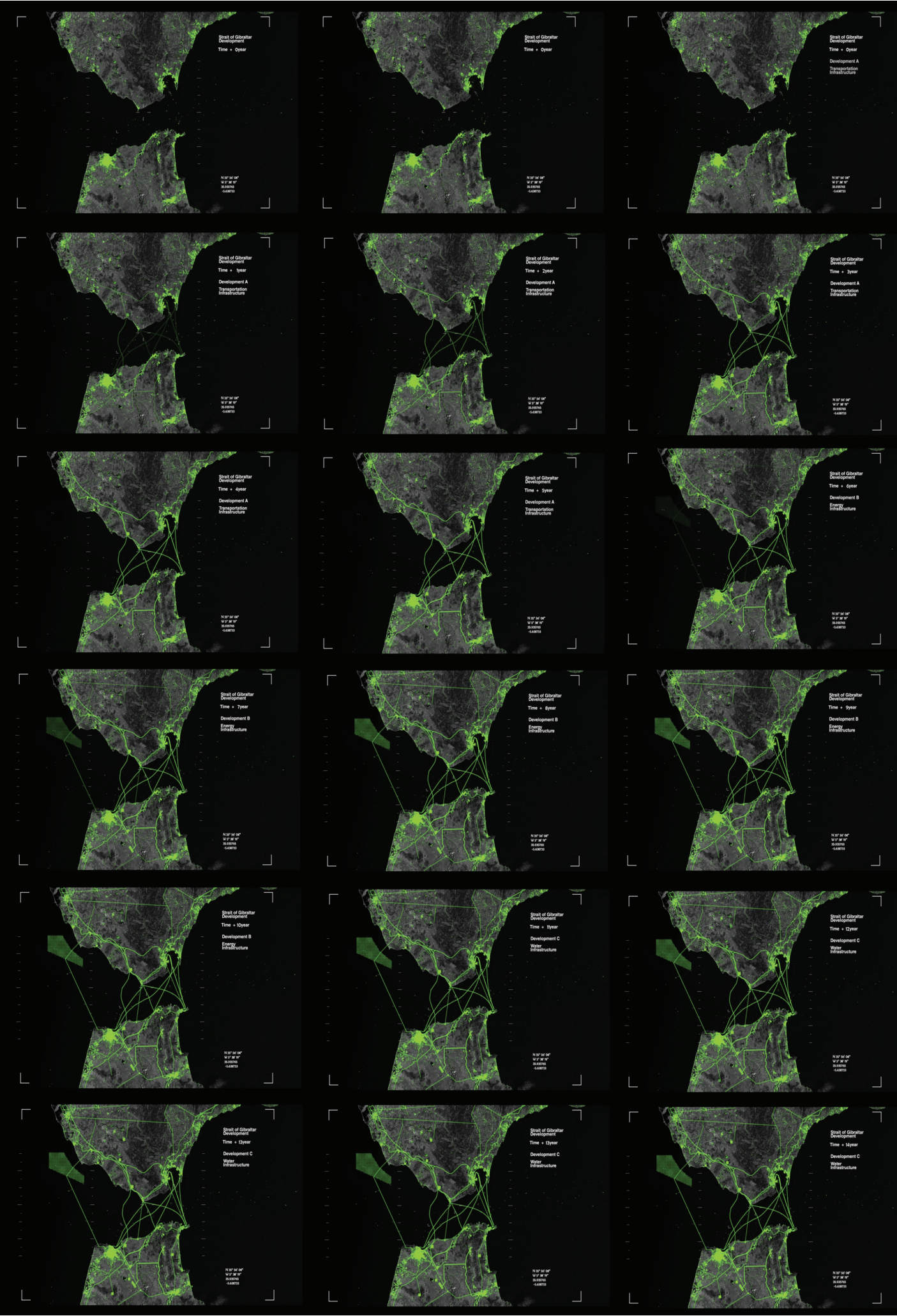


Project Book  
ARB301 Thesis  
Simon Stewart <sup>[ZA]</sup>

The Berlage Center for  
Advanced Studies in Architecture  
and Urban Design

# Power Struggle





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## Abstract

The project collects past, present, and future stories of energy in, around, and through Gibraltar: fuel economies in the age of Franco; the refueling of middle eastern tankers; the transition from diesel to LNG fuel sources; the additional load of bedroom bit-coin miners, to industrial scale server farms; the interception of fuel tankers bound of middle eastern war zones; the design of new power stations; the laying of new power cables between Europe and north Africa; new forms of decentralized energy sources and the impact of energy migrants crossing the Mediterranean.

The stories speak both of the internal and local logics of Gibraltar, and of its role within international networks: the alliances, arrangements, and compromises it makes to 'keep the power switched on' and remain a feasible territory; the economical and infrastructural side-effects of energy networks that pass around and through the straits and the peninsula.

The project describes how these networks manifest themselves in infrastructure, buildings, and spaces: cables, landing stations, and maintenance rooms; docks, re-fueling stations, and dormitories; LNG trading routes, power stations, control rooms; data networks, underground storage tunnels, bedrooms.

It does so in order to tell new stories about Gibraltar; not as a provincial cul-de-sac out of time, but as a node and a conduit in one of the key Geo-strategic locations in the Mediterranean. This is a location of increasing importance in the decades of climate emergency, as Europe turns towards north Africa for new sources of energy, as climate migrants line the Mediterranean coastline, as shipping and trade transforms.

## 5 Propositions

-Gibraltar is a hinge: a location of exchange, transition, transformation.

- Gibraltar is global: the forces that flow through and around it are disproportionate to its size and influence.

- As the global climate emergency unfolds energy architecture will take new and monumental forms.

- Energy effects the design of both the individual and the territory: from the pullover to the solar array.

- The global environmental ecology is the product of multiple designs, overlapping and intersecting, with different objectives, at different scales, unfolding over different periods, telling different stories.



As Found Propositions

Photographs from authors during fieldtrip in Gibraltar, June 2019

## Beyond the Rock

Spatial interventions define and are defined by flux. Fluxes manifest in infrastructure, urban arrangements, buildings, and rooms, guiding, directing, and facilitating our movement. Simultaneously, the practice of movement defines our perception of space. On land we orientate through boundaries, borders, obstructions, and divisions between fields, regions, and states. At sea, our position is determined by intersecting lines of connections through distant objects, creating reference points and networks.

Gibraltar—a small peninsula on the southern tip of Europe—has been one of these reference points for many years. The stable presence of the Rock has been central to many stories, myths, and projects—from the Pillars of Hercules to the dream of Atlantropa. The 421-meter-high limestone formation has been a reference point for sailors, a strategic location for military garrisons, and a crucial stopover for migratory birds and insects. Gibraltar is therefore associated with being a stable, static, and steadfast small town, where one only ends up by virtue of circumstance.

However, Gibraltar is anything but stagnant. Surrounded by water, the territory is part of a global trading network characterized by the movement of cargo, passengers, and migrants. It lies in the midst of the Strait, to which the peninsula lends its name, which defines and unfolds the dynamic, fluctuating, and ever-changing condition of the territory.

As maritime choke points, continental straits determine the rhythm, capacity, and intensity of shipping patterns. Located between two polarities, they pose an inherent condition of tension, conflict, and imbalance. As such, straits channel and catalyze flux. Where there is difference, there is flux; where there is flux, there is dynamism. The Strait of Gibraltar, too, can be understood in such terms—strategically located between two continents, it separates the Atlantic Ocean from the Mediterranean Sea. On its edge lies Gibraltar—the entry point to the Mediterranean.

Gibraltar is a relatively unimportant yet historically significant entity; the peninsula is a mere 6.8 sqkm with 33,000 people living almost exclusively on the west side.

Around 250 Barbary macaques and many other species live or stopover in the Upper Rock Nature Reserve, covering 36% of the land. Gibraltar is still crucial in its wider context. Over the course of history, the seemingly insignificant territory has been fought over, conquered, isolated, and reconnected by many. Early Islamic settlers from 711 AD conceived of the city as a fortress; in the sixteenth century the old town started to extend from the Moorish Castle, and the following centuries saw Spanish and Anglo-Dutch troops taking hold of the Rock. Their defenses, moles, batteries, and bastions shaped its surface, while tunnels and excavations shaped the interior of the Rock.

When the end of Great Siege (1779–1783) temporarily stabilized tensions, Genoese, Portuguese, and Moroccan merchants made their way to Gibraltar to make their fortunes at this British trading outpost. In the nineteenth century this multicultural community expanded the city into reclaimed land and onto the Rock, leaving their architectural marks on the city. Today, Gibraltar remains a British Overseas Territory but with separate legal jurisdiction. It is said that as long as the monkeys stay, the British won't leave. But that, soon, might change. Could we reimagine Gibraltar as an autonomous territory?

### *Independence and Interdependence*

Gibraltar is not an island, yet it is prone to isolation. Without any natural resources, the peninsula is highly dependent on its relationship with its surrounding context. This has put tremendous pressure on its border—a 1.2-km-long threshold beneath the Spanish town of La Linea. As Gibraltar is highly dependent on imports and cheap labor from Spain, obstructing this frontier can have a dramatic effect on Gibraltar's economy. As such, it forms an important bargaining tool for its neighbor.

Since the 1713 Treaty of Utrecht officially assigned Gibraltar to the British, Spain has tried to reclaim the strategic outpost by force and persuasion. Gibraltarians, however, want to stay British; in the 1967 sovereignty referendum, a massive majority of 99.6% of Gibraltarians expressed their eagerness to remain under British rule.

As a response, Spanish dictator Francisco Franco restricted all forms of trade and traffic across the border, leaving Gibraltar with no other option but to turn to northern Europe and Africa

for help. For 16 years, until the border fully reopened in 1985, the UK, the Netherlands, Portugal, and Morocco provided the territory with food, water, medical oxygen, and construction materials by sea and air. Franco's actions also forced Gibraltar to look inwards, identify its strengths, and make alliances to overcome its weaknesses.

