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Beyond Oil Designing the Transition

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CIRCULARITEIT

OP WEG NAAR 2050?

PETER LUSCUERE [ED.]



“The Industrial
revolution was
largely also
a petroleum
revolution.”

BEYOND OIL: DESIGNING THE TRANSITION

CAROLA HEIN

ABOUT CAROLA HEIN

Carola Hein is Professor and Head of the History of Architecture and Urban Planning at Delft University of Technology. Her book publications include *The Capital of Europe*, *Rebuilding Urban Japan after 1945*, *Port Cities*, and the *Routledge Handbook of Planning History*. Among other major grants, she received a Guggenheim Fellowship to pursue research on *The Global Architecture of Oil* and an Alexander von Humboldt fellowship to investigate large-scale urban transformation in Hamburg in international context. She currently works on the transmission of planning ideas among port cities and within landscapes of oil and teaches a studio on *Architecture and Urbanism Beyond Oil*.



BEYOND OIL:

DESIGNING THE TRANSITION

CAROLA HEIN

Earth has experienced a number of major energy transitions, each resulting in extensive systemic changes. The introduction of fire in the Paleolithic, the emergence of farming in the Neolithic, and later the industrial Revolution all changed the ways that humans lived, worked, and travelled and the materials they used.¹

The Industrial revolution was largely also a petroleum revolution. Entrepreneurs, inventors, large companies, and governments used industrially drilled oil to create new fuels, new materials, new spaces, and new lifestyles. Together their innovations have created what I call the *global palimpsestic petroleumscape*, an extensive and layered landscape shaped by the global network of flows and funding of petroleum and its refined products. This petroleumscape includes buildings (office buildings, gas stations), infrastructure (roads, railroads, pipelines), and other structures (refineries and storage sites) of varied ownership and uses that facilitate the production, transformation, and consumption of oil. To keep climate change from getting even worse, and to live through climate change, we must actively seek out the next energy transition, and move from fossil fuels to more sustainable energy.

¹

Lenton, T. M., Pichler, P.-P., and Weisz, H.: Revolutions in energy input and material cycling in Earth history and human history, *Earth Syst. Dynam.*, 7, 353-370, <https://doi.org/10.5194/esd-7-353-2016>, 2016.

An important step forward is to recognize where we are: understanding how thoroughly oil has shaped our environment, materials, and lifestyles. We must also understand the feedback loops that connect the actual places of oil (first) with the representation of those places and (second) with the practices facilitated by the use of petroleum products that mostly help make oil a positive and fun factor in everyday life. These representations and practices reinforce the consumption of oil, securing continuous production and expansion of the spaces of oil. These feedback loops then effectively prevent companies and countries from making a transition from oil to other energy sources.

The petroleum revolution changed our behaviour, our built environment, and its representation. The petroleum transition was not planned; it happened in a hodge-podge fashion. In contrast, we have a chance and an obligation to initiate the next transition.

HEROIC OIL: THE OIL REVOLUTION

Combining the forces of private land purchase, speculation, and construction with public spatial planning, policy, and regulation, petroleum actors have guided the development of urban and rural areas around the world. Extraction, refining, transformation, and consumption of petroleum have made an extensive impact on seas, landscapes, cities, and buildings. Oil drilling equipment, refineries, storage tanks, pipelines, dedicated road and rail infrastructure, and gas stations serve the physical flows of oil in industrial areas as well as everyday life. Headquarters, research facilities, housing, cinemas, and leisure facilities are linked to the financial streams of oil. All stand as material witnesses to the invasiveness of petroleum, but some of them are much more subtly connected to petroleum flows—international schools that serve oil expatriate’s children, for example, are less visible than refineries. In most instances, oil companies have not been planning agents per se, but they have often collaborated with public governments in charge of spatial planning; as a result, the flows and the interests related to petroleum and their representation have influenced public planning practice, directly and indirectly, in response to the changing urban environment. Mapping the petroleumscape of the Rotterdam/The Hague area provides insights into the pervasiveness of oil spaces (Fig. 1).²

The imagery of petroleum – in corporate publicity, policy documents, art, architectural design, and toys – also shaped citizen imaginaries and behavior.

²

For further analysis of the topic see: Hein, Carola. “Oil Spaces: The Global Petroleumscape in the Rotterdam/The Hague Area.” *Journal of Urban History* (2018).

