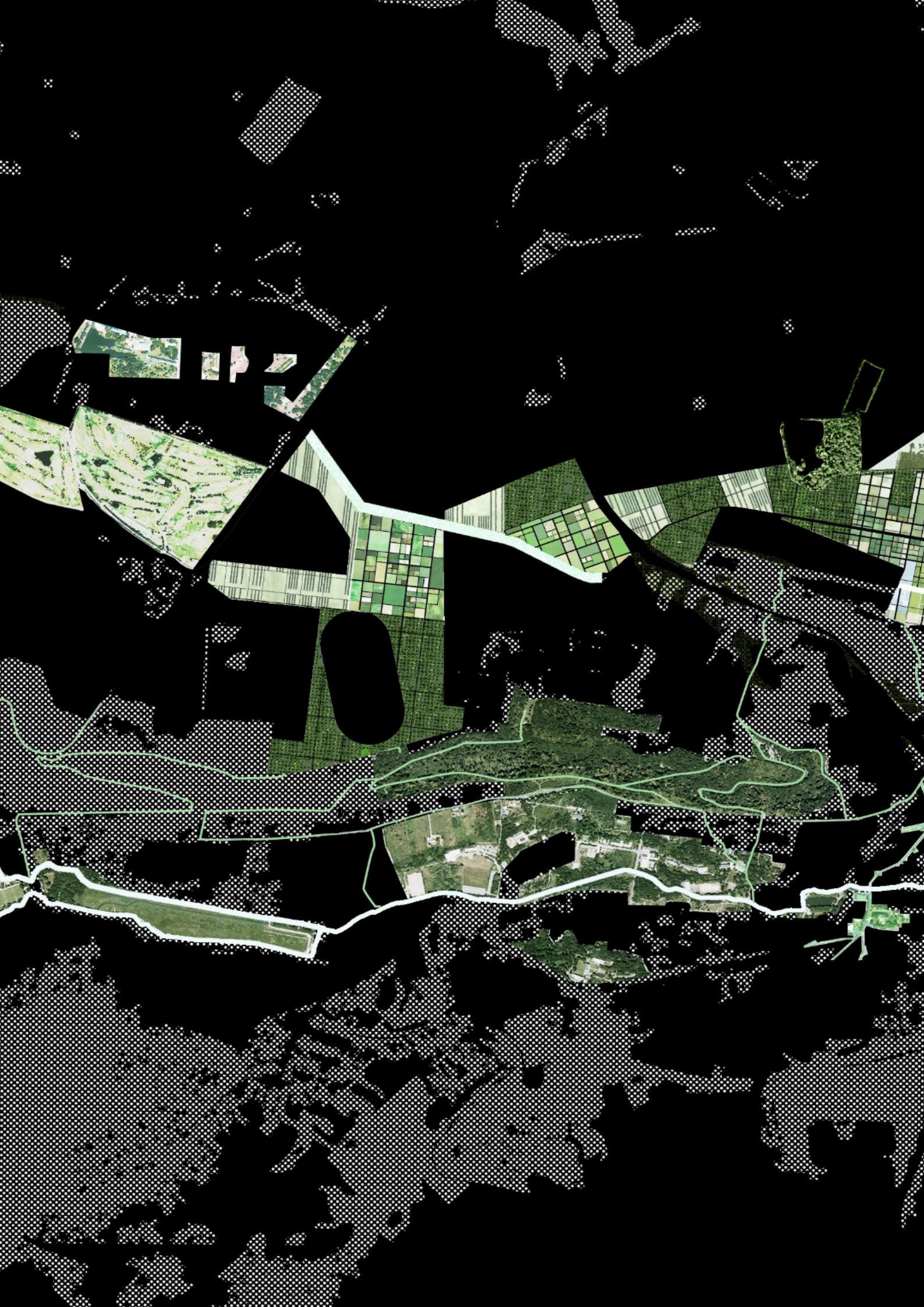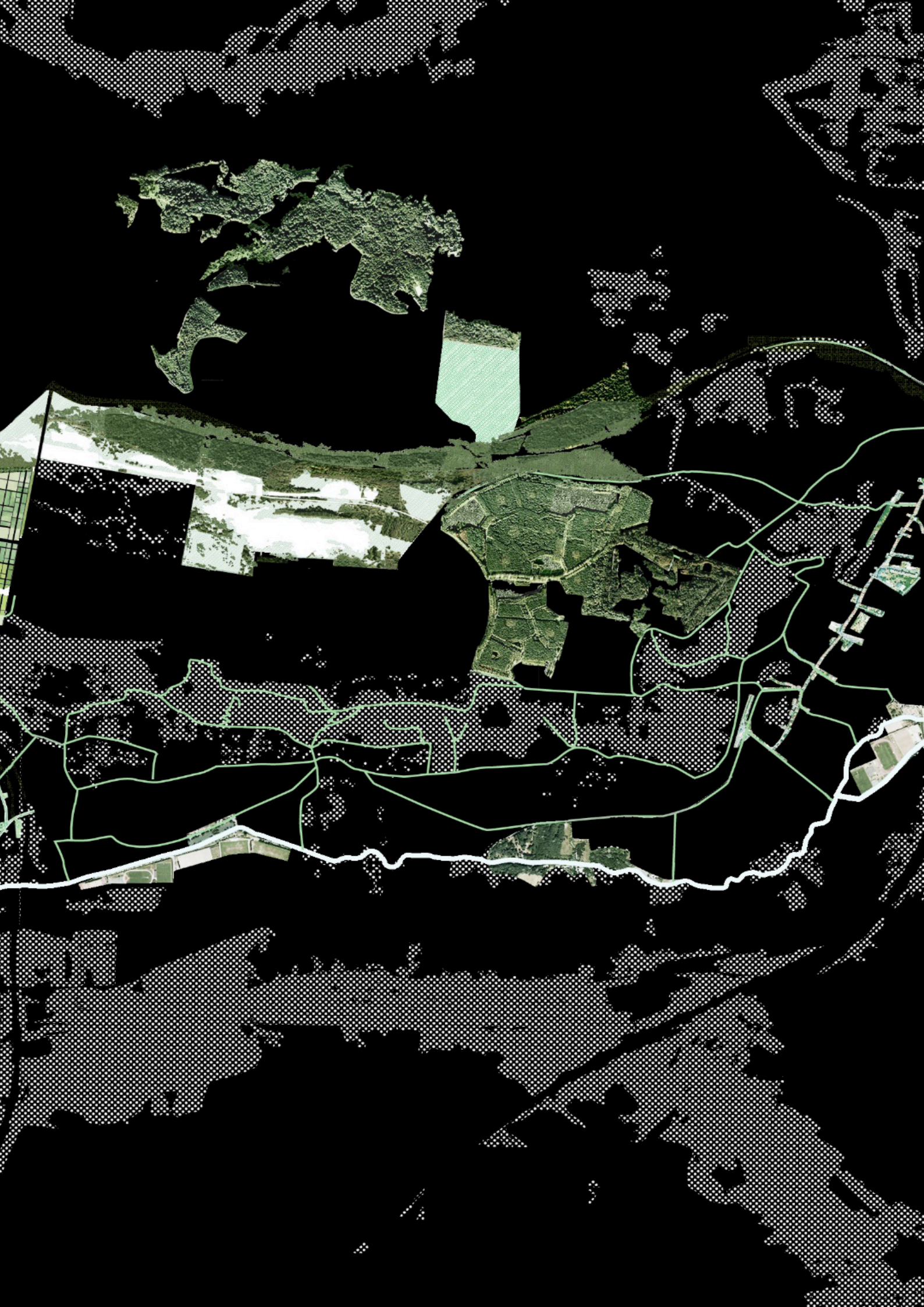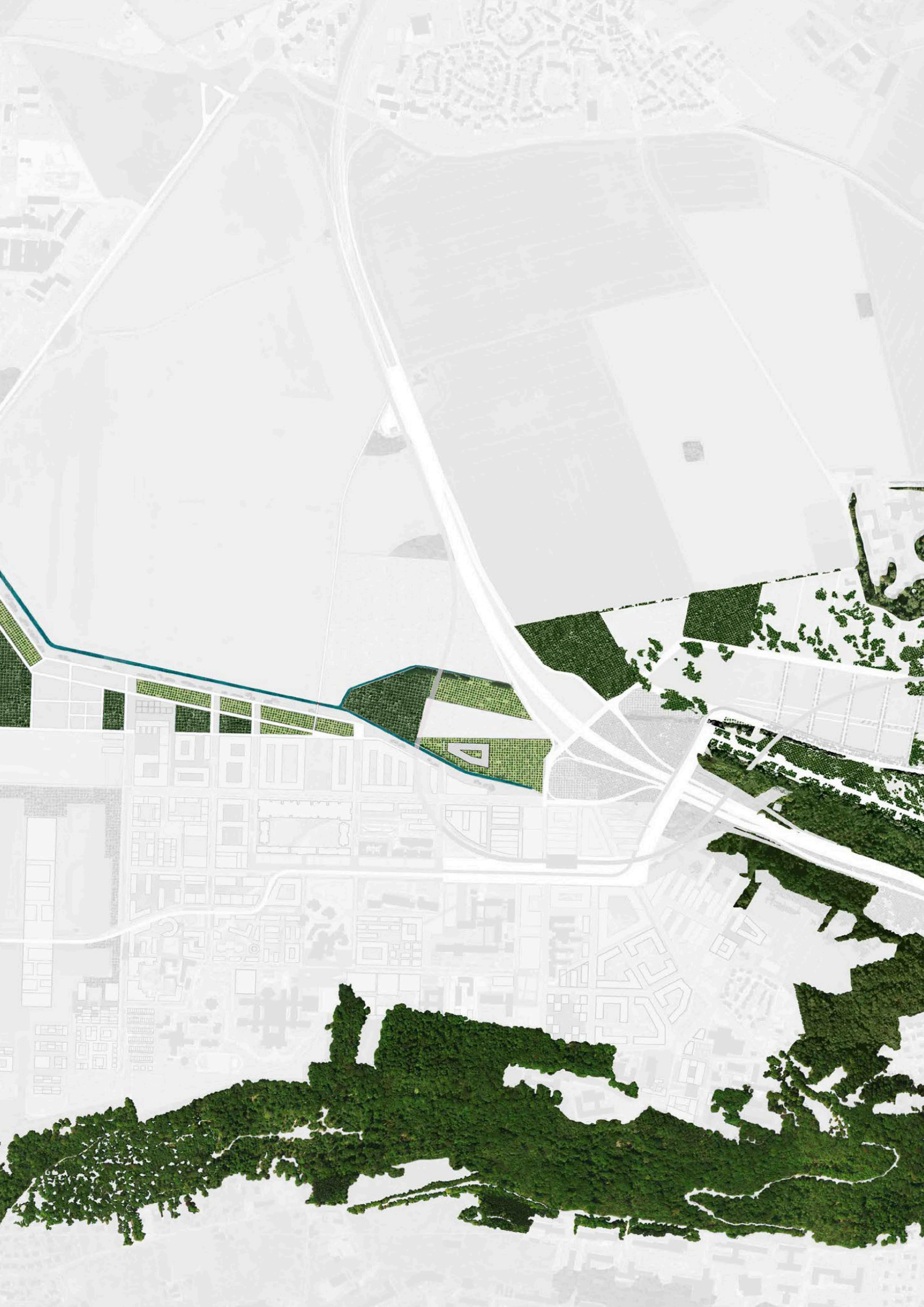
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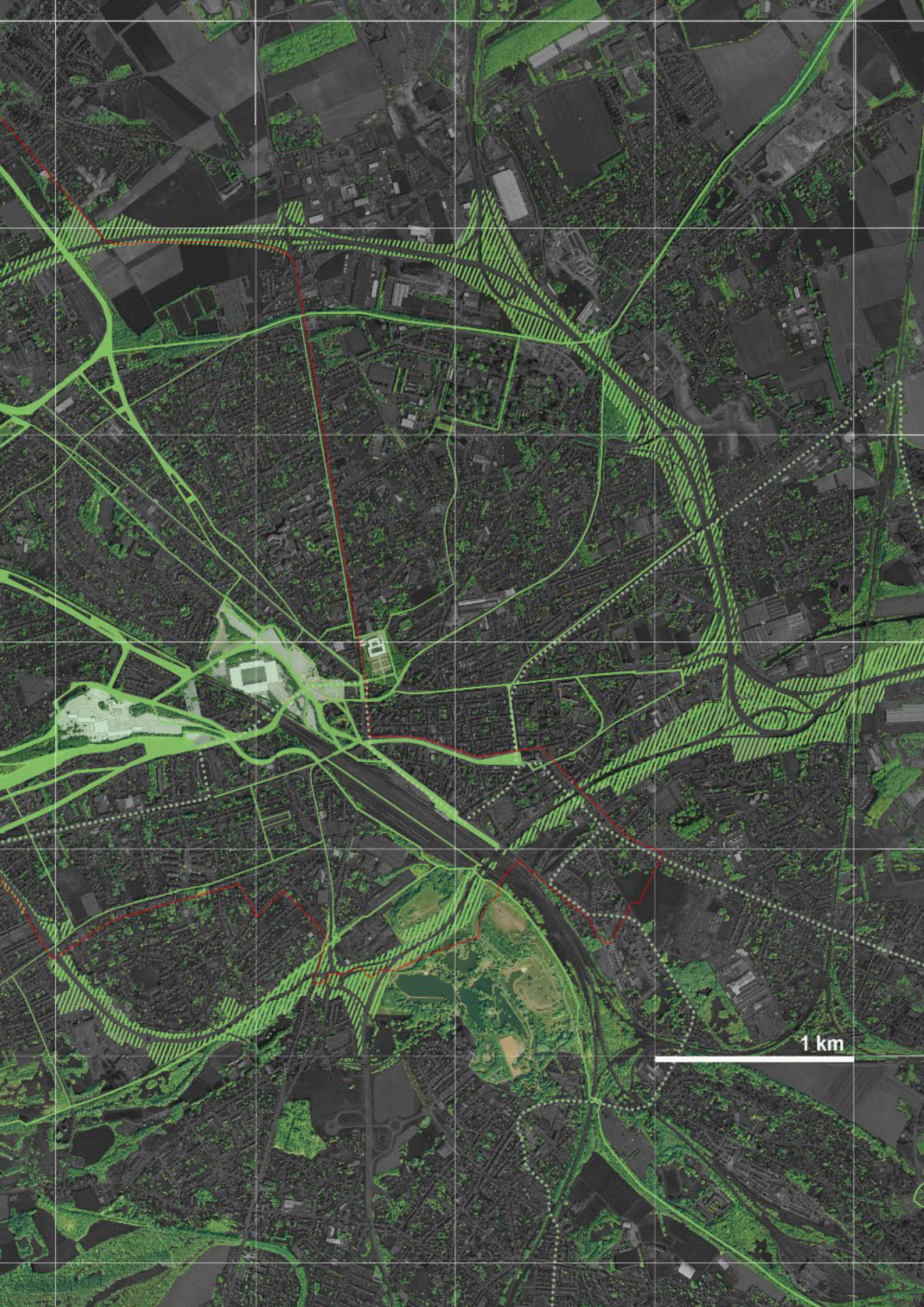
Park systems and the transformation
of urban wastelands

