

## Refining the Heritage Narrative of Post-oil Landscapes

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Petroleum and its products are omnipresent. They have reshaped the spatial and material characteristics of landscapes (Müller 1977) around the globe for almost two centuries, restructuring existing natural spaces, creating world-wide networks of infrastructure and even producing change on a microscopic level (Waters et al. 2016). Oil's spatial manifestation includes not just oil fields and refineries, but all of its material products, as well as the complex structures for their production. It is impossible to draw a complete picture: petroleum and its derivatives have become an integral part of nearly all types of humanmade objects. Even considering only the physical condition of landscapes, oil's influence is enormous. Many elements of the built environment are connected to oil: refineries, storage tanks and gas stations, but also headquarters and educational, cultural and leisure institutions. Petroleum is used to make insulation, paint, window frames, asphalt, roofing, solar cells, wind turbines, signposts, lighting and facade elements, to name but a few of the elements that are part of our daily life. These and other objects are connected by networks of oil-based materials, including roads, pipelines and electric cables. Petroleum is used to produce clothing, packaging, vehicles, smartphones, credit cards and sports equipment. In short, we have an environment so highly shaped by a complex network of oil-based products that it requires its own terminology to account for the phenomenon: the global petroleumscape (Hein 2009, 2013, 2017a, 2017b, 2018a).

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For much of the last century and a half, petroleum has been celebrated as a provider of work and wealth, facilitating mobility and everyday life, including through the widespread use of plastics. For many people, petroleum modernity evokes nostalgic feelings of freedom. These positive feelings are often related to what we may call the period of heroic oil. The seemingly positive side of oil consumption (the front end of petroleum) makes it more difficult to replace the petroleum-based energy system (the back end of petroleum) with sustainable energy sources and practices. Concrete plans to satisfy human energy needs in more sustainable ways include a far-reaching phase-out of fossil energy production. Structural changes affect production and consumption processes, and thus the behaviour of individuals and entire societies. They ultimately lead to closed chapters of human history, chapters that retrospectively represent a significant developmental step, which was elementary for groundbreaking developments, but no longer have a direct impact on the present. Even as the spaces of oil disappear, their cultural heritage continues in art, architecture, films, literature and everyday culture postulating oil as a source of pleasure.

Petroleum narratives are manifold and often celebratory: stories have long aided the successful emergence of companies like Standard Oil (the predecessor of today's Exxon Mobil Corporation). Oil ports, pipelines, refineries and storage tanks appeared prominently in national narratives in countries like China where Wang Jinxi, known as Iron Man, became the socialist hero of the Daqing Oil Fields, or Iran, where oil companies made films depicting their investments.<sup>1</sup> Petroleum has played an important part of postwar narratives in the port cities of Western Europe, such as the war destroyed cities of Rotterdam or Dunkirk that rebounded thanks to the oil industry. The era of heroic oil also included the freedom and individuality associated with the car, the many possibilities of air travel, and the auspicious consumption of new consumer and luxury items. However, more detailed analysis of the global petroleumscape also shows that it is extremely heterogeneous and that the nostalgic narratives associated with its diverse spaces convey a highly selective picture. Such an analysis must take into account the extreme differentiation between its front and back ends between consumption and production.

As much as oil has penetrated everyday human life, the places where oil is produced and processed are large in scale, but often out of sight, de-branded and hidden, for example, in the industrial zones of ports where global shipping meets land-based national infrastructures. Refineries and petroleum storage sites have been regarded as important symbols of progress in earlier times and are still seen as in emerging markets, yet production facilities have become increasingly unrepresentative in times when global warming has become an issue. Refineries and their related oil storage facilities are

the parts of the petroleumscape that have the most important staying power. Once established, the sites of petroleum transformation, and specifically the refineries, do not disappear (Hein 2018b). Due to the global networks of petroleum, refineries have managed to overcome periods of war and nationalization, of destruction and reappropriation, while redirecting petroleum flows over time. The refineries on the Schuylkill River in Philadelphia provide a good example here. Established in the 1870s, the Schuylkill facility has become the oldest continuously operating petroleum facility in the world. Surrounded by a metropolis of some five million people (Quivik 2015),<sup>2</sup> the site has become an environmental and security risk. Closure was on the table in 2011, but the shale oil boom revived the financial viability of the refineries. Local and regional forces pushed to keep the plants open and maintain employment for its remaining 850 workers (Hein 2016b).