Following the reopening of the border, the government of Gibraltar actively rebuilt its economy by accentuating its differences from its surrounding context. Over the past four decades, three major industries have emerged—in the 1990s tourism and ship refueling (bunkering) began to account for a significant daily in- and outflow of both people and ships. Financial services then emerged as another major industry after beneficial tax policies implemented in 2009 attracted foreign investors and online gambling enterprises. The boost to employment and general shift towards high-end residential development has brought a significant temporary population increase in recent years, mainly from the UK. These have negated some of Gibraltar's dependencies, but the built environment is still highly dependent on Spain.

Up to 12,000 tourists a month at the cruise terminal, peruse Main Street, and take the cable car for a quick visit on the Rock to illegally feed the monkeys, while 15,000 workers cross the border from the neighboring Spanish town of La Linea every day.

With limited options for urban expansion, the local construction market is highly competitive. Fast-paced developments arise on reclaimed land and former British military grounds, over which the local authorities have little to no control. Often initiated by Spanish contractors and private investors, building culture is characterized by a case-by-case system with little room for architectural innovation. In turn, Spanish urban planning culture restricts Gibraltarian architects to their familiar territory.

How can Gibraltar expand its architectural context and open new doors for its architects?



While the political situation of the European Union and the United Kingdom are destabilizing, Gibraltar finds itself in an ever-more vulnerable state.

However, opposite the Strait in Morocco and Algeria, solar and biomass energy sectors are rapidly evolving. They are likely to result in large-scale urban and infrastructural expansion, creating major investment opportunities in northern Africa.

In this projection, Gibraltar aims to monetize these opportunities by shifting its gaze to Northern Africa, plugging into the energy circuit south of the Strait.

As such, Gibraltar's potential, importance, and territory are no longer defined by its administrative borders, but rather in relation to the networks it operates within.

What could be the repercussions on the local building culture of Gibraltar?

If Gibraltar wants to gain control over its precarious condition then one thing is inevitable—connection.

As new and improved infrastructural connections create opportunities for investment and expansion in and around Gibraltar, improved connection to Morocco enhances the capacity of energy, freight, and capital flows across the Strait.

Gibraltar's beneficial tax policies make import through the territory appealing for both Europe and Africa, accelerating urban expansion and economic growth in nearby cities.

For Gibraltar specifically, the change means that the territory transforms from a geopolitically insignificant peninsula to a crucial node in the intercontinental trading network.

How can Gibraltar exploit this new nodal condition, and how can architecture assist that?

### 3) Gibraltar as Destination

A transport hub integrated within Gibraltar's urban tissue concentrates all traffic and freight, distributing the flows along and across the territory. By expanding its context to Africa, economic opportunities attract migration from its surrounding area, creating potential for Gibraltar to become more attractive to investors, tourists, and residents. Additionally, the optimization of ferry routes between Africa and Europe enhances the overseas connection for passengers. How can spatial strategies accommodate and optimize these new and intensified fluxes?

### 4) Population Growth & Urban Expansion

When financial opportunities open up, people from other countries arrive to reap the rewards. Improved maritime connections and accessibility strengthen the capacity, speed, and frequency of traffic across the Strait, and are thus projected to bring a substantial population increase—laborers from Northern Africa and investors from China are shifting their gaze from Africa up to Gibraltar. To accommodate this population increase, Gibraltar is projected to expand and densify into the sea as well as on land, following its existing strategies of long-term planning on the west side, and rapid reclamations on the east side. How could the peninsula deal with the contested changing coast lines, and how would these new communities express themselves in public space?

### 5) Climate Change

Gibraltar's natural water borders form not just a connection across the Strait, but also a threat to its expansion. While rising sea levels amplify the spatial pressure on the territory, rising temperatures, extreme weather events, pollution, and overfishing have resulted, and continue to result, in mass extinction and biodiversity loss to which the unique species in Gibraltar are especially vulnerable. How can we reconsider these crucial thresholds between the city and the water, and the city and the Upper Rock, accommodating both human and non-human populations?