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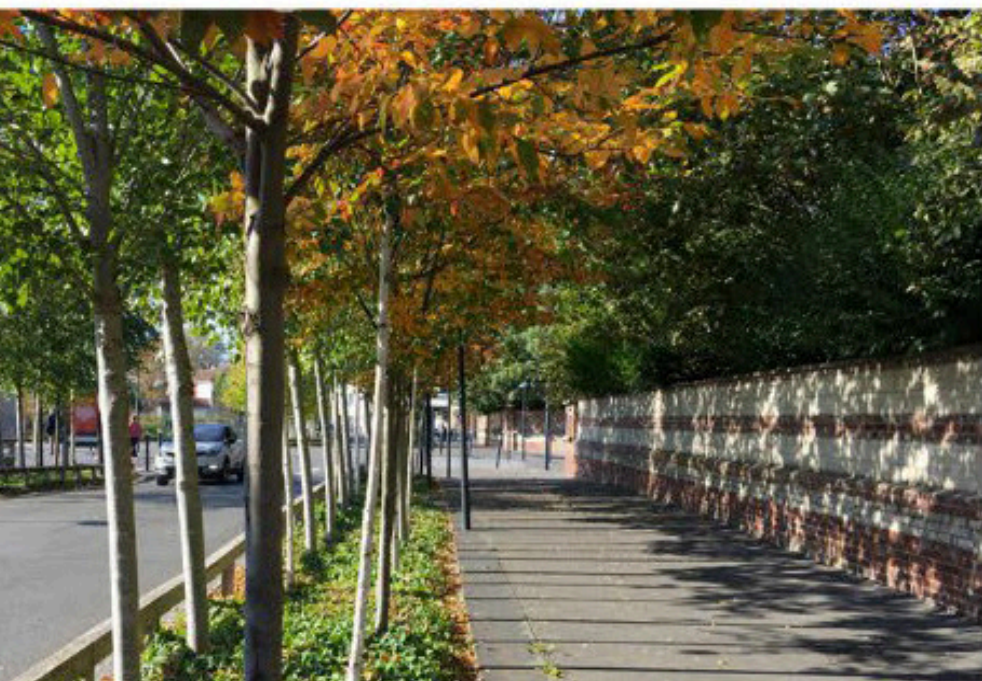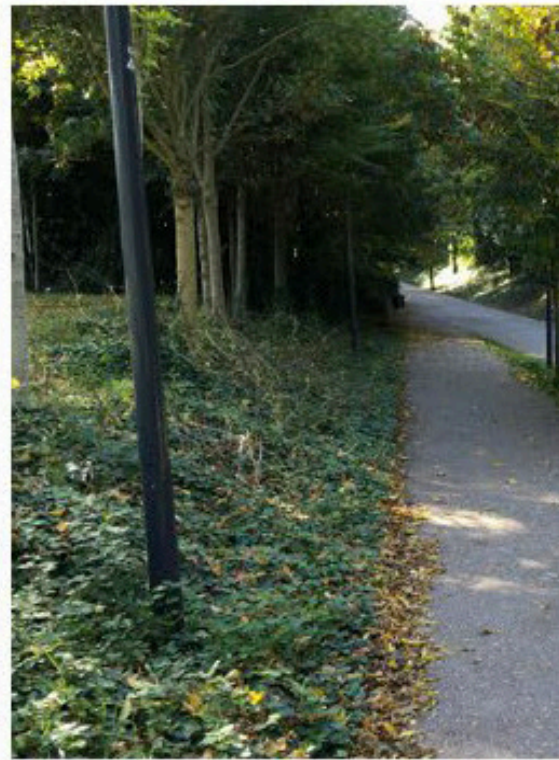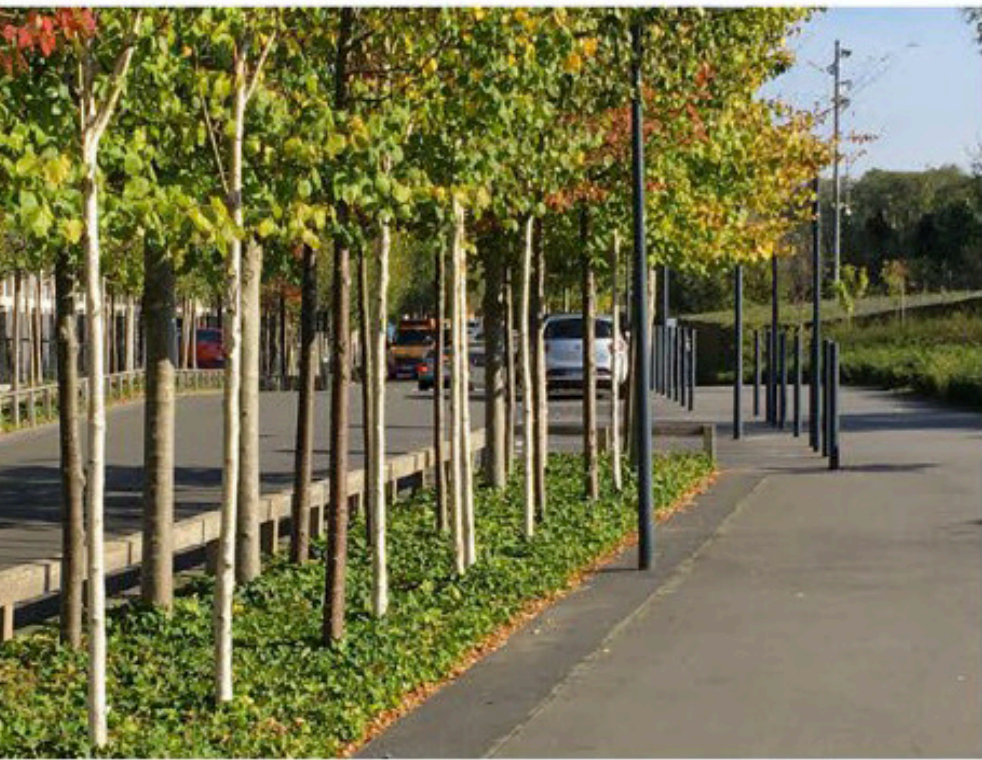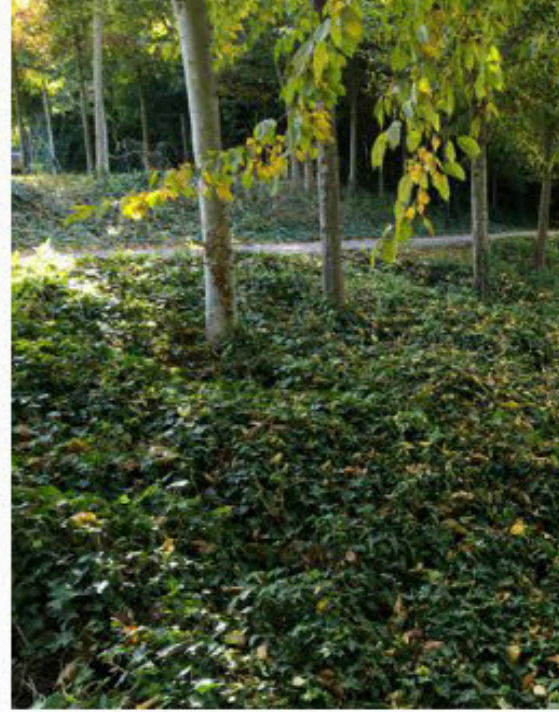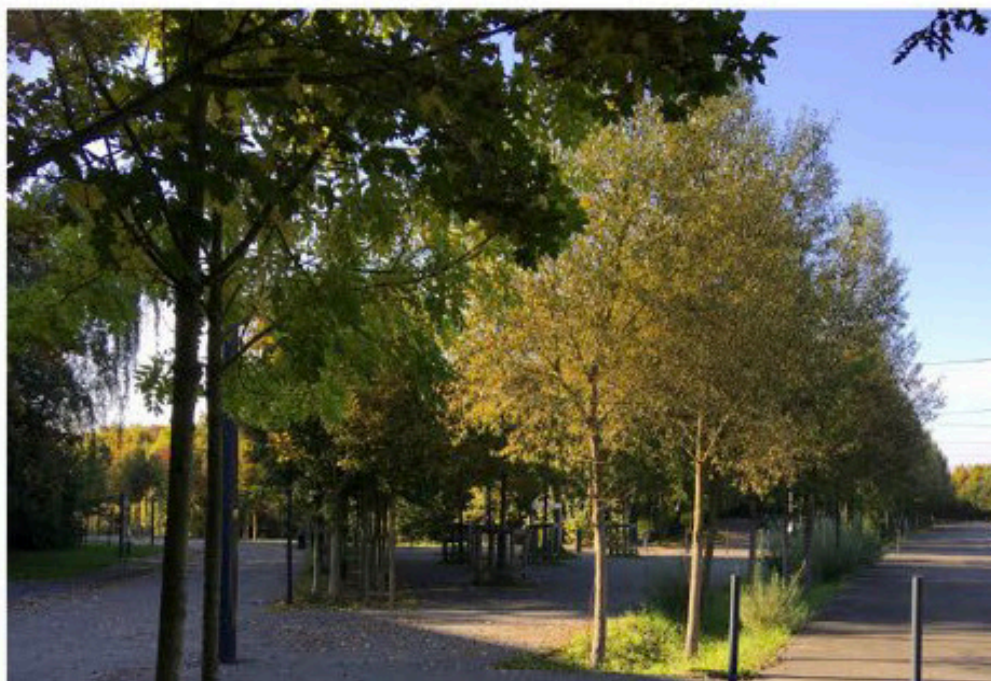Design, Harvard University, 1999.

