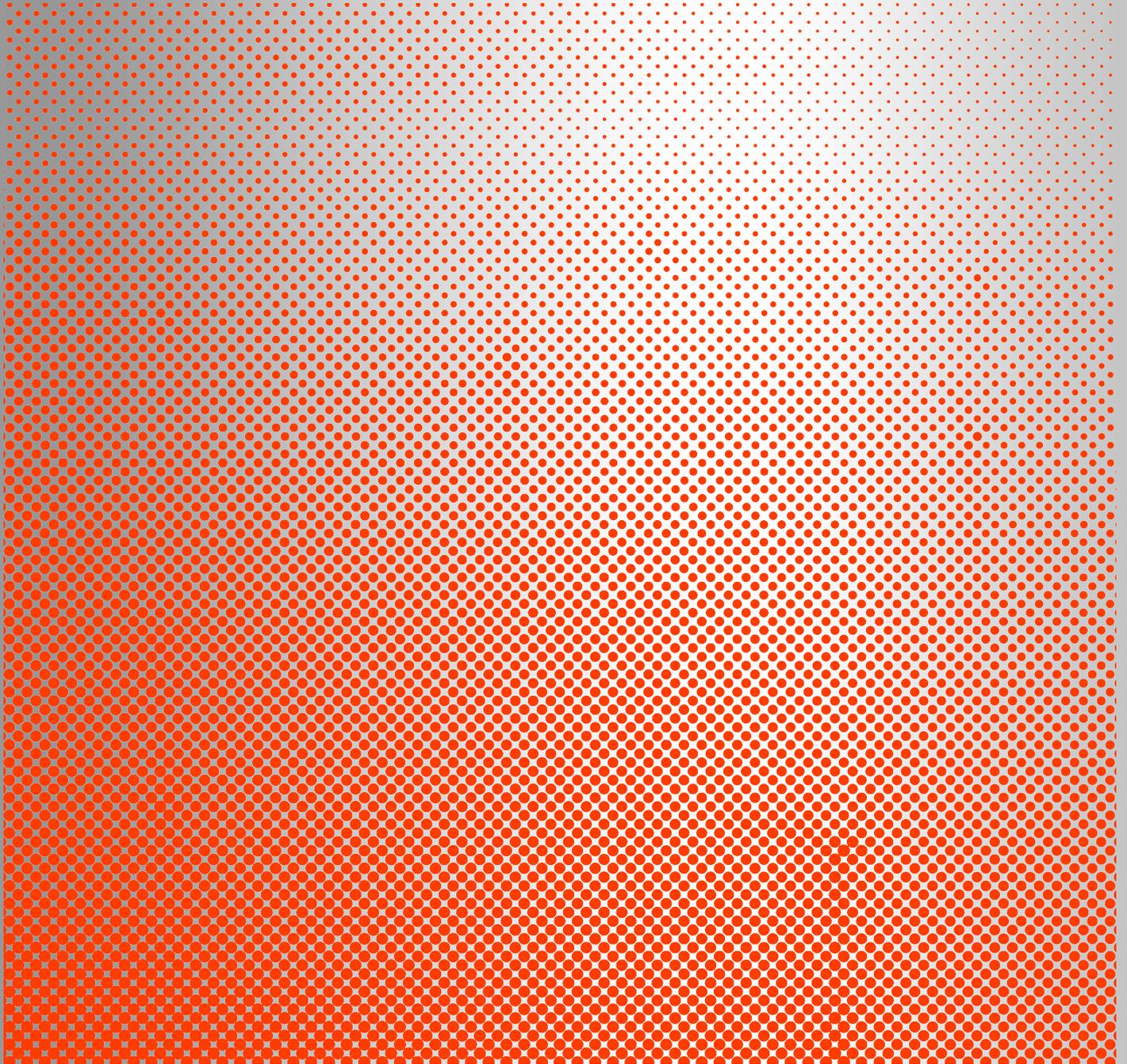


A Nation's Commitment

Unraveling the Promise of The Danish Energy Island



On Architecture's Agency in Future Energy Landscapes

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This paper delves into the complexities of Denmark's ambitious Energy Island (EI) project, the nation's endeavor in commitment to the global energy transitioning. The project is far more than the construction of an energy hub; it represents a new permanent form of infrastructural territory that combines political power, spatial innovation, and economic opportunity. The paper explores how the EI emerges as a unique extraterritorial zone, a symbol of future aspirations, and a manifestation of political and economic commitments. It dissects the enablers, underlying mechanisms and spatial implications of the project. The study draws reflections on the agency of architecture and planning in shaping such transformative endeavors. However, it also highlights the challenges posed by the urgency of decarbonization and the massive resources required. The EI stands as an emblem of architecture's power to materialize grand visions, yet it also raises questions about the careful consideration of the spatial implications of such projects in the pursuit of a sustainable future.

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This essay discusses the proposal of an Energy Island (EI) that will transform the Danish energy production landscape. This forthcoming megaproject does not only imply extensive territorial transformation in Denmark, but also bear the nation's commitment to be the frontrunner in the global clean-energy-race, via the construction of the world's first offshore island. The grand vision of the Danish Government seeks to extend and intensify the existing wind technology, leading the becoming of the global wind energy powerhouse of a green future¹. Since 2020, when the project was officially endorsed by the Danish Parliament (Folketinget), numerous agreements and progress work have followed, until a recent announcement by Minister of Climate and Energy regarding postponement and a search for alternative concepts². The rapid yet inconsistent proceedings of this seemingly significant project drew our attention to the question

of space in future landscapes dedicated to energy production.

The Danish Endeavor

As a current and complex project in its beginning stages, information around the EI appears scattered and limited. Based on published materials by the relevant authorities, the project provisions for the construction of an artificial island of 120,000 m² in the first phase and 460,000 m² in the final. Its identified site is 80 kilometers off the west coast of Jutland in the open sea, farther than all existing Danish offshore wind farms as they range between only 4 – 32 kilometers from shore. The remote location capacitates for electricity supply for up to 10 million households, which allows Denmark to become an exporter of green energy. Following this claim, the EI will function as a so-called “hub” for aggregation and distribution of the large-scale offshore wind, from which interconnections are built to transmit the power to neighboring

1. According to the DEA, the project bears the ambition to supply green energy for 10 million European households. Through this project, Denmark aims to demonstrate a pioneer concept and lead the green energy transition worldwide.