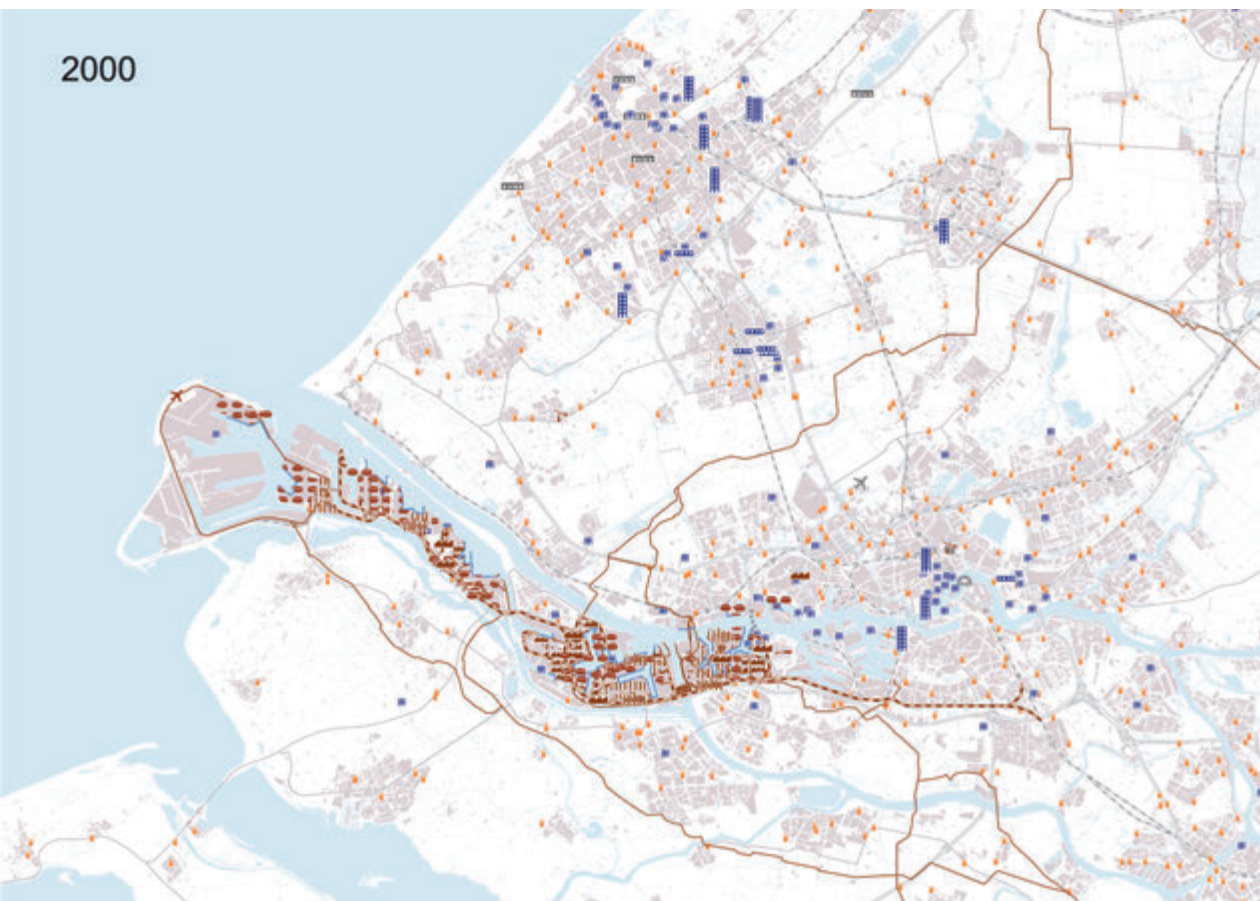


FIG. 1 The petroleumscape in Rotterdam/The Hague in 2000. Source: Carola Hein and Arnoud de Waijer.

The impact of these private and public petroleum actors on society has not stopped there. The imagery of petroleum – in corporate publicity, policy documents, art, architectural design, and toys – also shaped citizen imaginaries and behavior. Oil companies and governments have created a broad range of petroleum imaginaries that change over time and in line with local cultures.

They have promoted (and sometimes invented) progressive aspects of oil: they championed gender equality by publishing brochures teaching women to drive, promoting educational goals by teaching children about the dangers of the street, and more recently promoted green technologies. Oil companies and nations have depicted oil facilities as a sign of national industrial strength on company brochures, postcards, and stamps; they have promoted fun and attractive petroleum-derived products and spatial practices in everyday life; and they have engaged with spaces the oil industry doesn't own or use, but that petroleum products make accessible, notably celebrating the unspoiled landscape. Non-corporate representations of oil in art and architecture as well as film and literature have promoted oil as a heroic partner in creating contemporary society and our identity.