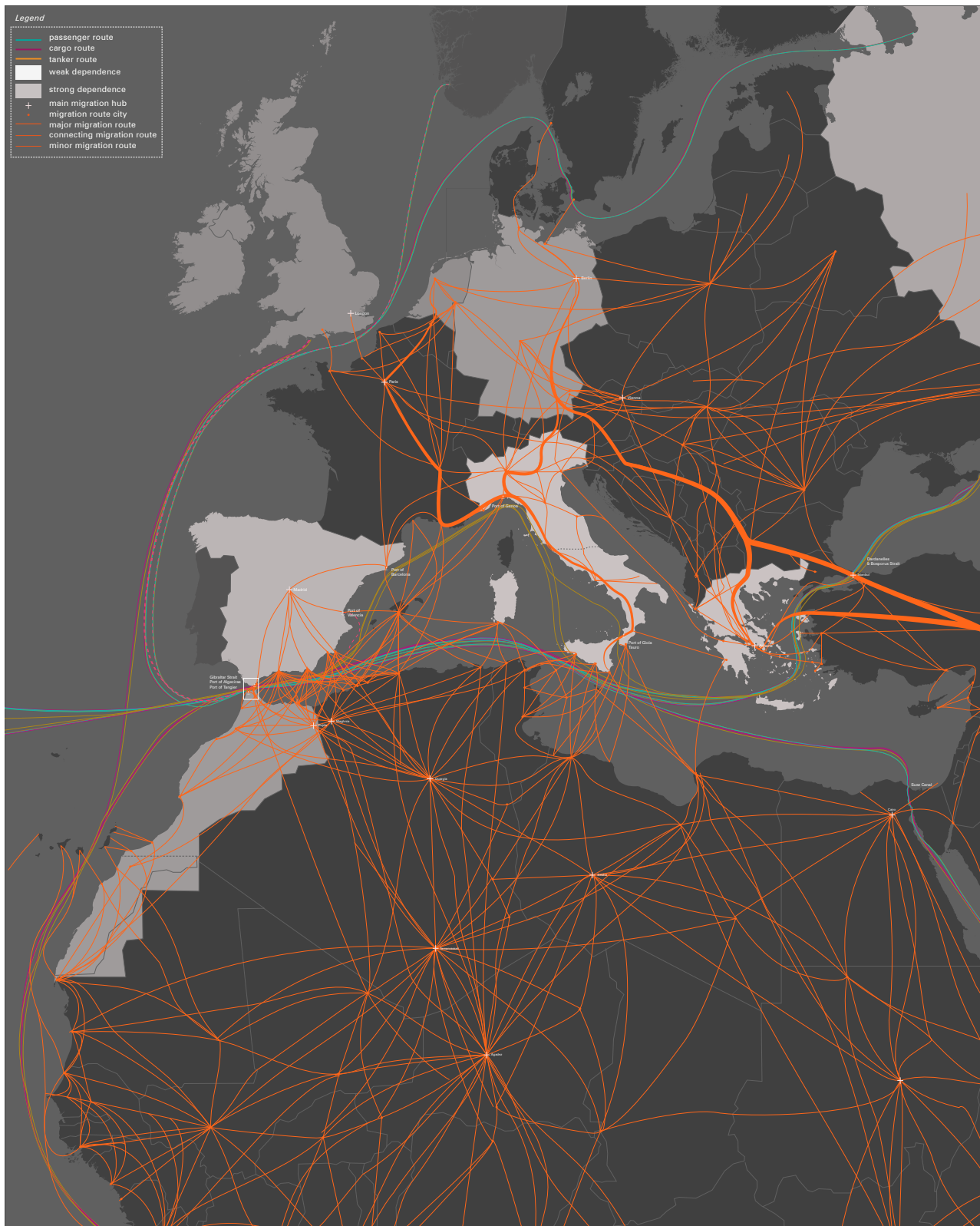
Gibraltar: The Built Environment





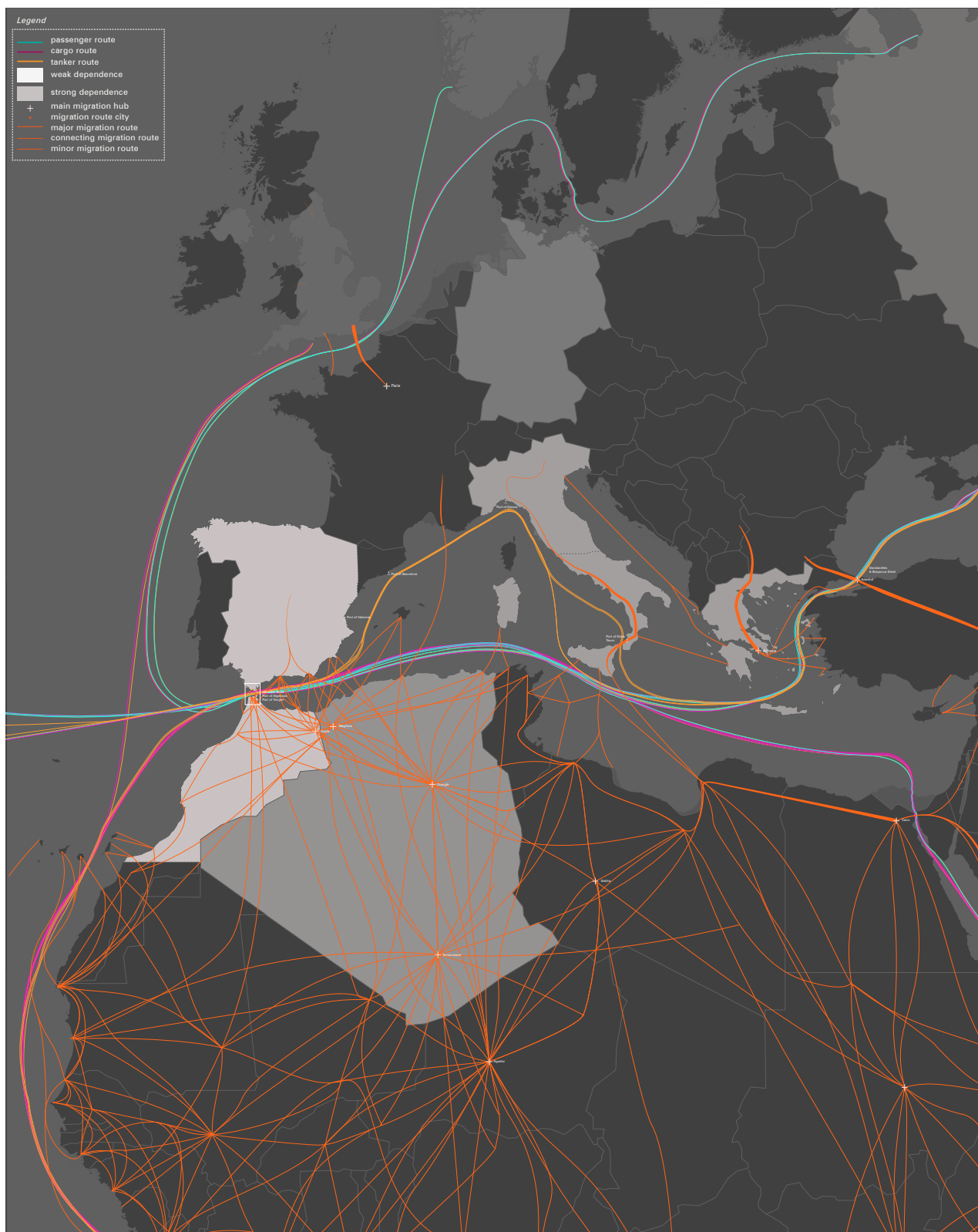
Site location of Gibraltar

### 1) Geopolitical Shift



2020

The Territory of Gibraltar: map with present dependencies and migratory routes

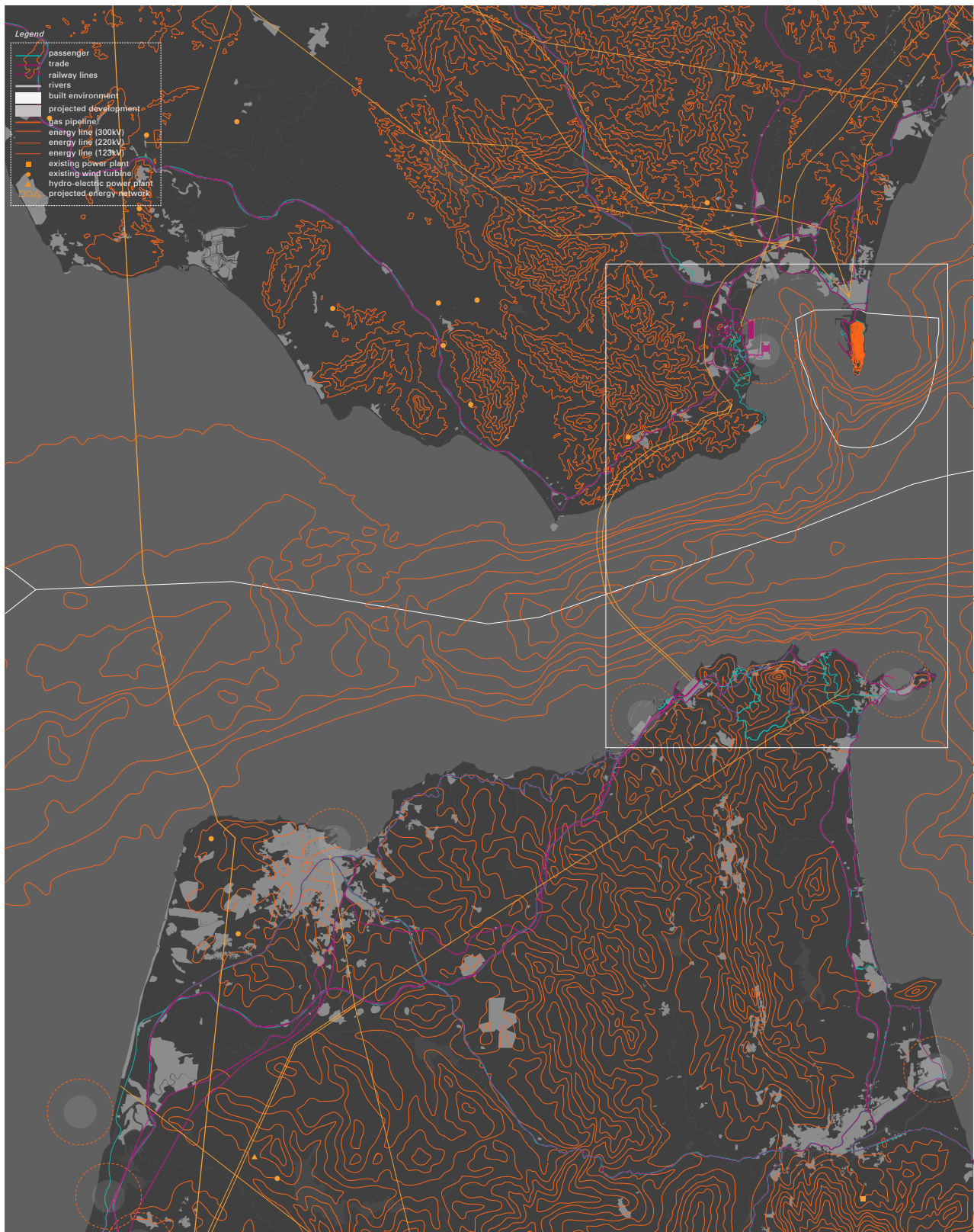


2050

The Territory of Gibraltar: map with future dependencies and the re-orientation towards Africa

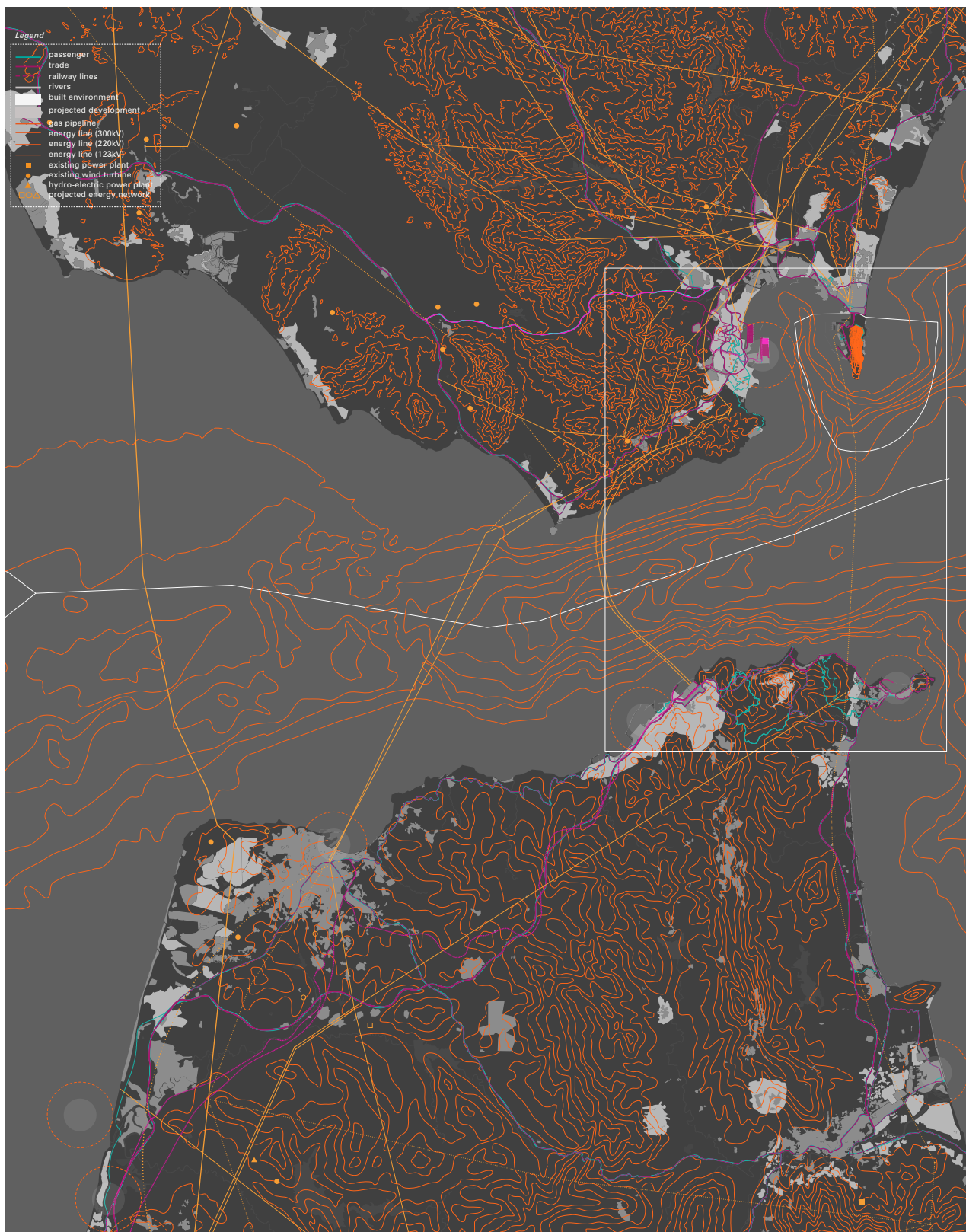


## 2) Infrastructural Connectivity



2020

The Strait of Gibraltar: map with the existing economies and infrastructural developments