2. Tendering process for Phase 1 was initially scheduled in Q2 2023, meaning that interested construction contractors are invited to bid for specific packages of construction work of the Energy Island. For instance, one of the major bidders is a consortium formed between energy developer Ørsted, the largest institutional investor ATP, and a few construction partners.

3. In *The World Electrified*, Denmark's power grid operator Energinet explained the concept of Combined Grid Solution (CGS), as an interconnection system that stabilizes transmission between power systems in different countries. It is made possible by use of a back-to-back converter. Energinet noted that installation of a back-to-back converter on land, instead of an offshore platform, is more economically beneficial and maintenance friendly.

4. The term has been found in media articles as early as 2021. It was more recently used by MSCI researchers Tom Leahy, Ashish Lodh, Elchin Mammadov and Andy Sparks, in the phrase of “clean energy arms-race” since Russia's invasion in Ukraine.

countries like Germany, Belgium and the Netherlands. (Danish Energy Agency n.d.) Its spatial requirements subject primarily to technical facilities for conversion and diversion of electrical power³ (FORESIGHT Media Group 2020), although ideas for a “business / innovation zone” have sprung up occasionally. Due to its ambitious scale, the EI has been presented as a pioneering proposal that exceeds previous experiences, of which implied an observable technical and financial challenge to the Danish government.

Transitioning to Decarbonized System in 2050

The ambition to construct the EI emerges from Denmark's pledge in the Energy Agreement 2012 to providing 100% renewable energy in the national energy mix by 2050. It aligns with the European Union's (EU) vision towards a climate-neutral economy as per the Paris Agreement in 2015, which was hence concretized by the European Climate Law in 2020 under the European Green Deal. Amongst the range of climate agreements, the roadmap to energy transitioning first came to light in 2010, demarcating a system network of complementary renewable energy in the EU (AMO 2010). It is worth noting that the growing political tension between

EU and Russia since the war in Ukraine has called forth the idea of energy self-sufficiency among the Member States, hence induced a considerable shift in energy production and supply chain within and between them. For the case of Denmark, this new energy infrastructure is dimensioned to provide surplus green electricity and biofuel for the EU market. For that reason, we are curious of the network of power dynamics in EU regarding renewable energy, as well as what position and action Denmark has taken in this clean energy race⁴.

Danish Energy Strategies

To achieve the energy transition, Denmark has structured a two-pillar approach which includes the adoption of green energy in the electricity, heat and transport sectors; and the implementation of energy efficiency measures (Ropenus and Klinge Jacobsen 2015). Aside from phasing out existing fossil fuel extraction, i.e. oil and gas, various technology-led strategies are being developed concurrently to the EI, including Power-to-X (PtX), Carbon Capture Utilization and Storage (CCUS), increase utilization of biofuel energy etc. While advancing energy efficiency in transmission grids and buildings are important

contributors to carbon-neutrality, it is particularly the transition from fossil fuel to green energy that motivates this investigation. As remarked by the DEA, the urgency to accelerate renewable energy development not only roots from the rising demand of energy, but also for decarbonization of the industrial and transportation sector, especially in aviation and shipping. From there, an urge for a new energy infrastructure developed, perhaps giving rise to the EI project as a pivotal instrument in driving the Danish energy transitioning.

Initiating a Discourse on Space

For the significance this project is presented with, the limited public discourse and information available is alarmingly disproportionate.

In immediate comparison, Lynetteholmen has been put into writing at the same time, but enthralled public discourse to a much greater extent⁵. Without denying the distinctively different modes of urbanism that the two islands are programmed for, we see that they share the fundamental basis of producing new territory as a response to societal challenges (coastal flooding and energy transitioning respectively) and instigating the making and reorganization of structures. The lack of discussion regarding

spatial implications of the EI and the transformation it brings onto the Danish landscape concerns and motivates this research from an architecture and planning perspective.

5. See *Tænk os om – Alternativer til Lynetteholmen* by Ane Cortzen (ed.); Ø / Island by Anne Romme and Jacob Bang;

Many questions about the EI arose during our investigation and the most conflicting of all: What enables this project? What is this Island really? And why is Denmark building it? Navigating amid the pool of narratives portraying the EI, we began to detect pointers that hint its spatial characteristics. From what we gathered, it is a massive development that suggests something entirely new yet bears so much ambiguity; a territorial transformation in a site virtually lost to view but implies transnational cooperation; and an immensely costly development shaped by a complex network of organizations yet shapes the fundamental functionality of our future. These observations form the point of departure for this writing as we attempt to formulate the EI's role and spatial agency.

A Duality - Between Infrastructure and Territorial Space

The first would be its functional nature as an infrastructure. This can be supported by one of the recurring labels of the EI, "critical infrastructure", that we noted in multiple agreements. In BEK no. 11, it is defined as: *Assets, systems or parts thereof, located in Member States, which are essential for the maintenance of vital societal functions and human health, safety and economic or social welfare, and whose disruption or destruction would significantly affect a Member State as a result of which these functions cannot be maintained.*

In other sources, the term also extends to cover facilities, processes, networks, and technologies⁶. It points to the program and use of space on the Island, including production, storage, transport and delivery of green energy.

6. On virk.dk, an elaborated definition of critical infrastructure demarcates 11 socially important sectors, which includes but not limited to: energy, information and communication technology (ICT), transport, contingency planning and civil defense, healthcare, wastewater and waste disposal, finance and economics, meteorology etc.