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Kersten Geers et David Van Severen •
Architectes, co-fondateurs, OFFICE Kersten
Geers David Van Severen. Lecturers at Harvard Graduate School of Design

Future History

Charleroi, Belgium, the city in Wallonia where the largest satellite manufacturing plant in Europe is set to open in 2025, lies on the river Sambre and 30 km east of the French border, part of what is known as Pays Noir ("black country") for its coal reserves, Belgian industrial underbelly, the workers' land that once powered national economy and experienced hardship as the production went elsewhere and the energy transition took place, with the last coal power plant closing in 2016. What today looks like a pastoral rolling landscape intersected with roads, railways and canals is in fact entirely manmade, the result of strenuous effort to extract rocks and minerals from the deep layers of Earth's crust. It is in this particular stretch of Europe which encompasses the Ruhr valley in Germany, over Aachen, to Liege and Charleroi in Belgium, and Nord-Pas de Calais basin in northern France, all the way to English West Midlands, where some three hundred million years ago, during the so-called Carboniferous period, the remains of lowland tropical swamp forests were flooded by sea, and marine sediments, pressure and heat had built up over millions of years to transform the organic matter into coal. A combustible black sedimentary rock, with a high amount of carbon, that burns more efficiently and produces more heat than wood. This geological fact alone was at the centre of the narrative that shaped Charleroi's future.

The future began with the onset of technology that used coal as fuel, starting with the steam engine at the end of the eighteen century, and by the mid-nineteenth century Belgium was, after Great Britain, the most intensively industrialised country in the world. Collieries and blast furnaces and steel mills popped up across Wallonia, and the perfect synergy between natural reserves of raw materials, transportation network, technology and market demand, made heavy industry flourish at what seemed as an ever increasing rate. The future ended when the mines became deeper and coal more expensive to extract, when the new centres of coal and steel production appeared on the global market, when oil, gas and nuclear power became main sources of energy, and when the once pioneering technology became outdated. The profound transformation, not only of the industrial sector, but of the entire community, began in the early 1950s, as the unprofitable collieries within the newly established common market of the European Coal and Steel Community (ECSC, the predecessor of EU) closed one after the other. The last active colliery in Wallonia was shut down in 1984, leaving over thousand people out of work. What followed was an entanglement with the history of what used to be the future. Charleroi became a city amidst what was dubbed a post-industrial landscape, a condition that suggested an aftermath, a postscript to the narrative.

The increasingly abstracted global economy involved dissolving of the established markets, dematerialisation and externalisation of production, and part of this broader course was deindustrialisation and reconversion of the former industrial sites. In the centre of that process, in the midst of a virtual dystopia beset by pollution, wastelands, economic decay and social struggle, was a community with deep ties and collective identity. Generations of miners and people employed in sectors connected to industry, formed an international working class, with common strive for social justice and workers' rights. If the public image of Charleroi was shattered, the city still did have a civitas and a polis–a social association of citizens, and a political community. This basic condition of a city would prove critical for the urban and economic transition from the 1990s onwards. Opposing swift reconversion that would obliterate anything that could possibly discourage new investments and multinational corporations, protests arose across the region to preserve the industrial heritage. Spurred by local activism and academic support, industrial archeology thrived as a new form of historical research, and several former coal mines in Wallonia have since been protected by UNESCO as World Heritage sites. The question of how to conceptualise historic space, to maintain the collective memory of the city, and at the same time promote transformation and development of Charleroi, had to take into account its specific urban morphology.

The first factory industries of the late eighteenth century were typically dependent on the proximity of resources (like mine-shafts, or water-power), and were thus randomly dispersed across the predominantly rural areas, making a hybrid of rural and industrial landscapes. Lacking a real centre, they developed as a sprawl on a territorial scale. In the following decades, as transport network developed, most industry had acquired an urban environment. Given the large workforce demand, the agrarian population, as well as immigrants, were swarming the new industrial centres, and the mythical prole-

tariat emerged as a new social class. A paradigm shift in ways of living and working required new types of housing and public infrastructure. As a way to relieve the pressure from overpopulated cities, self-contained 'model' communities for the workers, so-called industrial villages, or company towns (cité ouvrière), were typically developed as islands close to workplaces. These suburban and periurban collective housing developments announced what would eventually become the major enterprise of modern architecture: large numbers–of people, and by extension, housing–and dissolution of the city. Charleroi is in that sense an extreme example of modernism fully realised, a testbed for what an alternative future could be.

From a centralised medieval hamlet and a seventeenth-century fortress that dominated the landscape, to a dispersed urban conglomeration, Charleroi developed an ambiguous relationship to its hinterland, its territorial scale expanding after the merger with fourteen surrounding municipalities in 1977. Today, Charleroi Métropole stretches across two thousand square kilometres, its thirty boroughs home to about six hundred thousand people. The city has a low density, with more than half of its territory an undeveloped land. Its polycentric morphology comprises urban and suburban areas, rural grounds and industrial wastelands–this is a showcase of everything a city can be, an evenly covered field where housing, factories, farms, civic buildings, slag heaps, and highways with a series of viaducts and tunnels, merge into a single scene. With the disappearance of coal mining and decrease of heavy industry, the city turned towards the so-called R&D (Research and Development) industries, in domains such as biotechnology, logistics, optics, space and digital technology. In difference to earlier factories which depended on natural resources, and around which urbanisation was largely organised, the new high-tech industries are typically completely detached from their environment–they can be anywhere. They are also not a polluting nuisance to put away from the city (the city is now everywhere, after all). Long gone are the days of the CIAM's Functional City. Factories, research facilities, logistic centres–in one word, Big Boxes–are not only part of the city, they have become the new signifiers of civic architecture.

The post-industrial city is a parable of the bio- and techno-sphere intertwinement in the Anthropocene. Any development has to take this relation into account, given that sustainable management depends on the existence of both realms. This is precisely why the city of Charleroi is developing a twofold strategy: an urban intensification plan and a landscape intensification plan. In difference to Berlin, which was politically too important to evade conservative reconstruction, Charleroi is the unlikely place where "A Green Archipelago" can actually be realised. Ungers' theory of the European metropolis is a reality in the city where the Industrial Revolution on the continent effectively began. This is a place where the mo-

dern project has been so dramatically compressed, that we can observe its time-lapse simulation, its history and future history. As the sustainable urbanisation became alarmingly urgent in the face of global climate crisis, Charleroi, on its way from a black city to a green city, can serve as an aspiring model for the future, once again.

One of the municipalities that merged with the city of Charleroi, and is now part of the city's strategy to redefine its territorial structure by pointed densification, is Marcinelle. This place is a summary par excellence of the entire fiction of the city: it was developed around the Bois du Cazier coal mine, which also happened to be the site of the biggest mining accident in Wallonia, when 262 miners, most of them Italian immigrants, lost their lives in 1956. The coal mine was closed in 1967, listed as a national monument in 1990 and opened as a museum in 2002. Marcinelle includes industrial zone south of the Sambre river (subsidiaries of international steel manufacturers Industeel, Thy-Marcinelle and Alstom are all operating in the area), and a residential zone, separated by green patches. In-between, among the shrinking industrial sites is the former location of ACEC (Ateliers de Construction Électrique de Charleroi), the renowned Belgian manufacturer of electro-mechanical products, which closed down in 1992 after more than hundred years of existence. At its heyday in the mid-sixties, the company employed around twenty-two thousand people in several production facilities throughout Belgium. What is left of it today on the site in Marcinelle is a 13,000-square meters ACEC 38 building–now occupied by the Federal Judicial Police of Charleroi–and a four-story ACEC Administrative headquarters built in 1971. The now defunct 5,000-square meters office building features a glazed facade enveloped in steel profiles, a symbolical glorification of the city's trademark material.

This is the site of the future "megafactory", scheduled to start the production in two years and publicised as the largest spacecraft manufacturing plant in Europe, large enough to produce 500 satellites annually, a forty-million euros venture capital investment and a success story of Charleroi's economic revival. This will be the second factory of the Belgian satellite platforms and geospatial intelligence company Aerospacelab. The entrepreneurial spirit of the New Space economy mirrors that of the inventors and engineers of the Industrial Revolution, people like Julien Dulait, the founder of ACEC, and the location of this startup comes oddly apt. How should this factory look like, how can it pay tribute to the history of this place and live up to its future? And finally, how can it align with the ambition of the city's development? The factory is a 16,000-square meters Big Box, its major feature a 6,000-square meters production and assembly space, the so-called 'cleanroom', surrounded by 3,000 square meters of laboratories. But it is also a civic building, its bold presence dominating the cityscape, akin to former

coal bunkers and mine heads, its metallic facade an homage to the industry that made the city. The upper floor is reserved for offices and shared facilities, providing outstanding and dignified workspace for the employees. The accessible roof garden is connected by a pedestrian bridge to the former ACEC Administrative headquarters building. Given the ACEC building does not conform to contemporary building policies, and could not be reused as office space, it will be transformed into a parking garage. It is the responsibility of the architects–and even, broader community–to consider the environmental impact of any building campaign.