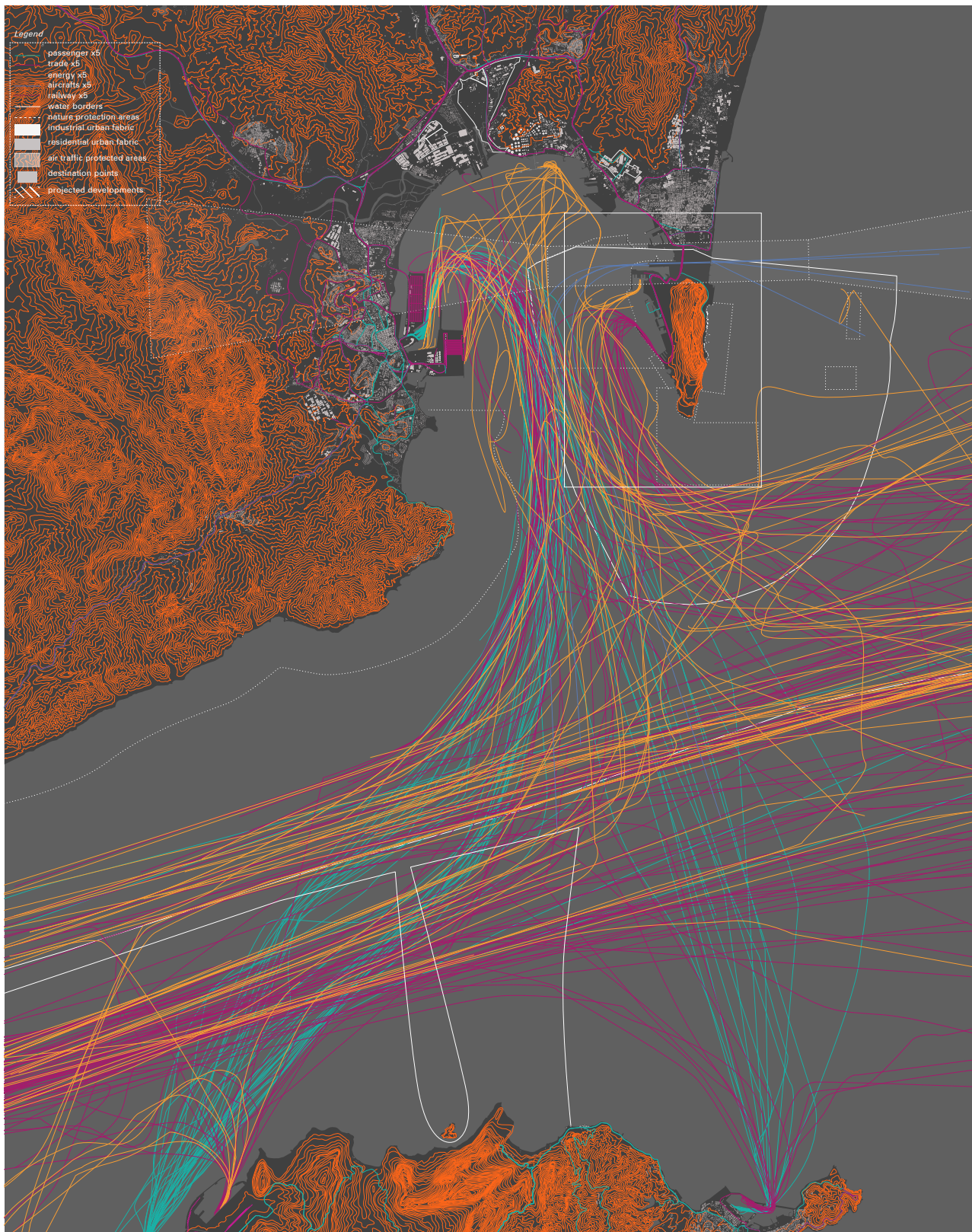


2050

The Strait of Gibraltar: map with  
the future growing economies and  
infrastructural developments



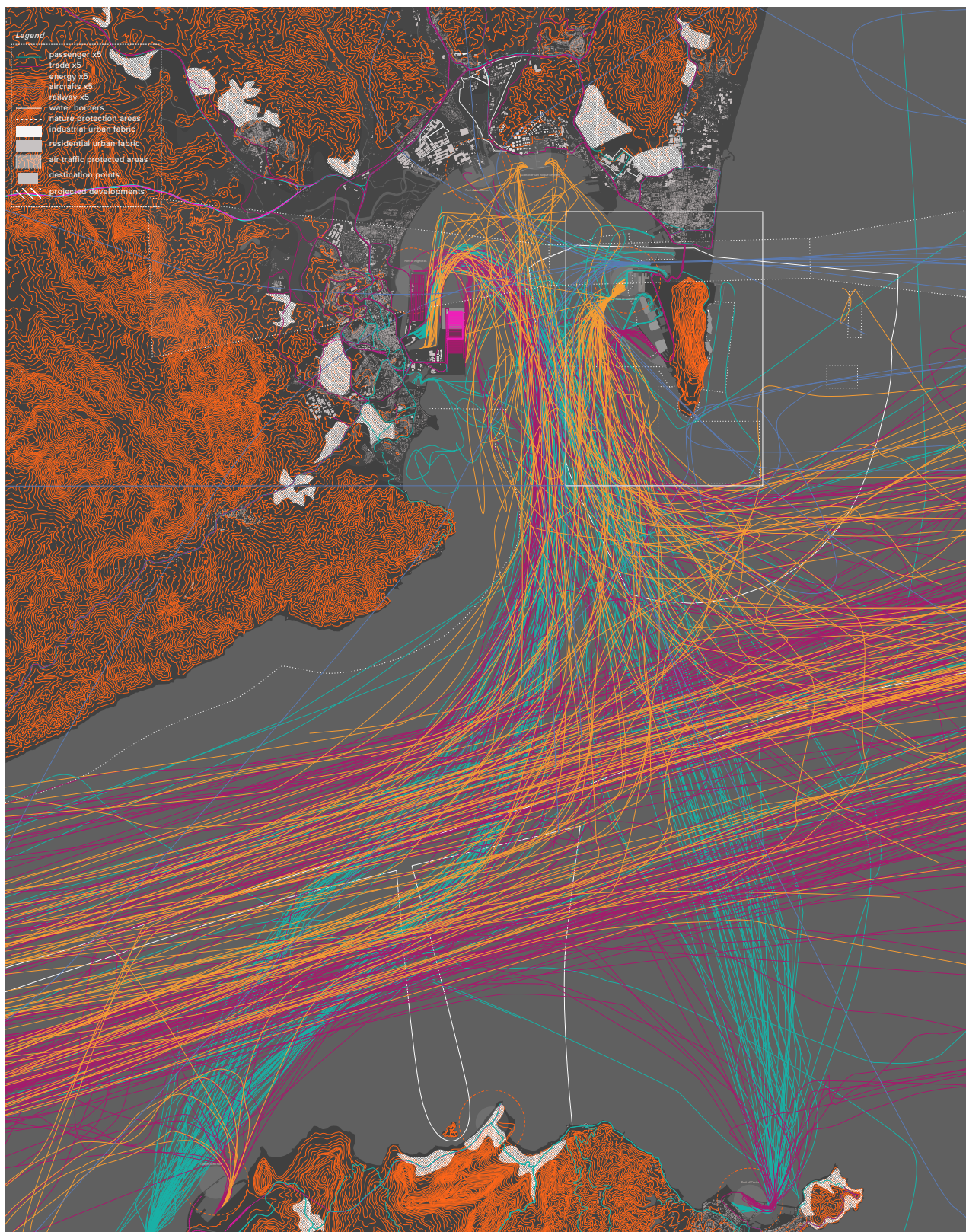
### 3) Gibraltar as Attractor



2020

The Bay of Gibraltar: map with the existing weekly traffic through and across the Strait