7. NIMBY is the acronym for the phrase "Not In My Back Yard". It refers to the phenomenon that the citizens of an area can see the necessity of a new facility or a new institution, but object to the location in their immediate area. (Orbesen, Niels: NIMBY effect in Den Store Danske on lex.dk. Retrieved 20 October 2023 from <https://denstoredanske.lex.dk/NIMBY-effekt>)

Discussed in *The Promise of Infrastructure* (Anand, Gupta and Appel 2018), contemporary infrastructures are configured in relation to modern understandings of the future as a time or space of potential change and improvement. Their unique relation between present and future make them powerful emblems of the politics of anticipation. They often reflect society's aspirations and expectations for a yet-unrealized future; in other words, it is typically planned to exceed present needs and circumstances. (Anand, Gupta and Appel 2018)

Moreover, we also find indications of the EI as territory that encompasses a physical and permanent production of space. Unlike common wind farms, which can be understood as a formation of wind turbines arrayed on the sea and connected via transmission networks, the EI is undeniably a physical construct of land: a provisional size of one-tenth of the Inner City area of Copenhagen with matter of at least 60 meters tall erected from the seabed to its ground datum. As Dan Jørgensen (former climate Minister) once described, the EI will indeed "change the map of Denmark." (Jørgensen 2021)

With plans for future extension underway, it is not at all impossible to picture the presence of built environment on EI that will accommodate livelihoods. However far it will be from sight, this project implies the emergence of a new form of territorial space, which impends an indispensable discussion of space.

What is Architecture and Planning's Agency in Energy Transitioning?

But why is the discussion absent in the first place? Is it the EI's out-of-sight location that excused it from discussions of aesthetics and urban form, because it is NIMBY⁷? Or is this mega-experiment legitimized deliberately through association with advanced technology in a far from imaginable future? In other words, are we consenting to this grand conception in the name of progress and green-everything with sufficient caution? If we eventually agree on the legitimacy of this project, then what would be the agency of architecture in the field of technology-led development?

Theoretical Framework

The project's duality as both infrastructural and territorial space echoes some of the features Keller Easterling has characterized as extrastatecraft – a site of infrastructural space serving as the medium⁸ of global and state power operations (Easterling 2014). As such, the concept of an EI shall not be confined to the construction of an island for technological solutions, but instead considered as a project through which organizations configurate our future. The EI, in fact, shall be seen and examined as a skillful inception of an infrastructural territory.

The notion of infrastructural territory is guided by Easterling's dissection of the free zone phenomenon, as an urban form of bureaucratic agency. It can be understood as a site of exurban enclave crafted by the state, offering premium incentives and minimum limitations from state

jurisdictions. In *The Smartness Mandate*, Orit Halpern et al. depicted the territory of smartness as zone, that it denotes not the demise of the state but the production of new forms of territory. (Halpern, Mitchell and Geoghegan 2017). This, for us, opens the perspective of the space where energy reform is taking place: to look beyond the square kilometers that Denmark is going to build in the sea, but towards an extra dimension of the territorial space, i.e., the zone, where the infrastructural, logistical and financial are reconfigured.

Moreover, the repercussion of the project is dependent on the success of delivery of the project. For that we look towards the concept of megaprojects: a category of ambitious large-scale endeavours characterized by their immense scope, substantial financial investments, extended timelines, and significant impacts on restructuring of society (Flyvbjerg

8. Keller Easterling's work on "Extrastatecraft" introduces the concept of "medium" in the context of governance and infrastructure. In her work, she uses the term "medium" to describe the systems, technologies, and processes that shape the built environment and mediate political and economic power.

2014, 3). This category of projects, however, often underperform both in its development phases and upon completion, frequently requiring multiple iterations and even downgrades (Flyvbjerg, Bruzelius and Rothengatter 2003, 3).

Furthermore, administrative tactics, including inaccurate demand forecasting and budgetary underestimations are often employed strategically to initiate megaprojects. For instance, we take note of the 'nothing-would-ever-get-built' argument, which implies that complete awareness of the true costs at the project's outset would make approval and initiation significantly more challenging (Flyvbjerg 2014, 13). This relates closely to the "Break-Fix Model" as overcommitment typically results in project lock-in, making it exceedingly difficult to abandon the project, whereas alternative solutions are left underdeveloped. Consequently, projects may experience pauses, revisions, and even complete redefinitions. Megaprojects also draws together a diverse group of stakeholders, each motivated by what Bent Flyvbjerg terms as "The Four Sublimes". It describes the rapture that different individuals or groups from the involved disciplines get from pushing the boundaries of

what can be done/built/constructed (Flyvbjerg 2014, 6-7). The collective ambition envisions a project of immense scope; however, it can sometimes overshadow critical consideration, posing risks of resource misallocation, and potential challenges to the viability of the project.

Method Employed

Our analysis draws linkages between the notion of infrastructure territory as an apparatus of the nation-state and a case of mega-development in response to energy transitioning.

For this inquiry, we closely examine the information released by the respective authorities, which includes government bills, political agreements, reports, tender proposals etc. These documents form the basis for primary publicized materials for this investigation. The authoritative bodies here are identified in line with the notion of the institutional power players in Extrastatecraft. We seek to interrogate the difference between the official writings of legal-binding directions towards the commitment, indicative of the "declared intent" and the power players' bias and secrets, which reveals the "underlying disposition." (Easterling 2014)

By unfolding the narrative and the course of events which materializes the objective, our investigation visits the encoded disposition in infrastructure development. We aim to offer a closer look at the EI project, first at its viability and potential complications, thus as an example or instrument of governmentality urged by a societal challenge like energy reform. In other words, these materials allow us to detect how Denmark positions and legitimatizes its actions towards energy transitioning.

Firstly, we explore what we consider the enabler of the project. We look beyond the spatial construct to the zone in which the project operates. As we dissect the coalition of institutions and other key players, we aim to unfold the narrative of the project and get a closer look at the EI as an instrument of power and governmentality. Secondly, we examine the EI as the symbol of Denmark's promise to provide and lead a sustainable future. In this regard, we inspect the parallel competition and collaboration to understand Denmark's position in the energy transition. Finally, in trying to grasp how this immense scope has emerged, we investigate who the potential drivers are, and what potential risks they may bring to the project and its realization.

As an Apparatus of Political Power

Through the Production of Infrastructural Territory

9. It has been determined that the Danish State and the private partner will become joint co-owners of the entire island (minimum 50.1% / maximum 49.9%). It has been decided that the ownership of the Energy Island must be based on a Danish limited liability company (in Danish: aktieselskab) in accordance with the Danish Companies Act.

Where is the power?