The decision to save the ACEC building meant not only a more sustainable solution, but a more profound concern for the living environment and cultural heritage, as well as the design rationale; this building was designed in the modernistic logic of open plan that enables easy transformation, and transforming an office building into a parking garage is nothing but an extreme application of

this principle. Finally, this meant liberating the site from cars, and making way for public squares and green spaces around the factory.

The Aerospacelab Megafactory is an example of architecture being part of a larger effort to realise a vision. As part of its economy diversification and territorial densification, the city is planning a myriad of other projects: university campuses, an economic park, a shopping centre, and significantly, housing, having set a goal of four hundred new units over the next thirty years. But this cannot be only the result of a speculative management in the times of restructuring industry.

For too long, Charleroi has been developed and destroyed disregarding its citizens and environmental consequences. Having experienced the bitter outcome of these actions, the time seems right for a different path. For long-term planning. For nature. And for culture. The future takes shape too soon.

Figure 1 • OFFICE Kersten Geers
David Van Severen, Megafactory

Paola Viganò • Architect, urbanist, Professor at École Polytechnique Fédérale de Lausanne (EPFL) and at the University of Venice (IUAV)

Charleroi, Porte Ouest: A Vision of 21st Century Wallonia

Porte Ouest is an exceptional site which is emblematic of both Charleroi's and Wallonia's industrial heritage. This site encompasses several scales: the Carsid steel plant grounds, the greater area that includes the urban periphery, and the surrounding territory. Few sites in Wallonia, or even in Europe, can match this scale and industrial history.

The Porte Ouest project is part of the Wallonian region's transformation. Once dominated by industry, the area is now striving to diversify and change its image. This evolution can draw on the infrastructure and heritage left by the industrial era, as well as on the landscape as a major unifying element not far from the city's core.

I.   Listening to spaces, listening to the city

The study's first phase led to an understanding of the site and the dynamics at work, notably through numerous interviews and working groups with local actors. This led to an ambitious, shared vision.

The Porte Ouest is first and foremost perceived through its built landscape. Viewed from outside the site and from the surrounding towns (Marchienne-au-Pont, Charleroi city center, Dampremy, etc.), the site is characterized by large historical and modern industrial features (chimneys, blast furnaces, water towers, etc.), which serve as landmarks in the landscape. Conversely, views from the site outward are characterized by the surrounding green landscape (particularly the slag heaps) and, to a lesser extent, by landmarks such as church steeples and the Alliés Brewery. At the site, it's not easy to grasp the subtleties of its microtopography: concrete plinths, de-

pressions, paths along elevated railways... The masterplan is therefore a means of systematizing the different parts of the area, and of redeveloping and enhancing them.

Several scenarios were studied, developed, and debated during the second working phase in order to define a "realm of possibilities". These scenarios examined the site's potential, ideas, and agendas, placing them in a broad perspective that would allow us to envision its new role within Charleroi's and Wallonia's dynamics of ecological and social transition.

The last two phases solidified the master plan's vision and direction/implementation. This vision establishes the Porte Ouest as a regional and economic park, a landmark in terms of culture, innovation and image. It is the foundation for the city's attractiveness and development in the short, medium, and long terms.

II.   Starting from the space

The approach that was developed begins from/is based on the space: the observed continuities and obstacles encountered, existing and potential practices, constraints and qualities that may be immediately perceptible or more subtle. It is based on getting to know places through experience, through intense and repeated fieldwork.

The pre-industrial landscape included the wooded Bayemont plateau (the Monceau Woods) with a slope running south and west down to the winding Piéton valley. Between the two waterways (the Piéton and the Sambre) and their valleys of pastureland was a relatively dry interfluve with fields. It is only to the east of Dampremy (starting point), just outside Charleroi's center, that these valleys join together.

The industrial era brought about an enormous infilling and raising of the landscape. The plateau's natural edge was shifted to the south and a new slope was formed by the chain of slag heaps. Additionally, the natural habitats associated with the wet-dry gradients around the Piéton and Sambre rivers were covered by dry layers. The banks (quays) of the Sambre River, the canal, and the Eau d'Heure River near its mouth have been artificialized. Today, there is a lack of natural wetlands in the Porte Ouest area. Besides the ecologically valuable chain of slag heaps in and around the site, Porte Ouest retains several ecologically valuable areas featuring pioneering vegetation: these are derelict areas where young forests are growing. Pioneer species such as mosses, grasses, elder, and birch can be found growing on the old (semi-) terraced land and stony soils.

The site, at the confluence of the Sambre, Piéton and Eau d'Heure Rivers, has historically been characterized by water. The floor of this wet valley was profoundly trans-

formed during the industrial period. This included the creation of the Charleroi-Bruxelles canal in the Piéton valley, the raising of the ground level by several meters in response to flooding, the digging of a canal to connect the Sambre to the Charleroi-Bruxelles canal, and the progressive covering of several waterways, including the Piéton and Carabin.

Apart from the Sambre River and the canal, water is invisible. The Eau d'Heure River is barely visible in the landscape, the Piéton runs through the site in underground pipes, the canal connecting the Sambre to the Brussels-Charleroi Canal has been filled in, and the ponds present at the beginning of the 20th century have largely disappeared. The canal and the Sambre's artificial banks are not particularly conducive to biodiversity. There is a major challenge to restore the visibility and place of water so as to redevelop ecological continuity.

Several factors (the presence of railways, roads, and industry) affect current perceptions of the site: metallic or engine noises, sirens, smoke, odors from combustion, etc. Added to these factors are physical elements of spatial discontinuity: viaducts, bridges, embankments, walls, fences, power lines and high-voltage transformers all combine and lead to an impression of low habitability, even hostility. Improved habitability therefore represents a major challenge in any hypothetical development of the site.

Its location at the confluence of two waterways, its proximity to the city, and the presence of numerous quays linked to the city's history, also offer a number of advantages for urban logistics. However, there is a need to develop a balance between logistical and urban considerations, just as there is a need to find a balance between industry and the park. The Quai de Dampremy's port facilities could evolve towards mixed use, with a public park and port activities contributing to the site's atmosphere.

III. Histories and icons

The site developed in parallel with the steel industry and technological discoveries. An analysis of the site's heritage enables us to understand how it historically functioned; several sub-entities coexisted and were connected to each other and to the surrounding area through various means (footbridges, railways, streets, waterways). Within this structure, the Route de Mons played a key role. Among the buildings on the site, the HF4 and the power station at Wez deserve special mention.

The HF4 blast furnace is the last remaining furnace on the site. From an architectural perspective, it is a large metal structure with imposing shafts, staircases and frameworks. With its isolated position and role as a landmark in Charleroi's landscape, this structure evokes the image of an industrial cathedral.

Constructed in 1963 for Thy-Marcinelle, it came 100 years after the first one built in Marcinelle. From the start, it was designed to have a large capacity in order to compensate for three old blast furnaces. It was equipped from day one with the era's modern technology, including command and control devices and automated loading. It was modernized several times (the last time in 2007), but finally shut down in 2008 due to the recession. Aside from its symbolic and historical value, the HF4 is a highly visible beacon in the Charleroi region's landscape, one of the last witnesses to Wallonia's industrial evolution, one of Europe's most productive blast furnaces and, thanks to its surviving equipment, one of the last symbols of the hot-rolled steel industry.

The power station at Wez is one of the site's oldest structures whose origins go back to 1850 when it was used to power the installations that were to become the "Hauts Fourneaux, Forges et Aciéries de Thy-le-Château" company. The complex comprises a pump room, a water tower, a building containing the boilers, the power station itself, and an electrical substation.

The power station was decommissioned in the 1980s, although the blower motors remained until the 1990s, and the electrical substations until 2012.

A true witness to the site's history and architecture, as well as to the beginnings of the Industrial Revolution, the power plant has great historical value. Built in a neo-Gothic style with its pointed-arch windows, it reflects the aesthetics and care that went into 19th-century industrial construction.

IV. A core project and urban scenarios

The "core project" relies on analysis and reveals the importance of certain elements within the site and their relation to the outside world. It identifies structuring elements (heritage, spatial porosity, the cultural axis emerging along the Route de Mons) that form a basic framework on which the various scenarios are based. The aim was to establish an initial understanding that the site is not empty, that it has qualities, and that there is no need to start from tabula rasa. Its finalization provided an initial basis for discussion on what could and could not be achieved within the Porte Ouest.

Two visions are emerging for the area and its plans: that of the quality of the city on the one hand, and that of an innovative economy on the other.

The quality of the city: All development is directed towards a quality of place that precedes any project, a truly green environment resulting from the confrontation

between a radically rehabilitated natural environment and a fully functioning heavy industry.

An innovative economy: The other analysis stems more from a classical approach to industrial development. Based on present trends, the Porte Ouest could position itself as a space which is open to the region's emerging dynamics, supporting the post-carbon industrial transition.

Attractiveness, a fundamental challenge: The project's goal nevertheless relies on improving the city's attractiveness through three mutually supportive changes: improving the population's education level, job opportunities, and quality of life. This is where changing the city's image by radically transforming the Porte Ouest can play a key role.

Scenarios for Porte Ouest lie at the crossroads of four themes and are built in successive stages (1. business park + landscape intensity; 2. landscape intensity + part of the city; 3. business park + efficiency of the "industrial machine"; 4. part of the city + efficiency of the "machine"). Together, they work on the compatibility of large-scale industry with landscape ecology, mixed-use development, and new forms of economy. The park model enables the integration of industry and urban quality of life, a natural space that mitigates the impact of heavy industry at the edge of the city, and even magnifies large-scale industry and the park through their respective disproportionate scales.

All the urban plans include a specific consideration of how to integrate a "District of the Future", in line with La Défense. It was while working on the plan that placed the "District of the Future" on what is known as the Train 600 site, at the western edge, that the potential of the HF4, the project's centerpiece, became apparent, along with the possibility of a city park, the Phare Ouest, as a way to change Charleroi's image and enhance the appeal of Porte Ouest.

The Haut Fourneau, which has been kept in a state of controlled deterioration, serves as a landmark for a highly original public space, providing support for international cultural events with its unique stature in the area's scene and serving as a gateway to the Boucle Noire, the Chemins de l'Eau d'Heure, and along the Sambre. It gives the Porte Ouest a role while waiting for the other sites to be used. Once this happens, the quality of the companies likely to set up there will have improved. It will be possible to offer them an improved environment that they, in turn, will be able to further improve.

V. A dynamic master plan: a new narrative

The masterplan therefore presented a "rebuilding plan": for the site, the city, its economy, its livability, and

its attractiveness. However, there were still a number of unknowns, particularly soil and groundwater pollution, which is one of the project's defining themes. Given this situation, the idea was to design a dynamic master plan that would be subject not only to updates, but also to genuine improvements and optimizations (upgrades) as new data became available, enabling the "rebuilding" grid to be integrated with pollution remediation strategies.

Faced with so many uncertainties, it was essential to clearly define the master plan's objectives and the values on which it is based: the plan opens with a statement of values focusing on enhancing the region's overall attractiveness and livability. The aim is to view properties as a limited resource to be managed, with a view to layering projects and mixed uses. The charter affirms that everything that exists is culturally relevant while also remaining open to changes in our heritage, so as to make its evolution possible. It affirms the right of every person and species to be able to move around and enjoy Porte Ouest comfortably. In terms of metabolism, the charter views the site as a renewable resource.