To effectively transcend the shortsightedness in our relationship with oil, it is crucial to reconsider the spaces of petroleum and provide a better understanding of production sites, including how they emerged and shaped our built environment and everyday practices. Reusing and transforming the back ends of the petroleumscape, the sites of oil production, storage and distribution, and repositioning them as part of our cultural heritage requires a rewriting of nostalgic oil narratives, a more holistic version that encompasses the promises and commodities of oil and its derivatives, as well as its dangerous aspects and that transform the currently for humans rarely accessible non-places (Augé 1995) of its production. This chapter proposes that a historical understanding can help designers create spatial strategies to reuse production and processing sites, to develop transition strategies for their reuse as energy hubs or urban sites, and help to make them a part of current business or residential projects. Furthermore, these petroleum sites could even become a part of the heritage landscape. The end of the (heroic?) oil era means revealing the shortcomings and motivations of political and economic narratives, and it means addressing nostalgia for the oil age and its buildings. Following a brief reflection on oil-age nostalgia and its meaning, this chapter explores the oil history and oil-age narrative of Dunkirk, an industrial city on the French North Sea coast, through the lens of the petroleumscape. It also features Dunkirk specific design projects from the MSc2 Studio Architecture and Urbanism Beyond Oil from Delft University of Technology (TU Delft) as examples of how to address heritage in a post-oil landscape.

## **Transcending the Nostalgic of Oil**

As explored by Nigel Thrift (1996: 13), the industrial petroleumscape is a space so unconnected with human nature, and so hostile and large in scale

that there seems to be no possibility for action and interaction between the human body and the world. One approach to overcoming this challenge requires studying the spatial characteristics of the petroleumscape. Conceptually linking oil consumption, with all its positive imagery, to production sites can further our understanding of the true scale of petroleum's impact and inspire efforts to overcome it. We take a spatial perspective (and understand architecture as spatial planning) with hopes of encouraging a specific understanding of locations as part of our cultural heritage. The architectural objective of creating habitable spaces can contribute to reintegrating these industrial sites with the human habitat. The inhospitable nature of these places, their stark contrast to everything that oil stands for in our cultural narratives, the dizzying dimensions of industrial areas that (again) transform into a human habitat have a physical reality that ultimately escapes purely intellectual investigation. Thrift (2007) proposes using a phenomenological approach to generate geographical knowledge that avoids the primacy of representationalism and can be helpful for understanding places of incomprehensible complexity. As Dewsbury and colleagues argue, the world is 'more excessive than we can theorize' (Dewsbury et al. 2002: 437), and this is of course particularly true of the production sites of a global landscape with ungraspable cultural, political and economic dimensions. Therefore, a more-than-representational approach to former sites of petroleum production seems plausible. How can we address the overcomplexity of these places by downplaying questions of representation? By seeing and experiencing the spatial conditions of the location through architectural and urban design, we can generate further usable knowledge. This spatial approach to understanding this vast heritage can help develop systemic post-oil frameworks and help overcome oil-era nostalgia.

Nostalgia is derived from the Greek νόστος (return, homecoming) and άλγος (pain). It describes an agonizing longing for something no longer present. This feeling can appear both individually and collectively, and the word implies that aspects of a closed past are perceived as positive. Historically, certain pasts, or selected aspects of these pasts, have often been imagined as ideal. Charlemagne glorified Roman antiquity, Rousseau the state of nature, Karl Friedrich Schinkel the German Middle Ages during the Gothic period and, most recently, a majority of the British the time before membership of the European Union. The idealization associated with nostalgia does not have to be truthful, nor must the eagerly awaited future even be part of one's own experience. Rather, collective nostalgia is based on narratives that, on the one hand, have a certain sovereignty of discourse and, on the other hand, stem from the partial nature of references to the past, which cannot present a complete picture, but only select aspects. Particularly in relation to heritage sites and objects, it is impossible to take into account every aspect of history.