Over time, petroleum actors have constantly invented new and more diversified uses for petroleum. As lighting oil was replaced by gas and electric lighting, fuel for engines captured the world, only to be complemented by a broad range of oil-based materials, from plastics for building materials, clothes, containers, and even medicine and cosmetics. Events, too, have served to promote this increasing use of petroleum and its products. The City of the Future exhibition at the 1939 World's Fair, designed by Norman Bel Geddes for Shell and General Motors celebrated highways and skyscrapers. The House of the Future at Disneyland, built in 1957, continued this collaboration between an oil-related enterprise, a leading industry, and design at a highly visible and widely attended event. Neither of these directly changed the world, but both spearheaded a major industry-led urban and architectural changes in the following decades: Cities around the world became car dependent and the building industry now uses plastic in the majority of building components. The world fair in Shanghai in 2010 tried to promote sustainability—at least it used the theme— but didn't catalyze a transformation as large as the earlier ones.

DESIGNING THE TRANSITION

How can we set into motion a transition that is as comprehensive as the earlier oil-led one? Traditionally, human lifestyles were sustainable because we didn't have abundant energy: we grew food locally, reused materials, and built long-lasting structures. After the industrial revolution, we got used to wasting energy and materials. But in recent decades we have come to understand that our energy sources are finite and that our lifestyles are not promoting our health and welfare or that of the planet itself. Asking individuals to live more sustainably and to effectively oppose the oil feedback loops requires a lot of strength and energy; it does not address corporate or systemic actions, and is ultimately set to fail.

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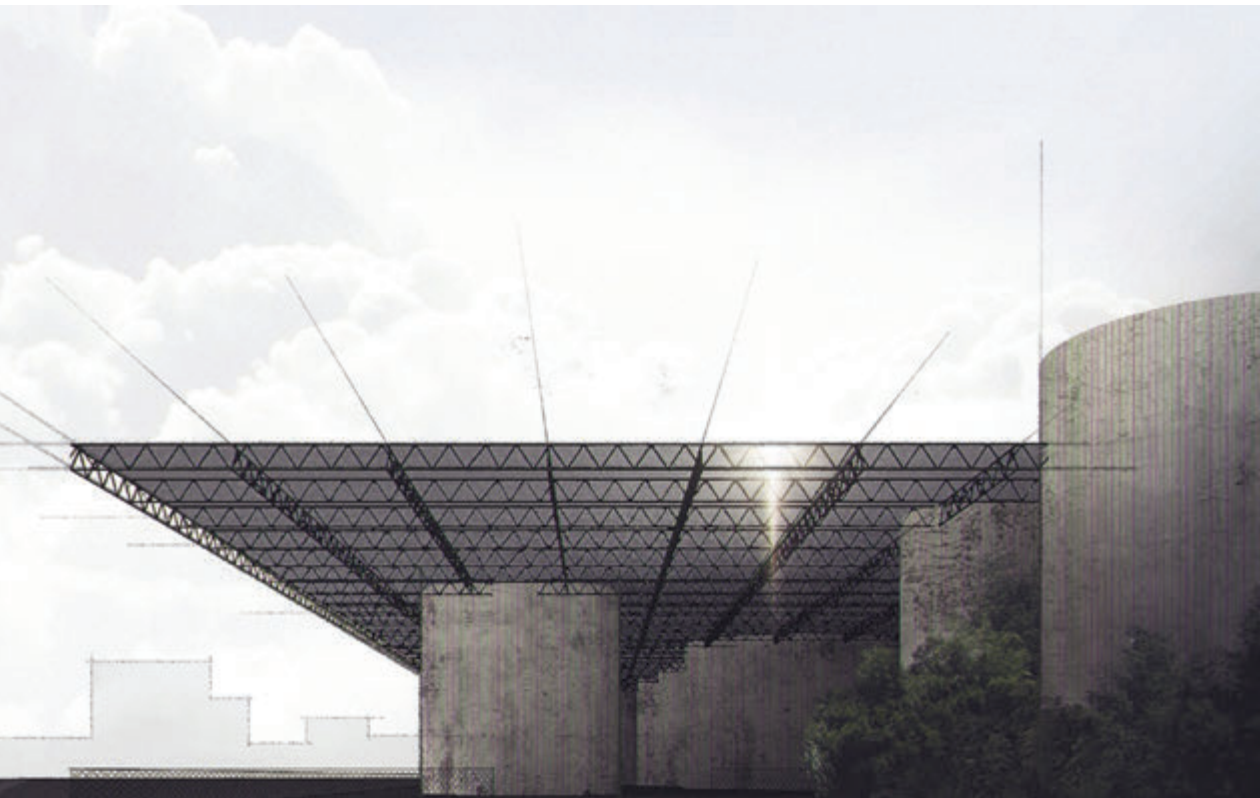


FIG. 2 In the MSc2 studio Beyond Oil at TU Delft, Johan Martin Dahlberg envisioned reinventing and transforming the oil industry and the port to educate current and future citizens about sustainable ways. He called for a “monument for the gone oil”.