A new narrative

Looking ahead to 2028-2035-2050, Porte Ouest will be a developing regional and economic park: a productive and cultural park, a home to biodiversity, to public and urban spaces. This vision, whose objectives have been debated, emphasizes landscape intensity and a predominantly economic approach, whose diversity can be developed to form a true part of the city.

This vision revolves around seven strategic objectives and several timeframes.

i.   *Redevelop the attractiveness and livability of Charleroi and its economy*

Porte Ouest is a dynamic location for a diverse mix of activities and functions. This is due, on the one hand, to new economic campuses that are connected to the region's economic clusters and hubs, and, on the other hand, to the expansion of the ecological framework as well as the quality of open and built spaces. These are key factors in terms of attractiveness and a new image, not only for Porte Ouest, but for Charleroi as a whole.

ii. *Enhancing landscapes and ecosystems*

Porte Ouest, a former wetland at the confluence of several rivers, is once again finding an ecological role in the region. It is gradually strengthening the continuity between the major surrounding landscapes and ecosystems through a mosaic of settings based on the site's long environmental history, by rediscovering diverse moisture gradients inherent in its valley floor setting, and by giving value to abandoned ecosystems.

iii. Valuing heritage as a system

Porte Ouest is one component of the greater Wallonia region's park – which extends to the European level – having reclaimed its various spaces and rediscovered its attractiveness thanks to its historical legacy, its industrial heritage, and its ecosystems. Within the Charleroi region, the site provides a narrative backdrop to its long industrial history and acts as a gateway to an exceptionally rich cultural heritage system.

Heritage is a cultural system divided into three families: icons, heritage buildings with redevelopment potential, and linked heritage elements.

The microtopography of embankments, retaining walls, plinths, and low walls is another legacy of industrial activity. On a smaller scale, their presence can provide a qualitative basis for the creation of robust public spaces specific to Porte Ouest.

iv. Embarking on the mobility transition

Porte Ouest is an area of continuity and part of the pilot city for the Charleroi region's mobility transition, featuring two accessible train stations, improved metro and bus services, docks for waterway logistics, the RAVel network of paths, and multiple pedestrian routes. There are numerous bicycle paths along the riverbanks, calmer roads, and the Route de Mons which is suitable for all types of users. There are also a number of routes making it easier to cross the site, a shared-use marina, and new pedestrian and cyclist bridges crossing the railway line, the Sambre, and the canal.

v. Envisioning pollution remediation as an instrument for regional redevelopment

A landscape and drainage grid has been set up to organize the transition and remediation of each part of the site using a range of techniques, from the most basic to the most innovative, which are adapted partly to the levels of soil and groundwater contamination (which are currently unknown), and partly to the pace and location of new developments. This system creates a transitional landscape that will shape Porte Ouest in the short term. It also generates the development of specific expertise that can contribute to the emergence of a local economic sector.

vi. Towards exemplary metabolic and energy performance

Porte Ouest is implementing the energy transition by aiming for carbon neutrality and the production of renewable energies within the framework of an energy community creating synergies between various activities and functions. It is part of a circular, "zero waste" approach,

making the most of the multiple sources and flows of materials involved.

vii. Leveraging existing dynamics in favor of transition

Within the site and its surroundings, the master plan extends and accompanies the many projects for public spaces, mobility, the economy, culture, energy, etc. that are consistent with the transition. However, certain projects that are not consistent with this new vision are not included in the master plan.

Temporalities

By 2028, the "District of the Future" will welcome its first occupants to Porte Ouest. A number of transformations are already underway on the site, with the aim of making it a center of continuity in terms of landscape, ecology, culture, mobility, usage, etc. This will create links both with nearby urban centers and with the surrounding landscapes and ecosystems.

Its livability will be bolstered by new public spaces that highlight its majestic geography and distinctive heritage, while at the same time taking into account the need for gradual soil and water pollution remediation. These spaces will gradually become attractive, benefiting from a prime location and optimal accessibility by public transport, bicycle, foot or waterway. The District of the Future is coming into its own and acting as a lever for development. Porte Ouest is progressively attracting a diverse group of businesses that are part of existing or emerging economic clusters, as well as a developing cultural dynamic... all with the constant aim of achieving exemplary energy and metabolic efficiency.

By 2035-2050, Porte Ouest will be an attractive, inhabited part of the city, with its productive campuses and emblematic power plant, and mixed-use urban marina. It will form part of the Wallonian region's great park, where people can work, spend an afternoon at the Phare Ouest, or a weekend following the narrative itinerary of Porte Ouest's and Charleroi's industrial history.

The Phare Ouest, an urban park that parallels the "District of the Future", is the centerpiece of the site, integrating productive activities on its southern edge, preserving and showcasing the two major industries (Industeel and Riva Thy-Marcinelle) as well as supporting public spaces and major events (concerts, sporting and cultural events) around the HF4, one of the city's iconic structures. The park is open for the short term and will increase in size over time (based on subsequent clean-ups), incorporating the numerous concrete slabs reused for sports and cultural uses. Its exceptional natural and historical setting, as well as its potential for multiple uses, will contribute to Charleroi's new image and appeal. Beginning tomorrow.

À l'horizon 2035-2050, la Porte Ouest est une partie de ville habitée et attractive, avec ses campus productifs et la centrale électrique en emblème, le port urbain aux usages mixtes, s'inscrivant dans le grand parc du sillon wallon, où les gens travaillent, viennent passer un après-midi au *Phare Ouest* ou un week-end en suivant l'itinéraire narratif de l'histoire industrielle de la Porte Ouest et du territoire carolo...

Le *Phare Ouest* est la pièce maitresse du site, un parc métropolitain qui ouvre en parallèle du *Quartier du Futur*, qui intègre des activités productives sur sa bordure Sud, permet le maintien et met en scène les deux grandes industries (Industeel et Riva Thy-Marcinelle) et qui est le support d'espaces publics et de grands événements (concerts, événements sportifs et culturels) autour du HF4, icône métropolitaine. Le parc est ouvert à court terme et voit sa superficie augmenter au fil du temps (en fonction des dépollutions successives), en intégrant les nombreuses dalles en béton réutilisées pour le développement d'usages sportifs et culturels. Son cadre paysager et patrimonial exceptionnel, comme son potentiel d'usages multiples, contribue au changement d'image et à l'attractivité nouvelle de Charleroi. À partir de demain.

Figure 1. Charleroi, Porte Ouest: The Masterplan – Studio Paola Vignaò

Bas Smets • Architecte paysagiste, Fondateur du Bureau Bas Smets. Professeur, Practice of Landscape Architecture, Université de Harvard. Mandataire du groupement BBSVKMDWADV, lauréat du concours pour la redynamisation urbaine de la ville haute

Charleroi, from fortified city to sought after city

Charleroi, city of ambitious projects

The city of Charleroi, in Belgium, has a very distinctive history. Since its creation, the city has grown through a series of ambitious projects. Designed by Vauban in 1666 as a fortress, it is perched on a rocky spur. Its defenses were expanded in successive stages.
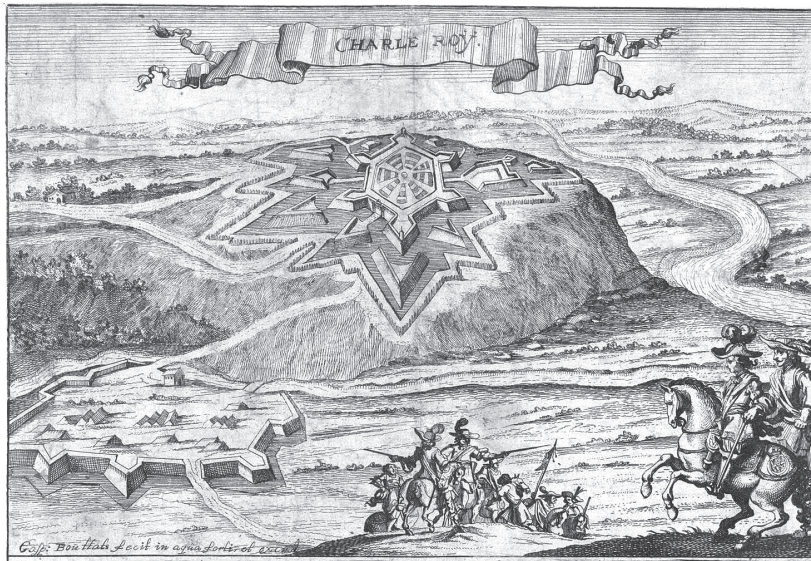

Figure 1. The fortified, isolated city

Two hundred years later, after the discovery of coal deposits in the region, Charleroi became coal mining's epicenter. In 1911, a new district was built to host the World's Fair, the height of the city's Belle Époque.

And so, the city of Charleroi never saw organic or linear development. It was developed to meet the needs of specific functions: first, defense; then, mining. Consequently, Charleroi was never designed as a 'livable' city. Its inhabitants were a by-product of other purposes.

Since the industrial crisis, the city has lost its second purpose. Three hundred and fifty years after its creation, Charleroi is in search of a history that can inspire a new future.

The urban revitalization of the upper city follows in the tradition of ambitious projects. This project offers the rare opportunity to imagine a new history, inspired by the intrinsic qualities of this extraordinary city. What was once a fortified and isolated city, an industrialized and exploited city, we can now envision as a welcoming and attractive city, one that is sought after and sustainable. It is a city which is deeply rooted in its region and connected to its surrounding landscape.

From 'Black Country' to a metropolitan landscape

Charleroi benefits from an exceptional location. A rocky spur, naturally protected by the Sambre Valley and two of its tributaries, was chosen as a stronghold. The citadel became the upper city, and the surrounding countryside was changed over time.

To the north of the city, a chain of slag heaps rose – a by-product of coal mining. These slag heaps created microclimates that are different from the region's natural climate and so have become a refuge for animal and plant species that are rare in Belgium. They form a unique topographic landscape, providing the city with a distinctive backdrop.

During the era of coal mining, these heaps were served by a railway which has become a soft mobility path which links the different heaps. Built on top of the former track's ballast, the path resembles a dry riverbed.

To the citadel's south lies the Sambre Valley and the canal that was dug into one of its tributaries. Together, these waterways carve out a wet valley, along which a number of industries developed, and which are now undergoing redevelopment.

These three major features – the rocky spur, the chain of slag heaps, and the wet valley – are bordered by the fields of Brabant to the north and by the Ardennes' wooded foothills to the south.
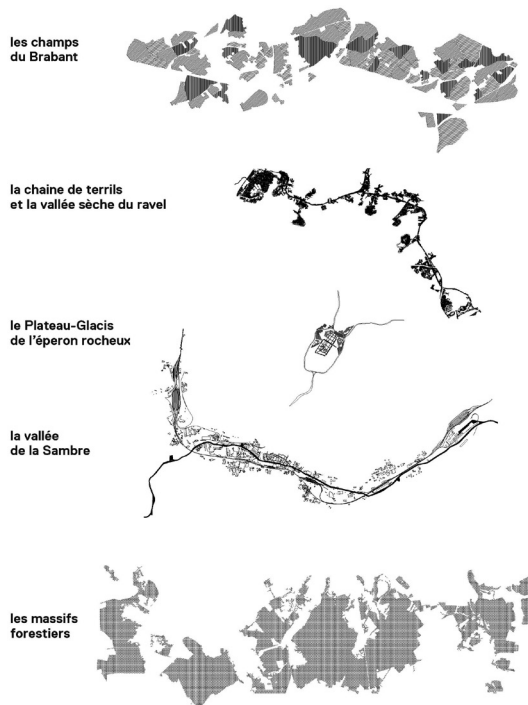

les champs
du Brabant

la chaine de terrils
et la vallée sèche du ravel

le Plateau-Glacis
de l'éperon rocheux

la vallée
de la Sambre

les massifs
forestiers

Figure 2 : Built landscapes around Charleroi

In his landmark book about Los Angeles, Reyner Banham defines that complex city through various 'ecologies': spatial systems with their own geomorphology, internal logic, use, and identity. Through this new reading of the urban environment, Banham disrupted and expanded the traditional view of cities.