Nostalgia for the oil past could have been overcome decades ago when oil's negative implications became visible. In 1972, the famous report of the Club of Rome warned of the depletion of natural resources. It was widely derided as a doomsday fantasy because of its primary conclusion: the planet cannot sustain current demographic and economic growth (Meadows et al. 1972). Even before 1972, scientists had highlighted the depletion of resources and the lack of rational governance to exploit them (Hardin 1968; Ostrom 1990). The Club of Rome's report was followed by more and more articles expressing similar concerns, especially with regard to oil; the term 'peaking of oil' began to appear (Hirsch 2005; Hirsch, Bezdek and Wendling 2005). What was attacked in 1972 as alarmist gradually came to be seen as realistic and prescient, yet, despite the early warnings, dependence on oil continued to increase to the point that it was no longer conceivable to do without it.

However, the oil age is coming to an end. Environmental organizations and governments are promoting the transition to green energy and are backing new attempts to clean up the oceans and replace plastics. Many people around the world are committed to supporting these efforts. Yet, individuals often find it difficult to see these initiatives as attractive to themselves as individuals, and to understand what their individual choices mean for global environmental, social and financial sustainability, or how their contribution can affect systemic change. The complex, evolving concept of sustainability underscores the need for new lifestyles, narratives and societal frameworks. The petroleum-based economy and its costs (including global heating, rising sea levels and the extinction of species) enable a desire to create sustainable societies. The attempt to change the system will result in limitations, as David MacKay notes: 'Have no illusions. To achieve our goal of getting off fossil fuels, these reductions in demand and increases in [renewable energy] supply must be big. Don't be distracted by the myth that "every little helps". If everyone does a little, we'll achieve only a little. We must do a lot' (MacKay 2008: 114).

The expansion of the currently marginal use of alternative resources and the future decline in the profitability of oil may put an end to the use of this affordable and polluting energy.<sup>3</sup> If past energy transitions have been gradual, the end of the oil age could be quite abrupt, mainly due to a lack of precautions taken by governments. Systemic change can only take place through a fundamental engagement with the global economic forces that shape our environment in order to manage the technological innovations that change our work and leisure so that ongoing social transitions work for the benefit of all. This process will be accompanied by the deindustrialization of former oil sites and the challenge of their transformation, on both spatial and social levels. Several institutions are faced with the problem of how to rehabilitate

sites if they cease oil-related activities. The complex balance between Europe's energy security, the production of oil derivatives and the transition to new energies makes the transformation of these areas difficult and calls for creative and forward-looking solutions. They also represent an opportunity to overcome our nostalgic relationship to oil and to refine post-oil heritage sites and narratives.

Oil nostalgia conflicts with reality; consequently, representing the accompanying distortion is an effective means of transcending the nostalgia. The memories of the past age (embodied in last-man-standing refineries like that in Rotterdam, but also cleared industrial sites and contaminated soils like that in Dunkirk and vast infrastructures, adapted headquarters and reusable warehouses) will slowly become more visible as Europe's oil refineries close one by one, and illustrate the need to address difficult questions about this heritage and its acceptance, including pollution, reuse and aesthetics. But even if the actual and former sites of oil production, trade and refinement will be a new kind of heritage, they are not entirely new in their unwieldy aspects. Much that is inherited from the past serves a memory function and offers intellectual rather than purely aesthetic pleasures. In a few cases, we can already see how nostalgia can be overcome. For example, in the German Ruhr area, industrial production sites of the iron and coal era have become places of education and cultural encounters. The past is displayed in raw form, without distorting its unsustainability or even the social conditions of the workers at that time. Visitors encounter a past that led to the present, but no longer remains part of it.