Therefore, I propose that we design the transition, create new feedback loops, and make the spaces of post-oil just as pervasive, heroic, and fun as the spaces of oil. We can design a transition that promotes circularity and sustainability in a socially just way, aligning with the UN Sustainable Development Goals (SDG). This includes closing circles of consumption and production, lessening the use of fossil fuel, reducing petroleum-based plastic waste to overcome an energy-intensive lifestyle, guaranteeing water safety, reducing hunger and responding to the challenges that result from the technologies of the Fourth Industrial Revolution.³

Architects and urbanists can help design this transition, not just by engineering targeted interventions, but with critical thinking, dreaming and curiosity, and imagining and designing the necessary new building, spaces, and forms of urbanity. Taking the concept and historical analysis of the petroleumscape as the point of departure, a Master-level (MSc 2) design studio at TU Delft, “Architecture and Urbanism Beyond Oil” (initiated by Carola Hein and co-taught by Henri van Bennekom, with assistance of Paolo De Martino), tackles the question of the

³

Klaus Schwab, *The Fourth Industrial Revolution* (Crown Business, 2017).

future of post-oil cities. Conducting historical analysis, students first reflect critically on more comprehensive and sustainable economy based on new energy sources. They then specifically design transition strategies combining short and long changes. Recognizing the importance of the cultural and social dimensions of the energy transition from oil to new sources of energy, Johan Martin Dahlberg, for example, proposed transforming the oil industry and the port, including its infrastructure, by adapting the old structures to the new needs of society; and he suggested siting new industries between the city and the port, to educate current and future citizens about sustainable ways. He called for a “monument for the gone oil.” (Fig. 2).

Class members have studied the port cities of Rotterdam and Dunkirk, but their approach is valid for cities around the world. Other designs for transition away from oil might include reclaiming polluted soil, reusing oil industry areas for new purposes, or even redesigning entire pieces of coastline. Creating temporary green spaces as part of a gradual renaturalization of polluted areas and reclaiming underutilized areas would be starting points for new energy cultures. We need to develop new narratives about the past and designate new heritage spaces that exemplify these new histories – another possible use for the oil-related architecture that gets abandoned or underused.⁴

As the Clingendael Institute has pointed out,
Rotterdam and Antwerp have “last
man-standing refineries” – they are too
important to close down in the short term.

These designs will create new feedback loops, creating further sustainable practices and economies. The transition beyond oil will change our relationship to food production, and to nature and landscape; It will affect the interrelationship between energy production, consumption, and urban form. We have to very carefully consider how we measure the transition and what scales are truly meaningful. A city like Rotterdam which includes a huge industrial complex is a good example to study. For example: How do we assess the transition if a port transports oil and other carbon fuels? Are we only looking at the functioning of the port or are we also considering the flows that cross it?

4

On the Beyond Oil Studio see: Carola Hein (2017) “*How the Fourth Industrial Revolution will change the energy landscape*” <https://medium.com/thebeammagazine/how-the-fourth-industrial-revolution-will-change-the-energy-landscape-7fe155227ca9> (Reprinted in: <https://cleantechnica.com/2017/09/07/fourth-industrial-revolution-will-change-energy-landscape/>) [also in print] Carola Hein and Paolo Di Martino (2018) “Designing post-carbon Dunkirk with the students from TU Delft” *The Beam* (5) <https://medium.com/thebeammagazine/designing-post-carbon-dunkirk-with-the-students-from-tu-delft-28f44c40d761>

The Port of Rotterdam serves as a hub for petroleum products and as a distributor for the industrial areas of the German Ruhr area and the petrochemical industries in the Antwerp region. Even if the whole of Netherlands uses only renewable energy, the function of the Rotterdam port wouldn't change, as the consumers for the oil from Rotterdam are located in Germany and Belgium.

Unless these countries also make a transition, there will not be much change in the Rotterdam port. As the Clingendael Institute has pointed out, Rotterdam and Antwerp have "last man-standing refineries" – they are too important to close down in the short term. Investments in the port are made for the long term, so it might take us a long time to create the energy transition of the port and the products that flow through it. These are not reasons to avoid the task but imperatives for starting to design it now. We can design the transition to include the impact of the transformation on the larger region, its hinterland, and its foreland. We can make Rotterdam competitive even without oil, using new technologies and re-imagining the spatial relationships between landscape, energy, infrastructure, technologies, and global-local economies.

CONCLUSION

Transition by definition involves a stage between where we are and where we hope to arrive. Changes in the energy landscape will require a process of dismantling, transformation, or reuse of oil-based industrial cities through innovative and strategic processes. Architects and urbanists can combine research with design, and develop solutions supported by local communities and governments, into a critical approach for a more sustainable future.