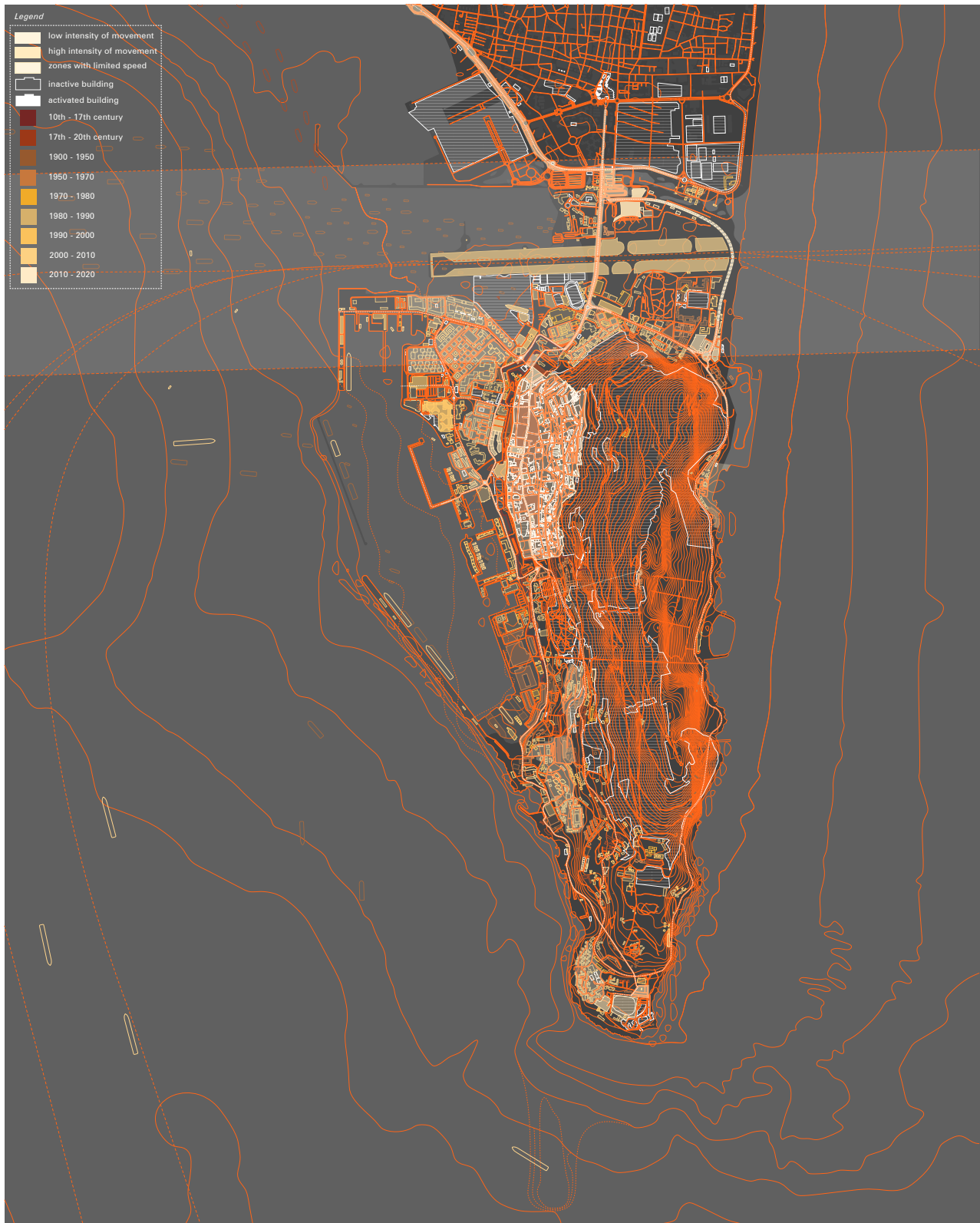


2050

The Bay of Gibraltar: map with the future weekly traffic through and across the Strait

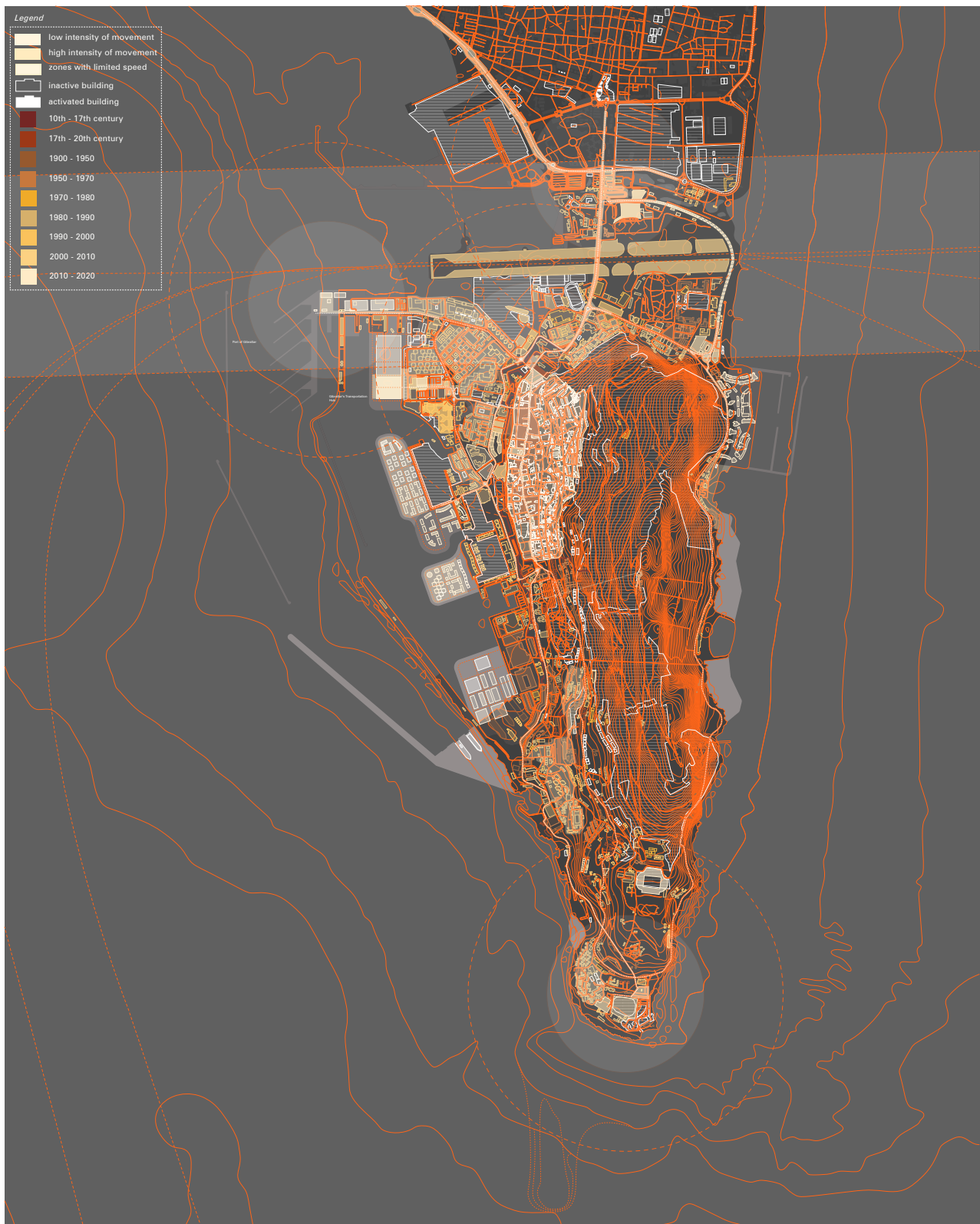


#### 4) Population Growth & Urban Expansion



2020

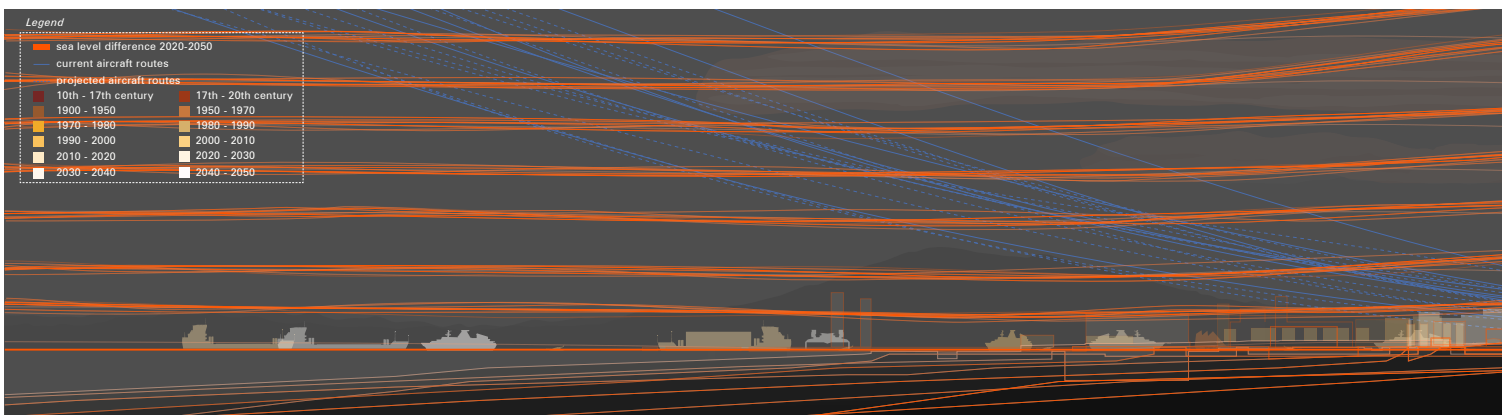
The Rock of Gibraltar: map with the existing built environment and the peninsula at its current state of flux

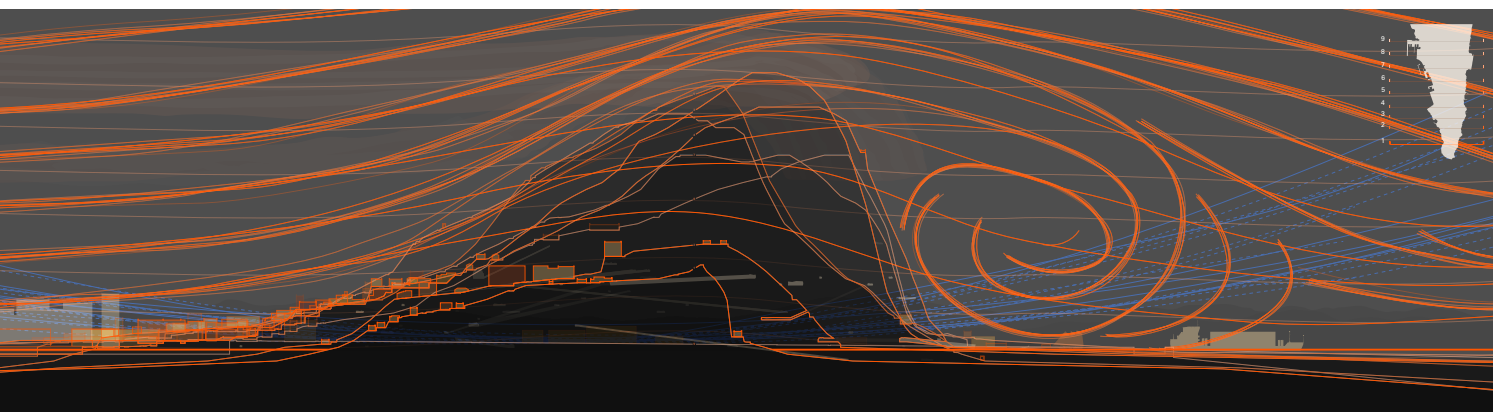


2050

The Rock of Gibraltar: map with the peak areas of the peninsula on the backdrop of future development