The closure of refineries in Northwestern Europe provides an opportunity for similar rethinking. It requires their neighbouring cities to reassess their oil-based history, heritage and narratives, to design new post-oil landscapes and to select heritage spaces. The northern French city of Dunkirk is a prime example of how global and national oil interests have shaped a city and its port, and have created a kind of dependence of the citizens on this huge industry, the provider of jobs. The city also exemplifies the uncertain future in the wake of the energy transition. Following the closure of the Dunkirk refinery's commercial activities in 2016, former oil spaces lie abandoned and contaminated, yet they provide opportunities to develop new projects, visions and practices. Dunkirk shows how democratic and sustainable solutions demand the acceptance of diverse perspectives. Future projects, including the selection of petroleum heritage and carefully framed narratives, must help viewers understand the enormous scale of the global petroleum industry and the ways in which energy has shaped landscapes, knowledge that is essential for the creation of new energy landscapes and sustainable lifestyles of the future.<sup>4</sup>

## **Dunkirk in the Heroic Age of Oil**

The growth of oil refineries in Dunkirk, a city of about 90,000 inhabitants on the French North Sea coast, is typical of how oil has shaped cities and regions. Since the middle of the nineteenth century, the history of the city has been closely linked to the ebb and flow of oil. In the second half of the twentieth century, only two major oil companies, BP and Total, shaped the form and function of the city. Their continuous reorganization of the port and its foreland and hinterland has confronted the local economy and decision makers with economic and spatial challenges.

As a country with limited oil resources within its borders and colonies, France, like the United Kingdom, was once a major oil importer. Oil was first used for lighting, lubrication of machines, tools and locomotives, then for automotive fuel and later for the manufacture of other products. Initially, companies built refineries along the northwestern coast of Europe to store and process oil from the United States. Oil importing and processing port cities, such as Dunkirk (along with Rotterdam, Antwerp, Hamburg and Wilhelmshaven), served other large cities and regions with raw materials and refinery products, and developed into places of national interest. Dunkirk was one of the most important importers of American crude oil on the northwestern coast of Europe. Entrepreneurs from Dunkirk were among the first to set up a coastal oil refinery in the region, where in 1861 Trystram and Crujeot built one in Petite-Synthe, along the canal of Mardyck, which is now part of Dunkirk.<sup>5</sup> This basic structure refined American crude oil, which was then sent through canals and railways to the hinterland, especially to Paris. In 1863, a first tax decree was issued, the first appearance of oil in the French customs tariff (Amphoux 1935). By taxing imports of refinery products, the state forced importing oil companies to build refineries in France. In this way, the government was able to ensure the production of this strategic resource on its own territory.

The dangers of oil were largely ignored by decision makers, where, under the leadership of the industrialist Jean-Baptiste Trystram, responsibility for locating housing near oil facilities was largely left to citizens rather than the industry. As President of the Chamber of Commerce and Industry, Member of Parliament, member of the Provincial Council and Senator between 1870 and 1905, Trystram played a major role in this lack of public intervention. Support for the development of industry characterized French policy as evidenced by Charles-Louis de Saulces de Freycinet's 1878 National Plan for the Development and Improvement of Railways and Ports (Gonjo 1972). The Freycinet plan notably prevented local authorities from adopting regulations that could adversely affect the development of port

areas or the proper implementation of the national plan. The legal framework for the protection of health, when it existed, was often disregarded. In the nineteenth century, when a warehouse or refinery in Dunkirk was closed, the site was reused for homes, schools and parks without taking polluted soil into account (Ministère de la Transition Ecologique et Solidaire 2018). Many of these oil-related sites in Dunkirk also disappeared from records and memories. Authorities lost track of their location, use, lifespan and size, leaving uncertainties on the condition of the ground, its use for inhabitants and the quality of the underground water (Hauser 2020). At the beginning of the twentieth century, health, safety and environmental concerns became public issues, but political actors only began taking industrial disasters seriously in the 1950s. Cities that hosted oil refineries relied on the formulation of national policy. The French state began to take control of oil imports in the 1920s. By 1930, a further seven industrial oil sites had been opened, integrating Dunkirk and other French ports in larger oil networks. The Chamber of Commerce in Dunkirk found these changes so important that it commissioned Hugo d'Alesi to document them in a monumental painting for the World Exhibition in Paris. In the painting, the city can be seen from the harbour with its various docks and storage facilities. In front, to the right of the entrance channel, it is possible to see the oil harbour, which is closed off by a floating barrier when an oil ship is in the harbour. This floating dam was a reaction to incidents involving oil in various ports, such as the fire that destroyed the port of Bordeaux in 1869,<sup>6</sup> and the stricter enforcement of the 1810 decree regulating unhygienic or unpleasant odours from oil sites (Baillot D'Estivaux 2013). Accidents and other environmental considerations ultimately led to the relocation of deposits and transshipment operations outside the city centres, but municipal pride in the oil industry remained strong.