For Charleroi, these landscape features can be considered 'Banham-ian ecologies'. A close study of existing physical elements allows the most relevant and enduring to be distilled. This mapping reveals and reinforces Charleroi's three ecologies: the rocky spur, the chain of slag heaps, and the wet Sambre valley. Together, these three ecologies form a metropolitan landscape, a large-scale frame of reference that anchors all elements in the region: the slag heaps, the highways, the metro, the citadel, the Sambre, and its industrial heritage.

The 'Black Country' is evolving into a metropolitan landscape, and Charleroi is becoming the Los Angeles of Belgium!
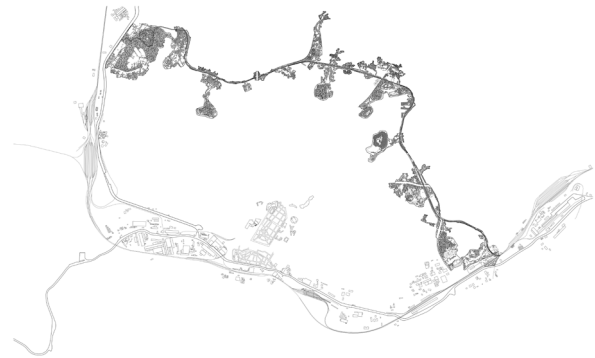

Figure 3 : The "model landscape" of three ecologies, distilled from their existing elements.

Plateau & glacis

Successive expansions of the fortification paralleled a gradual transformation of the natural landscape. The rocky spur's plateau was converted to a fortified citadel, while the surrounding slopes were transformed into exposed glacis. The plateau and glacis subsequently developed separately following their own course.

On the plateau, the citadel's streets were built in long, straight lines to ensure the best defense. The streets were not laid out to ensure optimal visibility. All the streets lead to a central square, built around a spring. Designed in a hexagonal shape, this square is the fortress' heart.

The terrain around the citadel was developed into a glacis. This military term refers to "an area of open land, generally built into a gentle slope, situated around a fortified site, in order to provide a clear field of vision." Following the removal of the fortifications, the glacis' flat surface allowed major public amenities to be built. This is where the football stadium, the hospital, the BPS22 art museum, the library, the police station, the courthouse, and the Palais des Beaux-Arts – among others – are found. These facilities often include large parking areas.

Superimposing a map of the last Dutch and Belgian fortifications over the modern urban fabric reveals the transformation of military elements into urban forms. Within these fortifications, the orthogonal street system is found. On the exterior are found the public facilities, parking areas, and fragmented parks. Wide boulevards have been laid out along the former fortifications. The highway that circles the city follows the old tributaries on either side of the rock on either side of the rock.
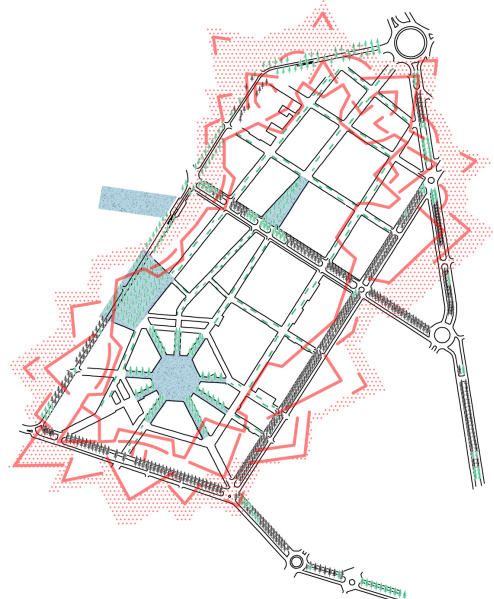
The dual plateau-glacis system was based on natural topography. This urban development project allows for a return to regional roots by inverting the military approach.

The redevelopment of the plateau's streets and squares offers the opportunity to redefine the identity of these public spaces. The fortified city is therefore transformed into a desirable city with a network of squares and the introduction of greenery in the streets. The glacis, once open, is transformed into a park system encircling the plateau, integrating the city's public amenities into a coherent spatial pattern.

Plateau

We can identify three urban features on the plateau: boulevards, streets, and squares. After the fortifications were taken down, large boulevards were built where the ramparts once stood. With their rows of tall trees, these boulevards provide visual continuity. This forms a 'tree loop' around the city center, serving as a landmark in the urban fabric. The streets have been invaded by cars. The project reduced the width of the roads in order to widen sidewalks. Trees were planted in the streets, in rectangles cut into the paved space. These trees provide the visual presence of greenery while taking up minimal public space. They are positioned in a way to help organize parking. Like natural 'pixels', these planted rectangles are

a reminder of the pioneering trees that were the first to grow on the slag heaps. The third feature is made up of public spaces. Place Charles II, Place Manège, and Square du Monument provide breathing room in the dense urban fabric of the upper city. These public squares gave cars too much space. The project rethinks these spaces as a connected network.

Glacis

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A study of the site highlights three elements located in the footprint of the former glacis: public facilities, parking areas, and small parks. The public facilities form a ring around the city center, complementing the city's dense urban fabric. The large parking areas can be landscaped in order to expand the bits of existing parks. This would allow these three elements to form a 'wooded glacis' and a true 'parks system', as described by landscape architects such as Frederick Olmstead and Nicolas Forestier.

Figure 7 : The network of public squares

A network of public squares

The upper city's different squares offer the possibility of creating a true network of public spaces. A specific

identity is proposed for each square in order to create a whole, each with its own ambiance and characteristic. The Place Charles II will regain its place as the city center's epicenter, Place du Manège becomes the market square, and Square du Monument becomes a small square and playground for the surrounding neighborhood.

The squares are connected by redeveloping the surrounding streets. The rue Dauphin will link Place Charles II and Place du Manège, while rue de la Régence will link it to the Square du Monument. This network of public squares is complemented by the new bus station, built over the metro's roof.

This network of public spaces provides breathing room in a dense city while showcasing public buildings such as the City Hall, the Basilica, and the Palais des Beaux-Arts. The squares help structure events in Charleroi, its weekly market, special concerts, and improve the quality of daily life.

Place Charles II

Place Charles II is made into a central, pedestrian

square. The concentric hexagonal shape is transformed into a webbed pattern whose points connect with the surrounding streets.

The project uses the hexagonal shape as an essential element for the square. A graphic design on the ground made up of interlocking hexagons transforms the fortress' hexagonal footprint into a dynamic shape. The lines, laid out in natural stone, will contrast with the square's blue paving stones. These lines are used to install water fountains. In nice weather, the square can transform into a giant water fountain, providing an oasis to residents and visitors.

In the center, where the fortress' water well was once located, a reflecting pool is installed, designating the city's epicenter. This reflecting pool reflects the sky, creating a feeling of intimacy and infinity.

A central water fountain can be turned on for special occasions. This jet can concentrate the power of all the jets around it to surge several meters above the square!

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Place du Manège

The open-air parking area was converted to a public space reserved for pedestrians, located between the Palais des Beaux-Arts and the City Hall's bell tower.

A grid of tall trees was planted at large intervals, creating a space that is open and understated. This large distance maintains the visual continuity between Place Charles II and the Palais des Beaux-Arts and allows many uses, such as markets or carnivals. Installations requiring more space can be set up in Place Charles II and the metro roof's terrace.

The trees cast a grid on the ground, struck through by stripes of blue paving stones. The tree chosen for the square is the Gingko Biloba. At once graceful and eye-catching, this tree takes up little space while introducing a real natural element. Following the seasons, its colors change from an electric green in the spring to an intense yellow in autumn. And so, Place du Manège gains its own identity while allowing for a variety of uses.

Figure 9 : Place du Manège

Square du Monument

The Square du Monument was an island surrounded by streets. The project removed the street on one side of the square as well as the connection between the two streets. The square was therefore enlarged and renovated from one end to the other. This square is intended to become a meeting place for locals. The leveled surface allows for different types of games, such as pétanque.

The outdoor furnishings were designed with Mullen Van Severen designers as objects that invite exploration. The renovation of Square du Monument gives it an entirely new identity, inviting new uses.

Figure 10 : Square du Monument

Green roadways

There are two types of roads on the plateau: boulevards and streets. The boulevards follow the footprint of the former fortifications and are nearly twice as wide as the streets found within the fortress.

Boulevards

The boulevards were planted with large trees and form a ring around the city center. We are proposing to expand this 'tree loop' which creates a link between the city center and the surrounding public facilities. This loop is intended to become an urban feature that increases the visibility of the urban fabric, helping to orient residents and visitors.

The redevelopment of Boulevard Jacques Bertrand follows this logic. The tree loop was expanded, the roadway reduced, and large sidewalks were created along the building fronts.

Figure 11 : Boulevards and their sightlines

Streets

The streets had been taken over by cars. The project

enlarged the sidewalks and, when possible, a rectangle was cut out of the pavement in order to install a tree layer. Our proposal is to plant the same pioneer species that colonized the slag heaps to introduce pixels of nature into a dense and paved city.

These rectangles space out parking spots and help combat heat islands. Wider sidewalks and greenery are helping to transform the fortified city into a welcoming and pleasant city.

Figure 12 : Streets and their pockets of nature

Wooded glacis

A new model for the university campus

For the World's Fair, prestigious buildings were constructed at the outer limits of the last fortification. Today, they are being reimagined as a campus in the American tradition, a true gathering place for students. The adjoining public space is made up of a raised esplanade, located above the tunnel. The tunnel's conversion allowed the public space above to be reimagined. Reducing the size of the road allowed a large lawn, punctuated by trees to be installed around the tunnel.

A series of small squares are found at building entrances. Today, the tree loop is interrupted due to the tunnel. New landscaping on either side completes the loop that crosses the campus. As a result, the campus is connected to the city through this tree loop, while at the same time forming part of the wooded Glacis system.

Transforming the tunnel

The boulevard Gustave Roullier tunnel was turned into underground parking thanks to a detailed cross-section study. The redevelopment of the northern entrance ramp reduced the roadway's footprint. The project made it possible to demolish the structure protruding into the natural terrain in front of the Université du Travail, keeping the paving stone level throughout.

The project replaces the exit ramp with a large staircase that leads to Place du Manège and the Palais de Beaux-Arts. The parking area is connected to the city by two distinctive entrances: one on the square in front of the Alfred Langlois Library, and the other on boulevard Solvay. These openings create natural ventilation and allow plenty of light to enter the parking garage. Natural light makes the stairs and elevators to the campus visible.

Landscape & climate

Based on an analysis of the existing landscape, we are proposing three main features for revitalizing Charleroi's upper city: the network of public squares, the planted road network and the wooded glacis. Together, these features create an independent and sustainable landscape. Planting trees will aid in evapotranspiration.