Political power lies within any site of territory. Easterling's work suggested that a new form of territory, particularly one ingrained with spatial and infrastructural functions, often pulls together a multitude of institutions to formulate regulatory and control mechanisms. By outlining the network of players in the EI project, we are informed of the organizations and sovereignty that it constitutes as an infrastructural territory, and the political power it possesses.

The Danish State

First and foremost, the Danish government holds an integral regulatory power of the EI project, which is delegated to various disciplinary bodies. Upon its inception, the Danish parliament has mobilized multiple state agencies in both advisory and supervisory role. It includes: the Danish Energy Agency (DEA) under the Ministry of Climate, Energy and Utilities (KEFM) as the agency in-charge;

the national Transmission System Operators (TSO) Energinet for preparatory studies, assessments, and system operation; the Danish Council on Climate Change for overseeing national climate targets; whereas certain enabling procedures, i.e. permission for extraction of sand, would require statutory approval from the Ministry of the Environment (delegated to the Danish Environmental Protection Agency) (Climate Act 2020, LOV nr. 965; LOV nr. 2379). On top of that, there was even an office of 45 personnel established solely for the project, although now closed and staff relocated (Thomas & Molin, 2023). If we draw reference to other national infrastructure projects, for example the Fehmarn Belt fixed link, a similar mode of delegating regulatory power has been adopted for administrative and operational purposes (it involves the Ministry for Transport, Danish Maritime Authority, a Danish state-owned company Femern A/S).

External Organizations

Due to the multidisciplinary nature of the project's work scope, it is only natural that external organizations and industry associations also participate in the planning process. For instance, the idea to establish an energy cluster among the North Sea nations was brought forward and continuously facilitated by the North Sea Energy Cooperation (NSEC), an international joint-body of 9 Member States and the European Commission.

Engagement of external groups was also seen in the 227 invited parties to Consultation on the Act on construction of the EI (Danish Energy Agency 2021b) (Danish Energy Agency 2021c)(LOV nr. 2379). Although no legal-binding action resulted directly from the dialogue, these parties represent the broad pool of professional expertise the project requires. As we inch closer to the construction and future co-ownership of the EI, relevant market operators are increasingly involved as seen in market dialogues held by the DEA (Danish Energy Agency 2021a). These tenderers are represented by consortiums comprising of industry giants and National pension fund investors, accompanied by constructing, energy distributing

and financing consultancies (e.g. VindØ, Ørsted+ATP and Partners) (Danish Energy Agency 2021d). As they partake in conversations with the DEA regarding everything from procurement framework, ownership model, presence of innovation or flexibility zone etc., they have arguably more significant power in shaping both the physical and governmental form of the EI.

Investors and Future Owners

It is potentially these consortiums who will co-own the future EI along with the Danish state. Depending on the ownership model (to be agreed upon the award of tender), the EI will be managed by a market operator (possibly in the corporate form of A/S) 8F under either or both the state and private partner (Danish Energy Agency 2021d). As a matter of fact, finding a way to financing and profiting from the EI makes or breaks the project: this is especially apparent as the "Business Case" has been a recurring theme on virtually all agreements we came across. We see this as a reflection of what Gupta described in his work, that large-scale infrastructure projects inevitably draw together a labyrinth of organizations, due to the lumpy, large capital and significant expenditures it requires (Gupta 2018).

10. Statement by John Ammentorp, DEA (<https://ens.dk/presse/offentlig-ide-hoering-af-danmarks-energie-i-nord-soeen-skydes-i-gang#:~:text=Et%20epokeg%C3%B8rende%20energi-projekt%20med%20mange%20fordele&text=a.,kan%20n%C3%A5s%20se-ner%20i%202050>)

Sovereignty

The complexity of governmental and institutional power intertwined in the EI project surpasses its precedents. It again presents to us that a constellation of players conglomerating an immense amount of authoritative power are shaping the future of the Danish energy landscape. At this very site of extraterritorial space, an undetectable form of domestic and transnational sovereignty infers, yet together they have the power to not only alter a substantial extent of landscape in the national territory, but also configures the form, the environmental footprint and cost of energy every Danish citizen uses in decades to come.

EI as A Zone

The project of EI should be seen as a case of extraterritorial operation: although the Island physically lies within the national territory, the project framework has been strategically devised to permit massive investment and rapid proceeding without the public noticing. Because the Island is also an invention, epoch-making as many have claimed¹⁰, it calls for new standards and custom regulations as no existing ones seem to apply for the planning or practice of this space. Paradoxically, its idiosyncrasies as a free zone

– where laws are exempted, and discussions are bypassed – is the very enabler and propeller of the project. In the following, we will examine the conditions to how exclusion of public's attention is done, thus give example to laws and regulations that are bypassed for the sake of moving forward.

Exclusion of Public Attention

It is not by coincidence that the EI has barely encountered public opposition. In fact, we argue that the attention has been tactfully deflected and discourse silenced by the power players. Halpern et al. highlighted in The Smartness Mandate that geographical abstraction, detachment and exemption characterize and underwrite the logic of zone as an extraterritorial space (Halpern, Mitchell and Geoghegan 2017). Many similarities can be drawn between this and the framework that the EI is set up for.

To start with, the Island is situated nearly a hundred kilometers off the coast – a place of nowhere for many. The perceived remoteness of the Island is amplified by the abstract geographical location presented. Since conceptualization of the EI three years ago, the only map made available to the public (to the best of our knowledge) only

demarcates an indicative area. (Fig. 1) There has to-date little to no precise geo-information provided, such as WCS. It is uncertain to what extent will the public be informed of its geographic location in the future, given the vastness and openness of the little-known seascape.

Besides, the project has been associated with the idea of a faraway future that renders a clear image impossible. This relates closely to the nature of contemporary infrastructure as discussed above – as it is a symbol of anticipation and aspiration, as well as a commitment it designates towards the desired future. Moreover, the long lead time towards realization, in this case 30 years, positions the EI project in an unknowable world. The sense of uncertainty and obscurity results in a lack of relevance for general citizens. This detachment is very much in favor of the power giants, as it undetectably deflects the public attention from any less-rehearsed or potentially controversial political decision.