Since 1895, the harbour basin has had a pumping station and underground pipelines that transport oil to the refinery. Another monumental painting, this one by an anonymous painter, seems to have been inspired even more than d'Alesi's by pride in the storage and handling of oil. It looks at the scene from the sea and focuses on port activity. Several oil storage tanks are visible on both sides of the river, giving a first impression of the city's new industrial strength that developed after the First World War. The tanks illuminated by the sun and the new structures appear bright white, heralding a near future with large new refineries and deposits. The exact origin and date of the painting are unknown, but the oil installations depicted date from the early 1920s and continued to expand into the 1930s. According to the Port Museum, the painting was exhibited at the colonial exhibition in Antwerp in 1930 at the request of the Ministry of Public Works in order to promote better living through oil.





**Figure 10.1.** The Dunkirk refinery with the Cité des Ingénieurs, France. Photo: © CMUA-Archives de Dunkerque (fonds SRD), used with permission

After the war, the Monnet Plan (1947–53), which aimed to rebuild large-scale industry to revive economic activity in conjunction with the Marshall Plan, made it possible to rebuild the refinery in Dunkirk (which was bombed by the Germans in 1940) on the site of the Raffinerie du Nord. In 1948, the French sector of BP (SGHP-BP) began building the new refinery on the west side of the port of Dunkirk in the Saint-Pol-sur-Mer area. At the beginning of the 1950s, BP built a 600,000 m<sup>3</sup> warehouse there and transported the oil by rail, tanker and ship through canals to the hinterland (Thelliez 1957). BP's presence has also influenced urban development. The company needed housing for its employees and next to the refinery, SGHP-BP built a residential complex that became known as Cité des Ingénieurs.

Life in this front end of the petroleumscape was radiant. The Cité des Ingénieurs consisted of twenty-three houses with accommodation for the director, as well as driving engineers and foremen. With the housing estate and its park-like surroundings, the company had implemented both garden-city concepts and modernist ideas for linking work and home. There was a *cercle*, a place for celebrations, which also served as a restaurant. Public spaces made it possible for families to meet and included playgrounds for children. However, only executives and managers were able to enjoy this modern Cité, and employees living there followed a strict hierarchical division in the use of space and facilities (Lecuyer 2002). There was also a need for housing for the workers. Thus, the Cité Bayard in Saint-Pol-sur-Mer was built with

more than 160 houses (333 apartments) 2 kilometres from the refinery, and separated from the Cité des Ingénieurs and its executives by railways; twelve more apartments were built in Rosendaël. The company also supported the workers in building their own homes in Petite-Synthe, demonstrating concern for their wellbeing (see Lecuyer 2002). For companies, employees and citizens alike, crude oil seemed at the time to be a unique opportunity and not an ecological challenge or industrial risk. Several decades passed before the environmental and health risks of the emerging technology became apparent. The City of Engineers was a popular place to live in the 1930s. When it was finally abandoned because of its location in an environmental danger zone, it was demolished in 2018.