## 5) Climate Change





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2020, 2050

The Rock of Gibraltar: section with  
external and climatic conditions





2050

The Eleven Contributions



2020, 2050

*Beyond The Rock*: 1:1000 wax site  
model



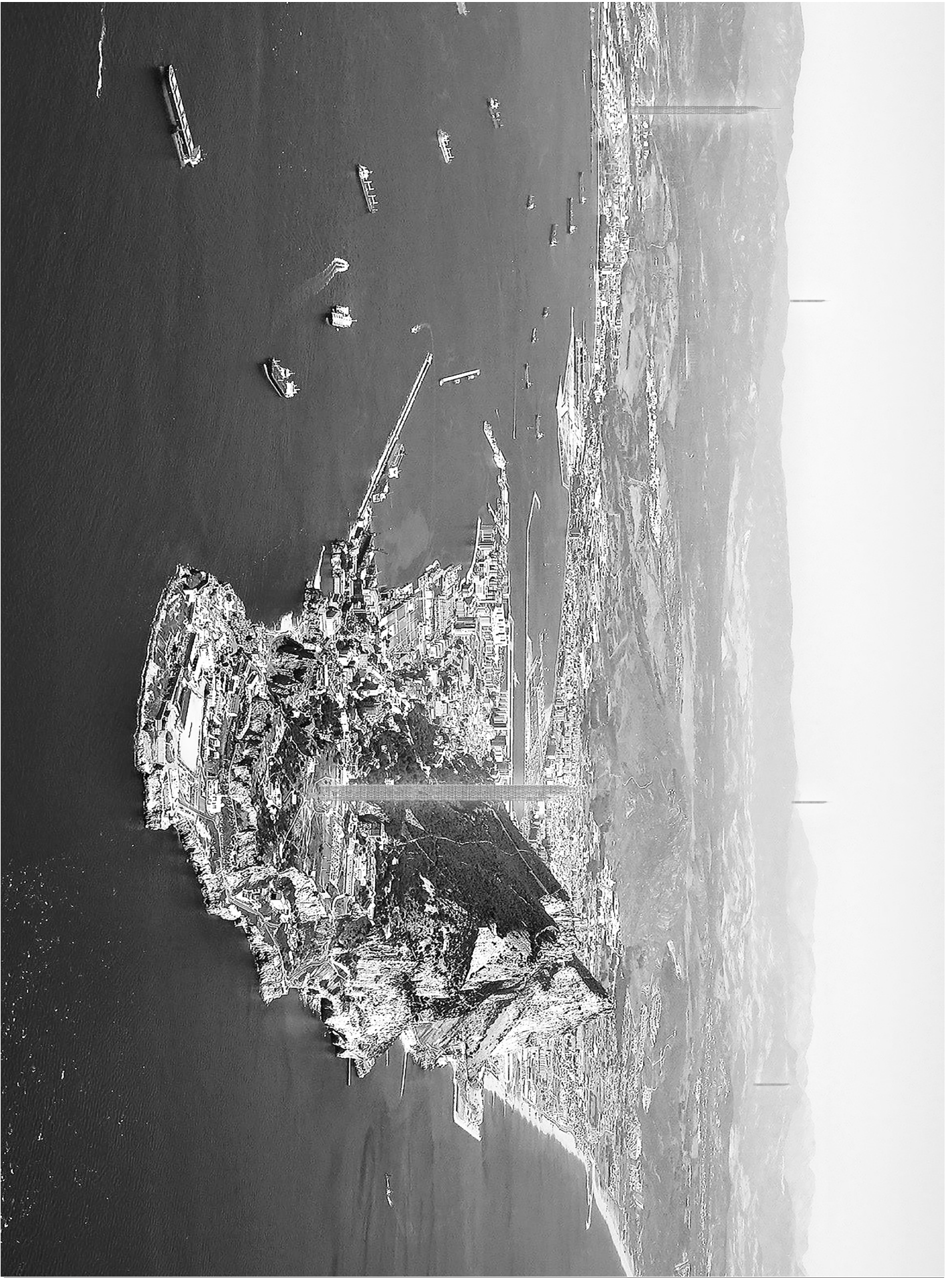


2020, 2050

*Beyond The Rock: 1:1000 wax site  
model*







Aerial image of cruise Europa Point.  
Energy towers cast across the  
landscape.



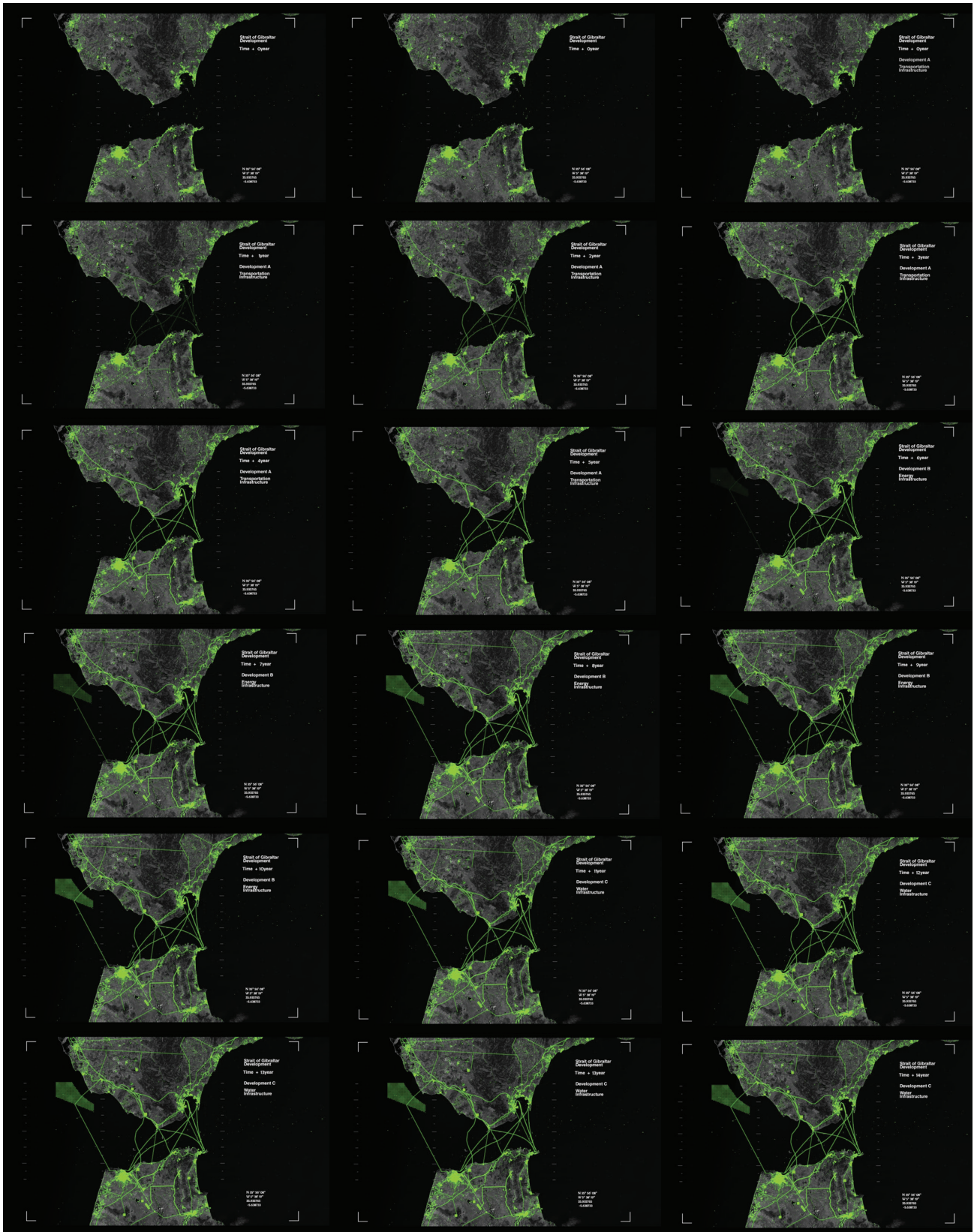
## Site Information

The site is both everywhere and nowhere, the conceptual development of the project is one that understands energy as something that is not limited or defined by one term, form or locality.

The aim of the project is to reflect on the architectural representation of energy and thus the spatial consequences that it necessitates.