Even with a lead, any interested public may still find it difficult to comprehend and participate in the discourse around the EI, due to the advanced technical language and knowledge the project is associated with. Exemption of the

public is done here at the very root of not knowing, hence coupled by unfamiliar functions and facilities that the EI is designed for. Together, they create a vacuum space where only the industry professionals and exclusive power players maneuver and operate within.

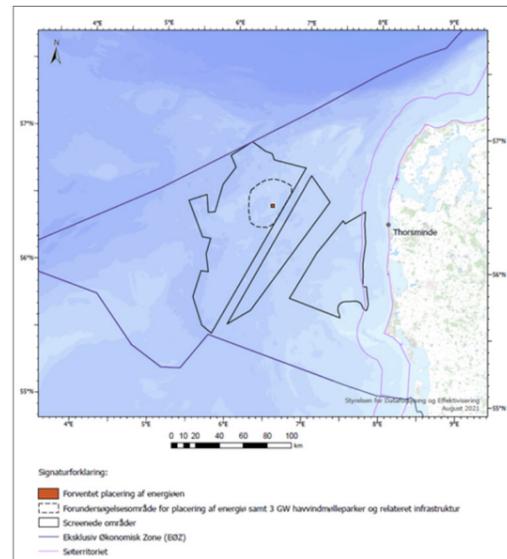


Figure 1. Published map of indicating the location of the Energy Island and area of its surrounding farms. (Danish Energy Agency 2021d)

Bypass of the Law

This space of extrastatecraft operation has also exempted the EI from potential hinderance by existing legal framework. Having categorized as a critical infrastructure positioned the EI as a pressing matter that must be facilitated, even at the cost of bypassing the law. We see that the risk of proceeding rapidly is being masked by the claim of criticality and uncertainty in the project.

In § 11 – 13 of ACT no. 2379, it is determined that permits and decisions made by the KEFM, or an authority to which it has delegated a power to, in pursuant to the Act cannot be appealed to another administrative authority unless filed as lawsuits to courts. This is generally referred to as the rejection of the “Right to Appeal”, which expands to cover § 20 of the Act on Raw Materials, and § 28a in the Museums Act. It raised concerns about the risks of environmental exploitation and abuse. In the public consultation, Danmarks Naturfredningsforening (DN) cautioned the Ministry that it is “a general democratic problem” to deprive stakeholders of the opportunity to complain. (Danish Energy Agency 2021d)

However clearly, industry representatives (Dansk Energi, Dansk Industri, VindØ Konsortiet and Wind Denmark) found that to be a conflict of interest. They noted that “the progress of the project could be significantly compromised” with the “agile permit process” that the right to appeal creates. The argument was seconded by the KEFM in the writing of the Act, as removing the right to appeal was deemed “essential for the tight schedule of the EI.”

Furthermore, it also came to our attention that certain custom regulations may be contrived in favor of activities on the EI. We noted in the market dialogues that potential market operators suggested the possibility of creating a tailored regulatory framework for trade and innovative activities for the EI to be commercially viable. It again points to the notion of free zone in Extrastatecraft, as the extraterritorial space calls for exception of restrictions, as well as invention of new standards.

As a Performance of Promise

Through Building,
Providing and Leading

^{11.} formerly known as DONG Energy.

At the world stage of clean-energy-race, the EI emblemizes the Danish-state's degree of advancement. Through establishing this massive energy infrastructure, Denmark is in a way showcasing the world and its citizens the country's power to secure and lead in a sustainable future. In Anand et al.'s words, it symbolizes the nation-state's promise of a future becoming (Anand, Gupta and Appel 2018). To understand Denmark's position in energy transitioning with the North Sea as the center stage, one must also map out the network of dynamics among who shares access and opportunity to the area.

Capacity versus Current Utilization

The world's first offshore wind farm was launched by the Danish energy company Ørsted off the coast of the town of Vindeby, Lolland in 1991.10F (Ørsted n.d.) Today, Denmark has a total of 15 wind farms, and 55% of the total Danish electricity production comes from wind turbines. Conversely, Denmark's

consumption is a lot higher than the amount it produces, hence why only 26.26% of consumption is covered by wind energy (Energy Institute 2023). Denmark must make an effort to increase its renewable energy supply in the national energy mix to reduce its emissions by 70% in 2030 and completely decarbonize by 2050 as per the Climate Act. For that reason, the Danish government has called for expansion in the wind industry, with the North Sea EI and Bornholm as the priority schemes.

Denmark possesses a geographical advantage with heavy wind zones being present in relatively shallow sea depths area (~30m) in The North Sea. It is considered ideal for technical requirements for the establishment of wind farms. Specifically in the North Sea, Denmark has operated since 2002 via Horns Rev 1, the first large-scale offshore wind farm 15 to 20 kilometers from shore, followed by Horns Rev 2 in 2009, 30 kilometers offshore; and Horns

Rev 3 in 2019, 29 to 44 kilometers offshore. However, the advantage is shared between all the North Sea countries.

Cooperation & Competition in the North Sea

In the broader picture, Denmark owns 3 out of a total of 41 offshore wind farms in the North Sea (Horns Rev 1 - 3). Altogether, they account for 776 MW of total generating capacity, which is only 2.6% of the current installed capacity in all of North Sea (4C Offshore n.d.) emphasizing that not only Denmark has utilized the harnessing potential of the sea territory. Similarly, other North Sea countries have also chosen to upscale their production. Just across the sea, Belgium has committed to the construction of an artificial energy island. It has been scheduled to commence in 2024 and reach completion by 2026. With Denmark's recent postponement on the completion of Phase 1 in 2033, Belgium will be advanced by a margin of seven years for the world's first trophy.¹²

Germany and the Netherlands are also on this parallel track of establishing EIs in the North Sea, only with a different approach. Instead of an artificial island, they directed the development towards a platform solution, derived from

ones commonly employed in offshore oil and gas extraction sites (Godske 2023). Compared to the Danish approach, which includes staff accommodation, spare parts, converter stations, and the potential incorporation of an electrolysis plant within the premise of the Island, the German and Dutch strategy appears much simpler and attainable.

With that being said, there are multiple agreements pointing towards broader cooperation in the North Sea. As of January 2022, the Ministers of Energy of Denmark and Belgium has agreed to collaborate on the creation of the world's first undersea interconnection between two Energy Islands. This means that the islands, while transferring energy onshore, will be able to exchange power between the two nations (European Commission 2022).