The oil industry continued to exert a strong impact on the economy of the city. By the end of the 1960s, Dunkirk Port was the third most-important French commercial port (defined as a port devoted to shipment of steel, oil, and textiles) (Rubio I Tuduri 1948). The oil trade needed more space and deeper water, and the demand for oil increased in 1972. Until then, the BP refinery was the only one in operation and could not meet local demand. As a result, imports of refined oil from the Netherlands, Belgium and Great Britain increased significantly. The construction of a new port area, 13 kilometres from the old port in a sparsely populated area, made it possible to make the port much more efficient (Husser and Raison 2015). The aim of the Port Authority was to create an accessible port and an attractive industrial area. Deep fairways allowed container ships and oil tankers of 200,000 tonnes to moor there. The site attracted the Pechiney aluminium industry, and the establishment of the USINOR steel industry in 1963 was another sign of the state's commitment to revitalizing the local and regional economy. In 1974, the French oil company Total opened a Flemish refinery in the municipality of Mardyck, part of the industrial port of Dunkirk, near the existing heavy steel, metallurgical and petrochemical industries. The new refinery, the last to be built in France, covered 230 hectares along the large Dunkirk–Denain Canal. Pipelines connected the refinery to the port of Gravelines, 8 kilometres away, where tankers of 300,000 tonnes could berth. In 1976, BP participated in the construction of oil storage facilities in the Flandres refinery area and in the construction of pipelines (Maurois et al. 1952). Until the 1980s, the oil industry in Dunkirk had a positive impact on the urban economy and had even provided good housing, leaving an image that many locals fondly recall.

## **Dunkirk: The Post-oil Landscape**

In the 1980s, the oil industry turned the tide of unchecked growth. The oil crisis had a strong impact on economic competition between BP and Total

in 1979. BP finally ended its oil refining operations in 1982 and dedicated its refinery exclusively to the refining of lubricants, waxes and bitumen. In 2010, the refineries of Flanders (Dunkirk), Reichstett, Berre and Petit-Couronne began their closures. The commercial activities of Total's refinery ceased in 2016, but the oil industry in Dunkirk still has an impact on the area. The refinery building still exists; part of it has become a training centre for the oil industry under the name Oleum (Total 2010). Together with Le Havre and Marseille, Dunkirk is the only port in France that can accommodate the largest container ships and large oil tankers. This is one of the reasons why the port authority intends to continue to use the port as a hub for oil transport.<sup>7</sup> Today, the former BP city is a brownfield site in Dunkirk. Local debates about maintaining the refinery site as a training ground are just one example of the difficulties in redefining both oil spaces and the relationships between global and local players. The closure of refineries in Dunkirk illustrates the declining interest of the oil industry in European locations due to the local overcapacity of the sector (Saudi Aramco 2018; British Petroleum 2019). It raises the question of how to reshape the primary petroleumscape, the growth of which has shaped cities for some 150 years, and what message to send to future citizens about the oil heritage. In addition to providing educational training sites for the education of oil workers, Dunkirk now contains an experimental area for biofuels. Some sites are being dismantled and decontaminated, and plans are being considered for an asphalt warehouse. But these transformations in Dunkirk only engage the contemporary oil heritage and legacy; they do not consider the full extent of the city's petroleum past. Public and private authorities are ignoring, involuntary or not, the pollution created by small industries before the First World War. The land use of these spaces changed, yet the threat caused by past oil activities on citizens' health remains.

Dunkirk now faces the challenge of reinventing itself by repairing and recycling its port, its port industries, its port heritage, and the abandoned and unused areas between the port and the city. It also faces the opportunity to provide an example of experiments with transitions in energy, technology, society and their spatial impact. All stakeholders, public and private, professional and lay, have an opportunity to consider the issues surrounding the dismantling, transformation and reuse of important parts of existing oil-based industrial cities, including their refineries, docks and infrastructures (Hein 2017a, 2017b).

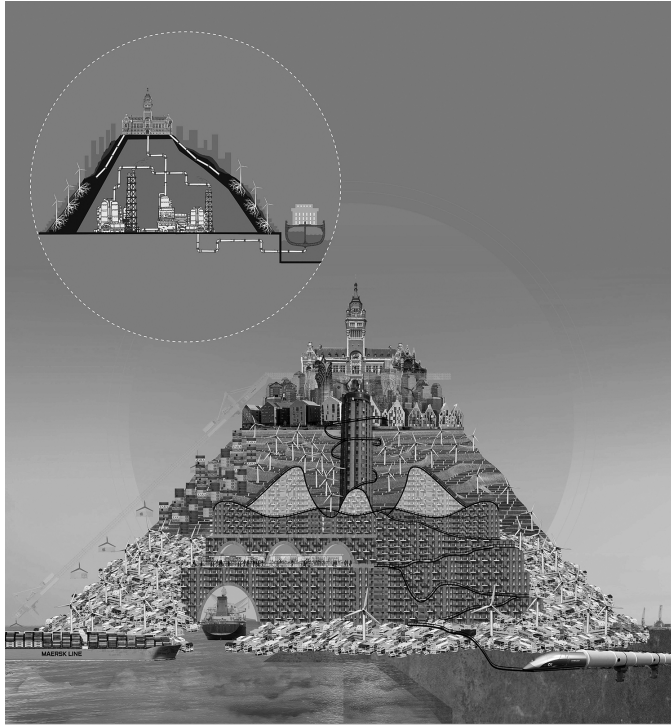
With the support of the metropolitan area of Dunkirk, the Hauts-de-France region and European funds and programmes, several actors have begun urban and architectural renewal. Since 2010, the Port Authority of Dunkirk has been pursuing a comprehensive strategy to protect its natural heritage with a masterplan. This instrument has led to a number of initiatives