Similarly, planting pits are designed to store rainwater. Specific types of vegetation are selected for each feature. The choice takes into account two major factors: the site's conditions (sunshine, wind, existing vegetation, etc.), and the roles that vegetation can play in this specific location (contributing to the fight against urban heat islands, creating ambience and landscape identity).
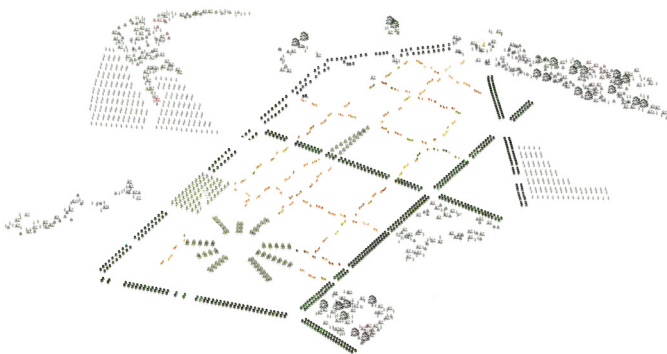
Figure 14 : The planting of trees in the upper city

Figure 13 : The Campus

Conclusion

After winning the competition in 2014, it has taken almost 10 years to complete construction. The project is in keeping with the dynamic spirit that has characterized Charleroi since its inception: that of transforming what already exists.

The Place du Manège parking area has been transformed into a verdant square, the Square du Monument has become a neighborhood playground, the university campus has been turned into a park, the narrow streets are dotted with trees, the tunnel and underground passageway have been converted into an underground parking lot, the metro roof has been converted into a bus station, and the Place Charles II has been restored to its role as the city's epicenter.

Three hundred and fifty years after the citadel was built, the city of Charleroi is entering a new phase, that of a desirable and attractive city.
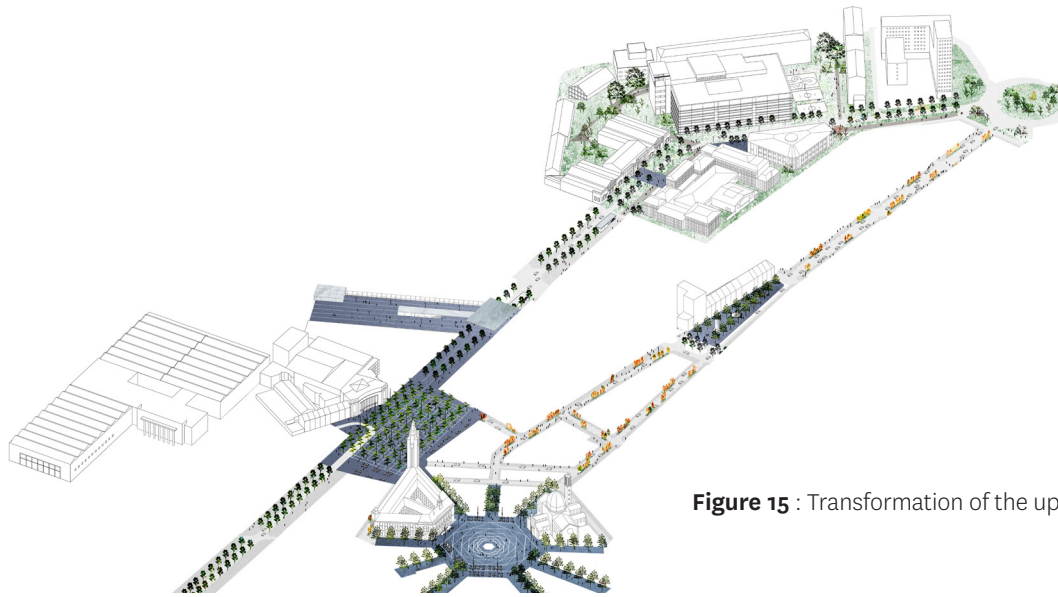
Figure 15 : Transformation of the upper town

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Forma urbis. Interpretations and Forms

If it can be said that, in general, all cities are different from one another and are distinguishable by characteristics related to their geography and history, then it is true that certain cities are "more different than others", and Charleroi clearly belongs to this category.

Even though it was founded in the second half of the 17th century by King Charles II of Spain (and the Netherlands), who decided to build a fortress there (later solidified by Vauban), Charleroi's urbanization as it can be seen today is the result of two eras:

– On the one hand, the great epic of industrialization (and its subsequent decline) that spanned the 19th and 20th centuries and left its mark on the region through the development of industries (steel, coal, electromechanical, etc.), the concurrent creation of major transport infrastructure (rail networks, canals and roads, etc.), the creation of new landscape artifacts resulting from coal mining (slag heaps) and the development of low-density residential areas around coal mines, factories and infrastructures, which sometimes merged with existing settlements (Couillet, Gosselies, Marchiennes, etc.) or which developed in a more open way in the second half of the 20th century in the wooded housing estates to the south of the urban area;

– On the other hand, the enactment in 1977 of a Belgian law to merge municipalities[1], which incorporated

fourteen other (former) municipalities[2] into Charleroi's historic territory, thereby forming the 472.19 km2 municipal territory we know today. Until 1977, the municipal territory covered a very limited area, which roughly corresponded to the inner perimeter of the current R9 ring road, along with an extension to the north (La Garenne). The 1977 merger brought with it a political reform of regional planning, relegating the former municipal centers to the background and cementing Charleroi as the operational and decision-making center of a new conurbation, which until then had not been considered in terms of spatial organization. This was an operational center for which the construction of the small R9 ring road and its various branches – combined with the metro network, designed around a central ring from which eight branches initially emerged – was meant to be an attempt to define a territorial structure that would give it some semblance of cohesion.[3]

Charleroi's form cannot be immediately understood in this way and requires a more complex approach that integrates the multiple dimensions of the city's history, sociology, regional ecosystems, and economy, as well as industrial mining and exploitation systems, etc.

In recent years, several descriptions of this area have been published, providing keys to understanding the city's unique forma urbis.

In December 2015, Mayor P. Magnette proposed a new idea in a lecture given as part of a "Collège Belgique"[4] session, held at the Palais des Beaux-Arts in Charleroi. He sees a region that must fully embrace its polycentric nature, transforming it into a valuable feature in its own right.

"Cities with a central core and a first and second ring, etc., are a model. But this doesn't mean we should dismiss polycentric cities, which are wrongly viewed as second-class towns, or agglomerations of villages. We need to be able to turn this notion on its head. Polycentrism, once viewed as a flaw, must become a strength."

Applied to Charleroi, the polycentric agglomeration model involves strengthening the structure of the central city, complemented by distinct secondary centers, which are linked by mobility infrastructures and landscaped open spaces, inherited from the industrial epic and becoming "shared places" accessible to all.

1. The merging of municipalities in Belgium in 1977 was made possible by the "Law of December 30, 1975 on the reform of provincial and local administrations". This law made it possible to merge many of the smaller Belgian municipalities into larger municipal entities, with the aim of streamlining and modernizing local administration. This reform led to the creation of merged municipalities throughout Belgium, reducing the total number of municipalities in the country as a whole.

2. Couillet, Dampremy, Gilly, Gosselies, Goutroux, Jumet, Lodelinsart, Marchienne-au-Pont, Marcinelle, Monceau-sur-Sambre, Montignies-sur-Sambre, Mont-sur-Marchienne, Ransart, and Roux.

3. See on this subject "Le petit ring est un plateau de lecture scénographique de la ville", F.Schreuer and B.Moritz in interview with J.Yernaux, in Dérivations, n°6, December 2019

4. "Forma urbis" : Penser la ville au XXIème siècle, a conference given by P. Magnette, Palais des Beaux-Arts de Charleroi, as part of the Collège Belgique, 3 décembre 2015

This vision was further brought into focus in 2015 with the publication of an "Plan d'intensification urbaine et paysagère" led by Charleroi Bouwmeester, which shows a polycentric conurbation, arranged in a star shape, striking a balance between green spaces (natural or artificial, products of industrial exploitation) and the metropolitan form made up of the centers of the merged former municipalities, the various districts' major public squares, the immediate surroundings of metro stations, the main public transport routes, and the Sambre valley.

This intensification plan is made up of two complementary plans: the urban intensification plan and the landscape intensification plan. The goal of these documents "is to intensify these two features and accentuate their contrasts".[5]

In a city experiencing demographic decline, this plan is based on the assumption that the urban area will shrink on the existing artificial terrain, highlighting the landscaped system of natural and artificial artifacts (slag heaps, industrial sites) that have shaped the area.

It is worth mentioning the seemingly random pattern of slag heaps scattered throughout the Carolo region on the landscape intensification map. In landscape terms, the organization of these slag heaps – which are evidence of the subsoil's exploitation – reflects the particularly irregular geometry of the mining claims located within the thick carboniferous seam that crosses the Charleroi territory from east to west.

In the introduction to the "Guide d'architecture moderne et contemporaine - Charleroi Métropole", G. Grulois presents a third interpretation of Charleroi's forma urbis, inspired by the perspective of R. Banham, a British architectural critic.

In a book originally published in 1971, Banham presents an analysis of Los Angeles focusing on four ecologies which represent the city's essential elements. Following Banham's example, Grulois proposes an analysis of the Charleroi region based on key features in the history of Charleroi's urbanization.

Figure 1. Superimposition of the perimeters of the mining concessions (1906) on the structure of the spoil heaps still present within the administrative territory of the city of Charleroi (2022). This superimposition illustrates that the irregular structure of the mining concessions generated an irregular distribution of surface spoil heaps. This explains the fragmented structure of the area and the strong interweaving between nature (which has colonised the spoil heaps) and urbanisation. Copyright: MSA, 2023.

5.   G.Maillis « Charleroi – un schéma stratégique 2015-2025», 2015, p.36

He identifies four major territorial features, which appeared chronologically and sometimes overlapped:

– the planned fortress and the consolidated metropolitan center;
– the industrial mining basin;
– the industrial axis of the Sambre;
– suburbanization and the fragmented territory of the automobile.

According to Grulois, each territorial feature can be interpreted in the sense of an ecology; in other words, a system of interactions between the living beings that populate it and the living environment that characterizes it.

This reading, which complements the previous two, focuses on the emergence of territorial features in the context of the Fossil Crescent, both in terms of its exploitation and its decline.

The three aforementioned interpretations allow us to think of the Charleroi conurbation outside of the conventional spatial framework of a city shaped by the long sedimentation of history and instead approach it from the viewpoint of its topographical, infrastructural, landscape, functional, and isotropic characteristics.

All these interpretations implicitly refer to the "archipelago city" model developed by R.Koolhas and O.M.Ungers in 1977, in response to West Berlin's demographic decline in the 1970s.

In this model, spatial fragmentation is viewed positively, with each fragment possessing its own functional and spatial qualities, like a city within a city, and its own particular identity. The hybrid nature of these forms is not viewed negatively, but as forming the constituent identity of the city-archipelago. The fragments – which in the Ungers/Koolhas approach embody the idea of the neighborhood – are interconnected by mobility infrastructures, immersed in a vegetated continuum, expanding and absorbing the ruins of neighborhoods abandoned by their inhabitants in a context of decline. It is each fragment's functional and morphological synergy that makes it possible to "create a city".

The question then arises as to what kind of architecture and urban and territorial projects are being produced in Charleroi today, and what territorial strategies are being put in place. What are the specifics in terms of forms and typologies?