Following the REPowerEU plan to fast forward the green transition and decrease Europe's dependence on Russian oil and gas, this shared potential was acknowledged later in May 2022, when Ministers of Energy from Belgium, Denmark, the Netherlands and Germany signed the Esbjerg Declaration. The agreement seeks to develop the North Sea as Europe's green energy

12. This variance in project timelines may be attributed, in part, to different technical specifications between the two islands. For instance, Denmark aims to attain a capacity of 3 GW at Phase 1, followed by an increase to 10 GW in Phase 2 set in 2040. They also plan to include the production of green fuels (PtX) on the Island, whereas the Belgium EI is designed to achieve a capacity reaching just 3.5 GW.

powerhouse to replace fossil fuels, including those from Russia. The plan aims at a joint target of 65 GW by 2030 and an increase to at least 150 GW by 2050.

Further on the 24th April 2023, these targets were increased to 120 GW by 2030 and at least 300 GW by 2050, when France, Ireland, Luxembourg, Norway, and the United Kingdom joined the cross-border project when signing the Ostend Declaration.

Underlying Risks

These findings suggest that Denmark has strategized its approach towards energy transitioning by significantly upscaling its share in the North Sea wind energy production. What this implies is that the success of achieving that goal relies heavily on the viability of the North Sea EI. Moreover, due to the scale and financial calculations involved, a development of such pulls together potential and risks from multiple neighboring EU countries for the collaboration and competition involved.

As a Discipline of Future Prospecting

Through Transforming
Targets and Goals into Matter

While “the island kingdom Denmark will be one island richer” as expressed in (Folketinget 2021, 1), the targeted societal impact of the island exceeds the territorial. The goal is to electrify various sectors of society, yet, the scope of the project extends beyond national borders, as the Energy Island is strategically dimensioned to export green energy to neighboring countries, in the pursuit of contributing to the broader energy transition in Europe (Ministry of Climate, Energy and Utilities 2021a). As the tensions of the project have come to our attention, in this section, we try to reveal the driving forces behind this grand scope and the impacts they may have on the outcome.

The Drivers of The Extensive Scope

Since the challenges and tensions of the project have started to surface, although we understand the initiative in light of transitioning, we question this extensive scope, and what drives it. A quote from the Danish Minister Dan Jørgensen,

Minister of Climate, Energy and Utilities during the enactment of The Climate Act, helps shed light on how the EI is perceived as a prominent initiative in the context of green transition: “With this decision, we set the framework for a decisive lighthouse project in the green transition. Not only for Denmark but also for Europe and the rest of the world” (Ministry of Climate, Energy and Utilities 2021a) (translated by the author). The statement underlines how politicians acknowledge the symbolic and transformative significance of the project while it aligns with Bent Flyvbjerg’s concept of The Political Sublime in which politicians see megaprojects as symbols of their agendas and proactiveness (Flyvbjerg 2014, 7). The symbolic value is further supported in a proposal by VindØ (Fig. 2-4), which even hints at the idea of communicating Denmark’s (yet to be realized) great achievement as it features a sculpturally built visitor center, rendering the island

accessible to the public. In parallel, the accessibility of the island can be understood as a way of softening the project making it more edible for the public. Besides the EI's ecological importance, it has evolved into an instrument for politicians to demonstrate their commitment to sustainability, innovation, and economic growth, while leaving a mark on the world stage.

To contextualize the magnitude of this undertaking, the projected cost of the EI, inclusive of its associated wind turbine installations, is estimated at approximately 210 billion Danish kroner, which is approximately five times greater than the construction costs of the Great Belt Bridge completed in 1997 (Ministry of Climate 2021b). But unlike bridges, no one has ever built an artificial island so far offshore, which demands a significant depth of expertise from professionals in various fields. Typically, this gathers attention from engineers and technicians, particularly when opportunities to partake in large-scale and innovative projects arise (Flyvbjerg 2014, 6). This becomes discernable to us through the emergence of imagery related to various proposals for the EI created by coalitions of engineering, architecture, and transmission system firms, and offers another angle to the spectrum of grand objectives that may even appear overambitious. An exemplary statement also showcases this heightened interest is found in the project's characterization as 'Denmark's moon landing' by Troels Ranis, the Branch director at DI Energy (Danish Industry 2021). The quote indicates the appraisal of the project as a pioneering venture in the realm of energy and infrastructure and suggests that the EI project is a defining moment in Denmark's history. Further, the opportunity to harness massive amounts of energy strengthens Denmark's chances of becoming leading in the production of green fuels, something which is emphasized by Troels Ranis, as he argues that the supply of a lot of cheap and green energy makes a leap in innovation in green fuels achievable (Danish Industry 2021). These opportunities for pioneering advancements in technologies can be identified in the proposals of the various authors, which indicate the project's rendition as a compelling prospect for engineers and technicians alike. In those presented by TenneT (Fig. 5) and VindØ Consortium (Fig. 6), the island appears to serve as a major innovation hub, in which large

spaces are designated for later investments in green technologies and housing units are in place for the people who will eventually operate these plants.

However, this highly ambitious project scope driven by project promoters and decision-makers can also derail the project. As Bent Flyvbjerg argues, important factors in megaprojects, such as overly optimistic cost estimates or over-commitment to a certain concept at an early stage can be overlooked when the sublimines are at play (Flyvbjerg 2014, 8). This means that excessive resources could go into the "wrong" project which eventually "breaks". Most often this leads to the search for a fix to deliver some version of the planned project (Flyvbjerg 2014, 12).

Challenges Towards the EI's Realization

Prior to the enactment of The Climate Act, the North Seas Energy Cooperation (NSEC) designated potential energy clusters, and as a result, a consortium between three state-owned electricity TSOs: Energinet (DK), TenneT B.V. (NL) and TenneT TSO GmbH (DE) signed an agreement to investigate the potential for wind energy hubs/islands in the North Sea in 2017 (Energinet 2017). This came after

the Dutch TSO's (TenneT) proposal from 2016, in which a grand scheme of an extensive sandy island is portrayed (see Fig. 5).