to preserve and improve nature in the port area, such as the development of the former St Georges railway line between Bourbourg and Gravelines as an eco-landscape corridor. In addition, several actors aim to connect port and city where, for example, the Port Authority of Dunkirk has opened the port to the city by allowing visits, including projects and activities in schools. The Learning Centre Halle aux Sucres educates the local community on issues of sustainability. A new Port Centre aims to communicate with the citizens and to encourage collaboration between the port authority, the city of Dunkirk and the port museum. These activities made Dunkirk one of the five finalists for the European Sea Port Organization Award in 2016.

### **Refining the Heritage Narrative of Post-oil Landscapes**

Understanding the historical importance of oil and the role of the heroic narrative in the growth of Dunkirk represented a first step for the MSc2 Studio Architecture and Urbanism Beyond Oil at TU Delft. We argue that a historical analysis can help students identify new spaces of intervention and new design perspectives. Supported by analytical readings of maps, historical documents and materials from the historical archive and documentation centre of the port museum in Dunkirk, students translated their individual impressions and research into individual approaches and methods, and created visual representations, as well as new projects for the future of the former refinery sites. They produced possible developments that tie in with the history of the site while also giving it a completely new future, one that makes industrial spaces of oil available for new practices, that uses historical narratives to pave the way for postindustrial futures and that relegates petroleum to a non-nostalgic past. Students took up the assignment in diverse ways. Some of them opted to write alternative histories or utopias that aimed at provoking public debate, others developed transition strategies and yet others focused on building materials. Rashid Ayoubi provided perhaps the most critical and dystopian project. He imagined a future where four companies (Oil Arch, GreenLeaf, Every Drop Matters and MADInc.) created a giant mountain over an abandoned refinery for the production of the last drops of oil. While the refinery satisfies society's needs for petroleum as a component in medicine, this hidden back end serves the people of Dunkirk, who use the global container trade and additional green energies to devote themselves to superfluous consumption and play.

Transition strategies were key to a number of projects. Ege Cakir proposed large autonomous animals that will roam the site of the Total refinery to clean up the soil and to make the changing remediation landscape a recreational park. Select oil structures, such as refinery elements and storage



**Figure 10.2.** Rashid Ayoubi's dystopian vision of post-oil Dunkirk. © R. Ayoubi

tanks, remain as sculptures in the landscape, a strong reminder of the industrial petroleumscape and its negative impact on the environment and health. Thomas Bianchi proposed a phased and economically feasible plan to clean up the land of the former BP Refinery in Dunkirk. Five phases create an interactive and changing landscape that communicates with the visitor. The production of biomass as a transition fuel generates a revenue stream, while also providing incentives for third parties to contribute to this development. By 2050, the site is free of oil and biomass-related processes. A dune landscape serves as coastal protection and hosts renewable energies and a research centre. A new understanding of logistics in landscape characterizes Casper Kraai's proposal for a Rolling Farm that uses Dunkirk's extensive railroad network to produce and distribute vegetables and fish locally, providing employment and a more sustainable food source. The Rolling Farm will use the railroad tracks of the Gare des Dunes railroad yard to grow crops on railroad carriages and currently unused tracks. As the crops grow, the carriages move further down the tracks. After harvest, they circle around the city and return to their starting point, completing the production cycle. Other students fo-