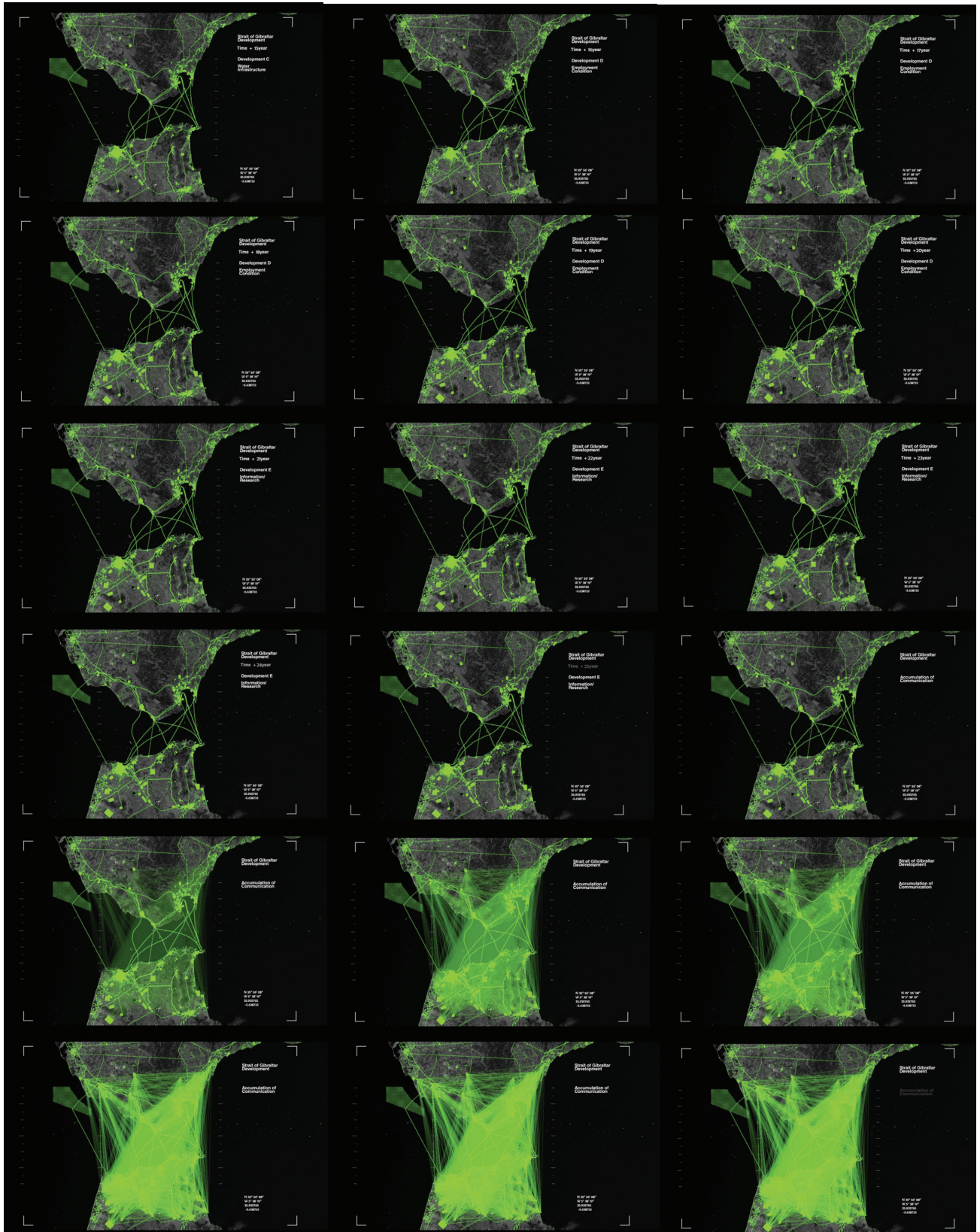
The site at Europa Point is one that is nearest to the infrastructural connection to Africa. It is based on a future development plan to shift industry and power out of the city. The tip of the peninsula also performs as a strong vantage point, taking advantage of passive ocean current and uninterrupted solar exposure.

Gibraltar is just a small node in a much larger energy network that spans Northern Africa and Southern Europe.

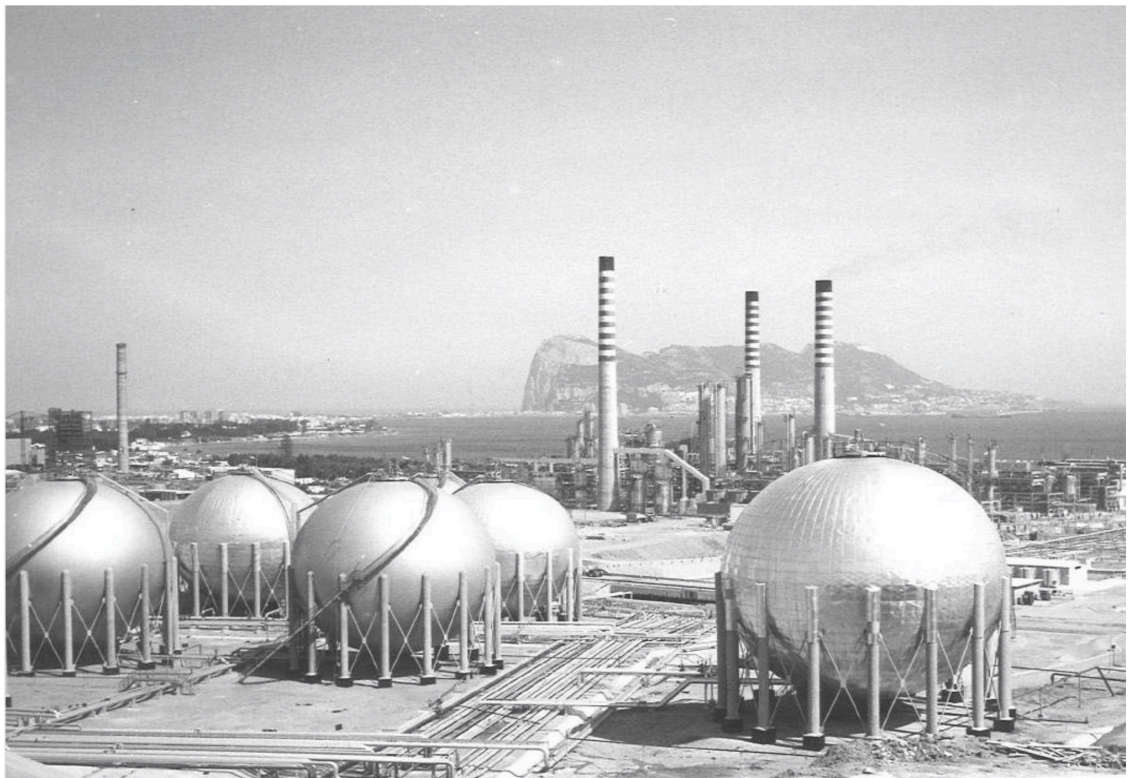


Projected Development plans across the Strait of Gibraltar over the next 25 years according to study.

Imagery shows major infrastructural connections and energy networks.







Above: Gas refinery built in the time of Franco's reign,

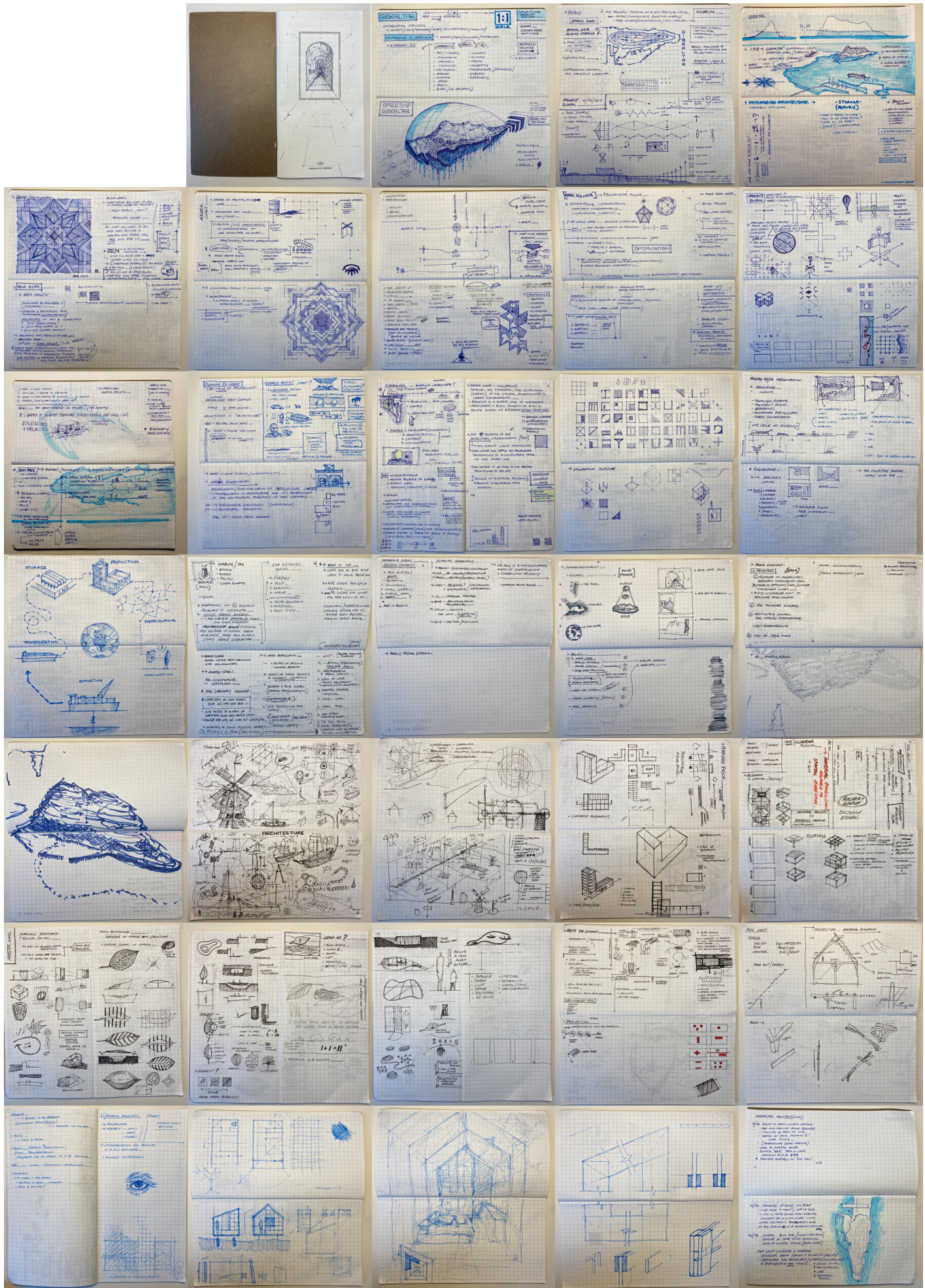
Below: LNG Terminal at Gibraltar Port, 2019. Vurrently busiest bunkering station in the Mediterranean.