In 2019, the potential for the world's first EI was mentioned in the coalition agreement of the elected government (cabinet of Mette Frederiksen) (Korsgaard and Thomsen 2019), hence endorsed by law in 2020. However, the anticipated completion date, as outlined in The Climate Act, has been challenged since the project's initiation.

Judging by the proposal that came after TenneT's, we identify a continued ambition to construct a large space, that can provide flexibility for the future, illustrated for instance in the previously discussed proposals by the VindØ Consortium (Fig. 6). However, it seems that Denmark has deviated from the idea of a sand island. Instead, the attention has seemingly been directed toward a caisson island as per the proposals by Sweco (Fig. 7-8) and Rambøll from 2022 (Fig 9), which is assessed to provide less flexibility and accommodate a lower capacity (The North Sea Wind Power Hub (NSWPH) 2021, 32).

This seems to illustrate a downsizing of effort, suggesting that a recalibration of the project's scope has happened in its early stages. Examining the various legislative materials reveals, however, that this recalibration hasn't resulted in more air in the schedule. On the contrary, it was specified that by virtue of the selection of construction type (dammed/caisson island) and the ownership model (the state as majority owner), it was deemed difficult to realize the project before 2033 (Folketinget 2021). The decision might however have saved the project from further delay as the construction time for a sand island exceeds that of a caisson/dammed island by four years. (The North Sea Wind Power Hub (NSWPH) 2021, 32).

Although the tendering process was scheduled to commence in spring 2023 (Folketinget 2022), the project was paused in June the same year and the Center for Energy Islands (EØN) under the DEA has been closed, according to an article in Zetland (Thomas & Molin, 2023). The decision stems from budgetary concerns, with government costs exceeding 50 billion DKK, rendering the project unprofitable (Ministry of Climate 2023). The need to investigate new

models for the island now further extends the timeline.

Although this line of events is concerning considering the urgent need to transition, we would argue that since infrastructures fixes the present time and space onto a particular future trajectory (Gupta 2018, 63), the recent pause of the project can also be seen in a more positive light. The considerable costs associated with the EI would require intensive utilization for repaying debts; even in the case of changing circumstances, reversing such monumental projects would be virtually impossible (Gupta 2018, 63), why the deviation of pouring excessive amounts of resources into the wrong project, because of the projects pause, can be considered positive. It indicates cautious and proper frontend planning, which Flyvbjerg coins as "The cure to the break-fix model" one where projects are started based on optimistic or manipulated estimates of cost, schedule, or benefits, which eventually leads to revision and/or a pause of the project (Flyvbjerg 2014, 12). In the end, this could help limit eventual cost overruns and delays in delivery once construction has begun but leaves us still questioning if the scope is achievable in the near future.



Figure 2, (Arkitema 2021)



Figure 3, (Arkitema 2021)



Figure 4, (Arkitema 2021)



Figure 5, (North Sea Wind Power Hub 2016)



Figure 6, (VindØ 2021)

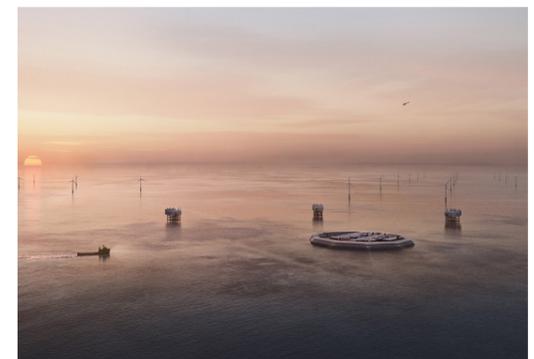


Figure 7, (Sweco n.d.a)



Figure 8, (Sweco n.d.b)



Figure 9, (Volander 2023)

Proceed with Caution

This paper allows us to see the EI as a case of infrastructural technology-led development along the global trajectories towards transitioning. It dissects the fundamentals of the project, the heavily politicized context it's situated in, the parallel but interdependent tracks that it relies upon, as well as its potential courses in terms of delivery. By recognizing architecture as a medium between imagining and materializing the pursuit of a certain future, it came to light that we should examine the following more closely.

Urgency as a Double-edged Sword

Energy transitioning in a broader context is a societal challenge and in some ways a crisis that demands to be addressed. It impends an urge to act, to find a solution to a problem. However, urgency is truly a double-edged sword. On one hand, it motivates progress and stages a powerful opportunity to

innovate and transform. Our findings showcase the sheer magnitude of technological innovations that a green decarbonized future has motivated. Just the EI itself has called forth joint forces from the North Sea nations and an immense pool of professional expertise. Not only that, Denmark's effort in taking the initiative to bring a positive change should also be acknowledged. On the other hand, urgency can also manifest in a form of desperation that pressures premature development. The many inconsistent and lack-defined attributes of the EI validate that the development is maneuvering in a realm of non-knowledge. It is concerning to us that the vigor and momentum it gained has yet to bring clarity in neither the size, the function nor the construction type of the Island. As fair as it is to act promptly upon a challenge with drive and motivation, it should also be reminded that the commitment brought about by urgency shall be evaluated carefully.

Ambition Entails Resources

Nothing denies that the EI is an ambitious project. Besides the Danish state, so many power players behind the project bear a strong desire to succeed in creating, realizing and leading in the realm of energy transition. But ambition does not always justify the resources it entails. That is because resources are finite – including costs, time, manpower and materials – they are required in every physical and functional dimensions of the project. Our investigation has revealed the tremendous cost that has yet to be resolved; the prolonged timeline needed that ingrain plenty of uncertainties; or even the scarcity and costs for mobilizing the sand, concrete or metal for its build-out. By committing in, or perhaps in a more critical lens – betting on, a singular solution, finite resources we have in the present are fixated upon the imagination. It is possible that Denmark is putting in what it takes to achieve something pivotal and remarkable. But the inherent variation of each dimension of resources also points to possible futures where alternatives are overlooked or only a fraction of the ambition is delivered.