cused on building materials. Lea Scholze proposed a park for mycelium production and research on the rewilded site north of Fort-Mardyck, bordering Arcelor Mittal. Mycelium, the roots of mushrooms, is widespread where fungi thrive on organic and inorganic materials, including oil, and are able to clean the terrain. They can also serve as a replacement for plastic. The new small-scale redevelopment connects to the adjacent neighbourhood, offers publicly accessible buildings for research, education and work, and enables private and cooperative use. Gemma Galeno suggested the use of bamboo as a low-energy material that is produced without the use of oil and does not contain oil. She developed a new connection system, a bamboo plantation and a high-rise building for the bamboo research centre.

These projects, developed within the framework of the MSc2 Studio Architecture and Urbanism Beyond Oil at Delft University of Technology, represent just a few possibilities. They are early attempts to conceptualize the impact of energy, technology and living environments on our future built environment. Addressing the possibilities of new materials, technologies, lifestyles, and utopian and dystopian narratives can contribute to a necessary conversation about a future beyond oil. The designs and future scenarios reflect a wide range of ideas. What they have in common is that they form the basis for a necessary examination of the spatial, chemical and economic legacy of the oil age. It is now up to the local population, policy makers and new industries to find and support a sustainable and meaningful use of these desolate areas.

## **Conclusion**

Over the past 150 years, the oil industry has created a narrative of oil-based freedom and progress, creating products for all areas of life. The general public may retain positive feelings about the heroic oil period. But the oil industry has also polluted the water, soil and air around its facilities. Toxic material has seeped deep into the soil. The problematic and costly remediation is partly or often entirely left to local public partners. So far, the cost of such remediation is often prohibitive, especially where land values are low. Oil companies focused the public's attention on the industry's front end and tried to keep the back end hidden from view. Now, these front and back ends of the petroleum industry must be examined and transformed in the post-oil landscape itself. The world's fossil energy sources are indeed finite and the dominant Western lifestyle does not promote health or wellbeing; above all, it has endangered the survival of a habitable planet. The resulting call for individuals to live more sustainably and resist oil-based systems requires a lot of strength. It is almost foreseeable that the focus on individual

action will fail because it does not concern entrepreneurial or systemic measures. Reduction and restraint in the use of resources (water, food, energy and materials) and a fair reduction in production and consumption are of paramount importance. Industry, research and leisure must intertwine to create the necessary economic, social and cultural circularities. To this end, new narratives must be created, narratives that overcome the glorification of oil-related commodities and that promote new materials, transport and lifestyles that are not oil-dependent. New approaches, technologies and practices can help stimulate discussions of the post-oil future as a process that generates money, promotes innovation and responds to collective needs. Therefore, we argue that the transition must be systematic and post-oil spaces must be wrapped in narratives as heroic and fun as those dominant in oil's heyday.

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## Notes

1. Regarding films celebrating the oil industry in Iran, see *British Movietone* (1951), *Persian Story* (1952) and Damluji (2013).
2. 'Revived Sunoco Refinery Could Be Worth \$1 Billion Plus', *Philadelphia Inquirer*, 6 August 2015.
3. A total of 15% of the total of energy use comes from alternative sources or nuclear power (International Energy Agency 2014).
4. The MSc2 Studio *Architecture and Urbanism Beyond Oil* from Delft University of Technology (TU Delft) is taught by the Chair of History of Architecture and Urban Planning at Delft University of Technology.
5. The date of the construction of the Trystram refinery in 1861 does not necessarily coincide with the start of refining of petroleum from Pennsylvania, established through documents on arrival of ships starting in 1863. However, the data on cargo is not always complete. Trystram himself mentions a construction date in 1861 and specifies that the refinery treated petroleum from Pennsylvania, see Port de Dunkerque (1884) and Durin (1899).
6. From a discussion with C. Stroobandt, project manager in the Port Museum of Dunkirk.
7. Interview with the President of the Management Board of Dunkirk Port. Retrieved 13 April 2021 from <https://www.meretmarine.com/fr/content/interview-stephane-raison-president-du-directoire-du-port-de-dunkerque>.

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