As a corollary to the forma urbis, which diverges from conventional frameworks, contemporary architectural production is characterized by a specific morphology of large objects that can be read on a metropolitan scale and interact functionally with one another. In Charleroi, for

example, it is very rare to find street-front construction or renovation projects that form an "urban fabric" or are part of an acupuncture strategy, but instead they are isolated interventions of a certain scale, forming a landscape.

From a project point of view, recent urbanization, the absence of a strong cultural heritage and the unique forma urbis allow architects to develop innovative proposals. When asked in 2017 about specific buildings in Charleroi, architect G.Maillis mentioned the Hôtel de Police's Blue Tower (arch. J.Nouvel and MDW, 2014), the Fire Station (arch. Ph.Samyn & Associés, 2016), the ring road renovation (J.Glibert and ReservoirA, 2019), and the Rive Gauche shopping center (arch.DDS, 2017).

To this initial list can now be added projects such as the Grand Hôpital de Charleroi (arch. VK Architects & Engineers and Reservoir A), built on a leveled slag heap, the renovation of Charleroi Expo (arch.Vylder/Vincke/Tailleu - AgwA), and the future Aerospacelab megafactory (arch. Office Kersten Geers - David van Seeveren).

From a Koolhas/Ungers perspective, it would also be worth considering the concentration of urban projects in the Ville Haute, the District Créatif, and the Ville Basse that run along the Sambre river as large, stand-alone urban objects, and as morphological entities that form part of the Caroloregian archipelago and embody the urban intensification vision championed by the eponymous development plan. The building complexes left by the former ACEC conglomerate at the Porte Ouest can be viewed in the same light.

In terms of carrying out the territorial/regional strategy, the four features proposed by G. Grulois can also be applied to the axes used to classify urban projects developed by the city and its institutional partners over the last decade. These are extensively covered in Charleroi Bouwmeester's recent publication.

One of these axes is the creation of a new narrative for the Sambre's former industrial corridor, in terms of its relationship with the city and the region. The literal backbone of the town's industrialization in the 19th century, the river's role as a means of transporting goods and merchandise progressively declined with the closure of factories and coal mines, as well as through the development of road logistics in the second half of the 20th century as an alternative to waterway transport. The intense industrial activity depicted in paintings by Pierre Paulus (1881-1959) was gradually replaced by a bleak and sometimes empty landscape, where few relics of the industrial epic remain.

At the end of the twentieth century, this area had been abandoned by public policy in favor of developing new economic activity zones in the northern part of the co-

nurbation, especially around the airport, which became civilian in 1997.

It is only in the last ten years or so that the Sambre's former industrial corridor has received renewed attention, thanks to a unique initiative spearheaded by the city and promoted by Mayor P.Magnette and architect G.Maillis, to develop masterplans encompassing the waterway's route that anchors the valley floor. These plans aim to find a balance between economic considerations, soil remediation and the development of green spaces.

The first master plan, which is currently being implemented, concerned the urban layout of the Sambre running along the city center (Left Side, see below). The most recent masterplans, on the other hand, concern large, extremely complex areas, covering 110 hectares for the Porte Ouest, and almost 180 hectares for the Port Autonome de Charleroi concessions to the east of the city (SuperSambre - Trilogiportn see below).

Three of these masterplans, designed by MSA, are part of a twofold urban and landscape intensification strategy, making use of the Charleroi area's particular morphology.

Left Side Business Park (2013-2014). Beside the R9 ring road, designed as a "vast scenic and landscaped plateau" (according to its designer, J.Yernaux), a number of derelict parking lots and office buildings dating from the 1980s still remained within the ring road's interior. The project focuses on urban intensification in a part of the city center that enjoys excellent accessibility thanks to its proximity to the train station's multi-transport platform.

The masterplan proposes creating a group of six towers in a row which stand perpendicular to the motorway and form a single morphological whole, despite the diversity of their architecture and uses.

This large complex works with the scale of the Ring Road that it faces, while at the same time embracing the need to be firmly planted on the ground and to establish a relationship with the urban space. On the Sambre side, a nautical docking area has been created, allowing pleasure boats to stop off in Charleroi.

Figure 2. Masterplan Thy-MarcinelleMasterplan for the development and urban integration of the Thy-Marcinelle steelworks.

The strategy consists of reorganising and rationalising the occupation of the open spaces on the operating site and positioning new built volumes in the landscape to create a qualitative "foreground" for the plant. An approach to the renaturation of the site is also proposed. Copyright: MSA - 2019

Thy-Marcinelle (2019-2020). The Thy-Marcinelle plant is the result of converting a concrete bar rolling mill that was scheduled to be dismantled in the late 1980s. Initially powered by a neighboring blast furnace (HF4), the rolling mill was converted into an electric steel mill in 1992, equipped with an eight-line continuous casting system. Initially operating with the blast furnace located on the right bank, the steel mill's operations require it to be able to access both the city center and the ring road for storage and production purposes (coils and welded wire mesh) as well as waste (scraps, slag, etc.).

At the city's request, and in anticipation of its 30th anniversary in Charleroi, the company commissioned a masterplan to improve its urban integration on both the city and Sambre sides. Through a series of separate interventions, the masterplan calls for reorganizing the site in terms of function and landscape, as well as constructing buildings visible from the Ring road to create an urban foreground for the gigantic factory.

Super-Sambre-Trilogiport (2021-2022). Located to the east of Charleroi, the project area includes the former Hainaut-Sambre steelworks and Solvay factories. Following their respective closures, the manufacturing sites were dismantled, cleaned up and made ready for future real estate development. Featuring large, unstructured open spaces, the masterplan proposes creating new connections between the two banks of the Sambre, which were previously separated by the factory sites. The creation of new logistics and production facilities has been proposed in the form of mega-platforms, which are interconnected by a landscape structure built along the course of the Sambre River.

The masterplan proposes strengthening ecological infrastructure as well as improving the quality of both open and built spaces, which are essential elements for enhancing appeal and transforming the image of this part of the city.
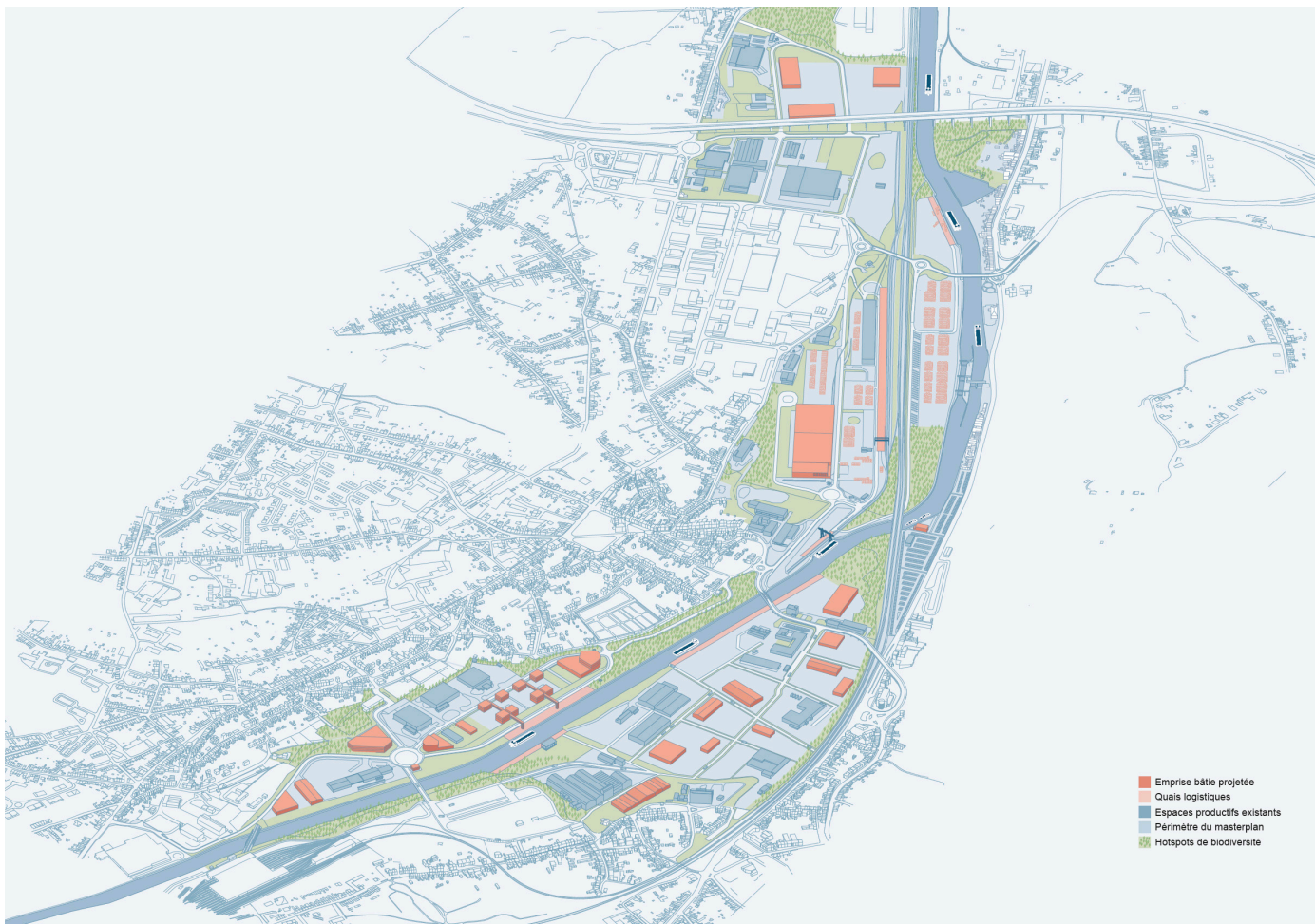
Figure 3. Masterplan SuperSambre. The project focuses on the future of former steel and chemical industry sites that have been levelled and/or are in the process of being cleaned up, acquired by the Autonomous Port of Charleroi. The masterplan's vision is to exploit the presence of the Sambre by installing logistics and port infrastructures linked to it. The masterplan has a strong landscape vision and proposes to create new connections linking both the two banks and the former industrial sites to their inhabited environment. Copyright: MSA - 2021.
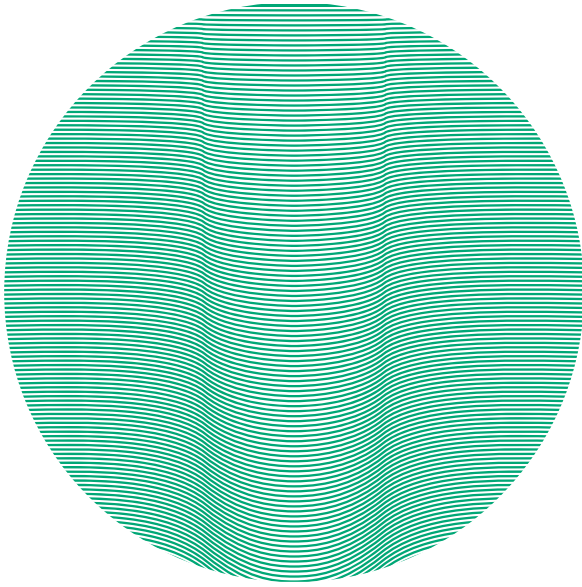
The fossil range of the Anthropocene

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Unlocking the energy of the modern world

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