Power to Shape Future

The project of EI epitomizes the architecture's potential to shape imaginations into realities of the future. Although situated within a domain dominated by political agendas, financial considerations and technological knowledge, it is at this very site of extraterritorial space enabled by architecture where the power of future-shaping lies. Upon dissection of the network of governmental and market players, we can see the EI as an instrument or by-product of a political game – the clean-energy-race. However, in another light, it should also be recognized that the propulsion of this project will bring alteration to a substantial extent of national territory. Even more so, it instigates reconfiguration of energy production landscapes into potentially new urban forms. As members of the architecture and planning discipline, we hope to remind ourselves of the power withheld in each production of a new landscape, for that such attempt creates a space of manifestation towards our shared future.

Possible Future Scenarios

We start to wonder how the EI will impact the landscapes in which it operates. Will it reach its final anticipated size of 460.000m² in its second phase (Ministry of Climate 2021b) or will it turn out even larger, to increase its capacity, area for innovation, or other needs that could not have been predicted? Will the EI take the form of a dammed island as initially agreed and promoted by Deputy Director of the Danish Energy Agency, Mogens Hagelskær “...to secure more options both when it comes to the installation of equipment and the possibility of innovation” (Godske 2023) or will it materialize more as a platform hinted by Climate Minister, Lars Aagaard (Volander 2023). Also, which functions and facilities will it accommodate in the end? To what extent will the EI out of necessity become inhabitable or not? Having reviewed various proposals, in which mobilizing staff to different operations is discernable, either through infrastructure, recreative area, or even housing units, we question if the EI will merely be technical “land” or not.

The Powerhouse – Development of A Techno-Landscape

There are hints indicating that the EI could form the basis of a new

urbanity, perhaps more likely in case a gradual expansion is necessary to meet the ever-increasing energy demand. We would assume, that if the energy production must be re-dimensioned or adjusted depending on the final construction type, several options could be at play. Retrofitting or re-organizing the island would be one, and perhaps the first, but we could speculate that a demand for more area could emerge to keep up with innovation and increased capacity. Resolving this may either happen in the form of expansion or even by replacing the island with new ones that have the required specifications.

What if the built-out of EI becomes proven as a highly effective and viable option for transitioning and echoed by all the engaged nations around the North Sea? Could we imagine an increased and eventually maximized exploitation of the geographical advantages? The efforts of decolonizing the atmosphere would result in increased colonization of the sea territory through an archipelago emerging from the network of various nations’ energy-led developments. To what extent would this new territory be accessible to the public, and would it create new recreative areas, or solely a techno-landscape?

The EI as an Obsolete Solution

Conversely, we engage in speculation regarding both the success and failure of the project, whether realized or not. Just as there are numerous potential outcomes, there are also obstacles and adversaries. For instance, the project could face challenges from public opposition due to environmental concerns, even though the right to appeal has already been cut off as criticized by Danmarks Naturfredning (Danish Energy Agency 2021d). This, as well as material scarcity and the costs of materials hereof, could greatly affect the delivery of the project, its construction type and size. Ultimately, this could challenge the EI’s model as a viable solution.

The transition towards renewable energy sources engages many concurrently developed technologies, one of those being the removal of carbon from the atmosphere. Advancement of these technologies is rapid but unpredictable. There is an underlying threat in the case of carbon capture solutions advancing ahead of the EI, by which we are lured back into the stable source of fossil fuels. This implies that interests may be shifted away from the EI and similar initiatives to develop green energy sources.

Alternatively, other renewable sources, like solar or nuclear power, could become cheaper and more efficient in the future, which leaves the EI obsolete. In this case, how could this territory be adapted or utilized? Would it become a monument of past ambitions or a space for new offshore activities?

Transformation of future renewable energy landscapes has already begun. Presented as an ambitious innovation and a critical leap that Denmark must take in transition to a sustainable future, the EI answers to the urgent need for an expansion of existing Danish energy infrastructure. Although situated in a technology-led and politicized realm, the EI encompasses an undeniable presence of space that demands in-depth discussion from architects and planners.

This paper sets out to examine the inception of a new form of infrastructural territory and its spatial implications, and it has become clear that the EI is more than merely a faraway energy hub. By exploring a spectrum of political, technological and economic agendas that informs the project, it revealed the EI's alternate form as a new, abstract and exclusive zone, a profound symbolization as a promise towards a desired change, and a manifestation of aspiration

that obligates commitment from the present. It shows architecture and planning's agency in creating a site of extraterritorial space where political power operates in; its instrumentality of constructing vital systems which symbolize advancement; and its innate ability to materialize visions and goals into reality of the future.

All agreements, projections and visual imaginations of the project prove architecture's power and agency to render something as large and complex as the EI. But such power also amounts to liabilities: the urge to act on perhaps unripe decisions, the lock-in of resources, and the commitment to virtually a practice of future world-building. Regardless of the degree of prevalence of EI in the future.

13. See *The Underdome Guide to Energy Reform*, by Erik Carver and Janette Kim.

Potential Site of Intervention

Due to the limits of the paper, other onshore developments related to energy reform have yet to be discussed. For instance, we see that both the ambition to quadruple the production of energy from solar and onshore wind turbines in the years towards 2030 (Folketinget, Parliament of Denmark ((S), V, F, B, Ø, C, O, I & Å) 2022), and development for emerging technologies like PtX plants, imply potential transformation to the Danish energy landscapes. It interests us to engage in the imagining of a future where energy production becomes more present and prevalent in the national territory.

Conversely, transitioning towards the 100% renewable energy scenario leaves existing oil and gas refineries obsolete by 2050. We are intrigued by the potential recovery or transformation work on post-fossil sites and landscapes.

But Before That...

We must acknowledge that evaluating any future developments in terms of dollar and carbon savings doesn't bring us to the crux of energy reform. Erik and Kim have shown in their work the importance to contend the limits of architectural practice in energy agendas.¹³ We shall be cognizant of the bigger questions: What city do we imagine for ourselves? What kind of lifestyles do we want to encourage? (Carver and Kim 2015) As a starting point, we see this paper as a testimony to the power of infrastructural territory, for they not only are powerful emblems of aspirations for our shared future, but also a new form of space instigated that falls out of, or is intentionally removed from, the existing discourse of land use and regulations. If not carefully, the urgency of crisis may bring about irreversible changes to the future landscapes sooner than architects and planners could detect.

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