Below: Iranian tanker carrying illegal crude oil to Syria. Help by Gibraltar Authority in 2019.

Above: Shell LNG tanker crossing the Mediterranean sea.





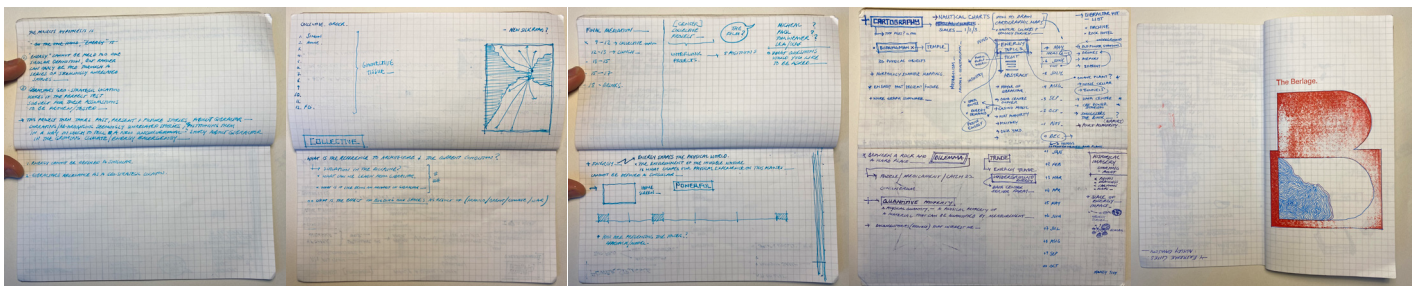






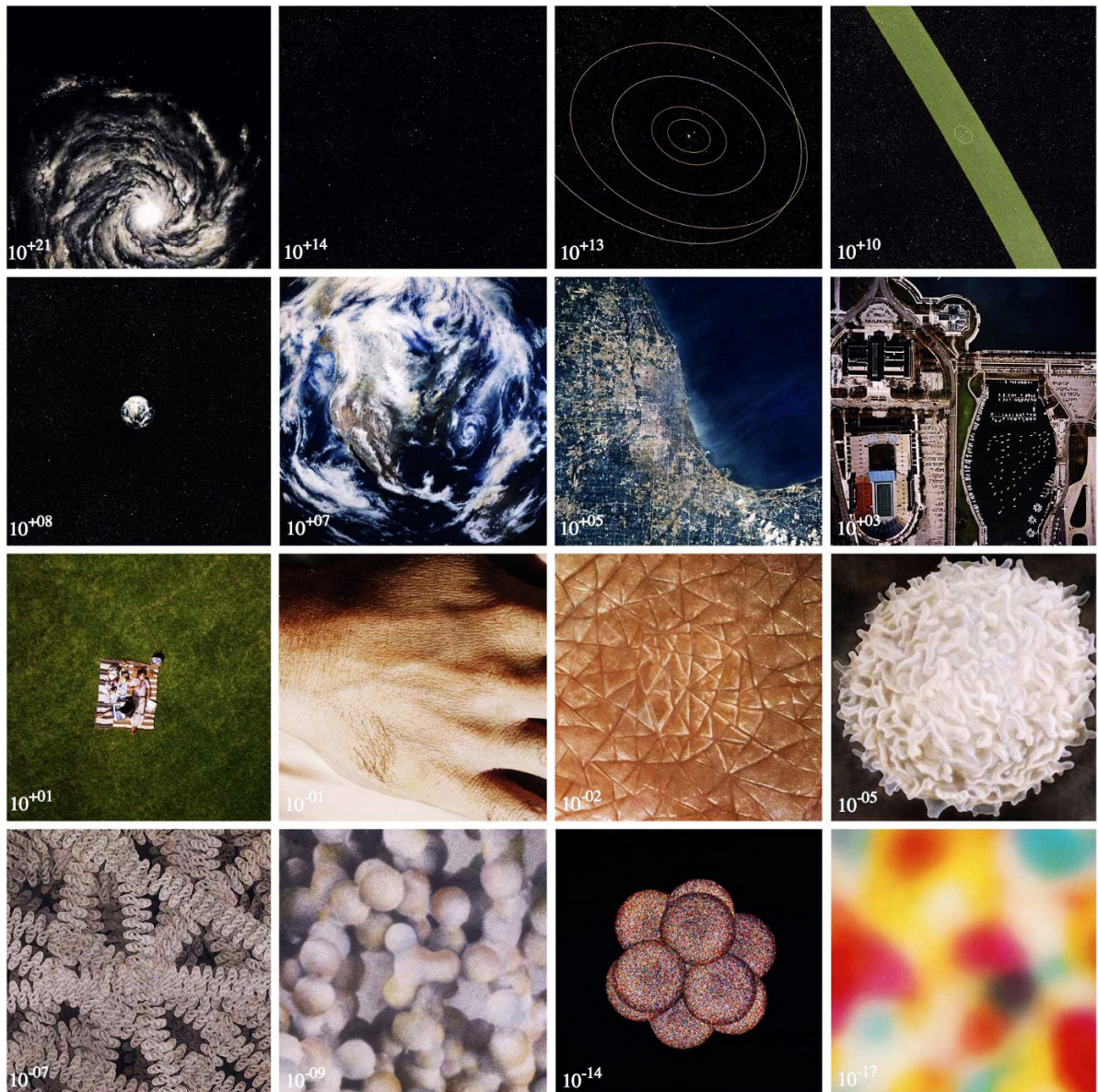






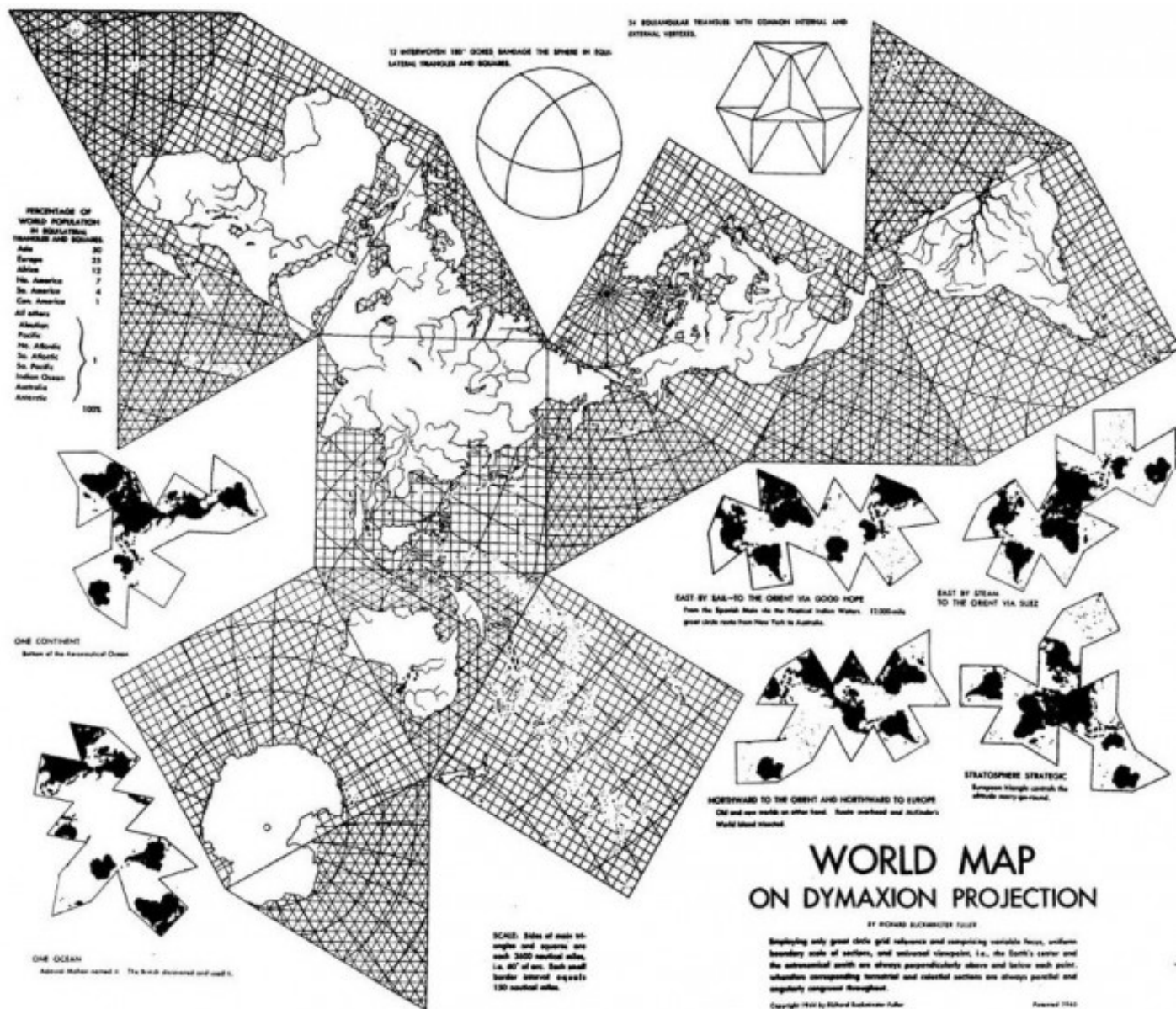
Authors' sketchbook.





Eames film, Powers of Ten, "A Film About the Relative Size of Things and the Effect of Adding a Zero".

The short documentary filmed in 1977, shows the relative proportion of things from a microscopic level to a cosmic level in powers of ten.



Buckminster Fuller's Dymaxion Map An intended global solution to equal and efficient resource distribution.





Armin Linke, *Prospecting Oceans*, (2018).

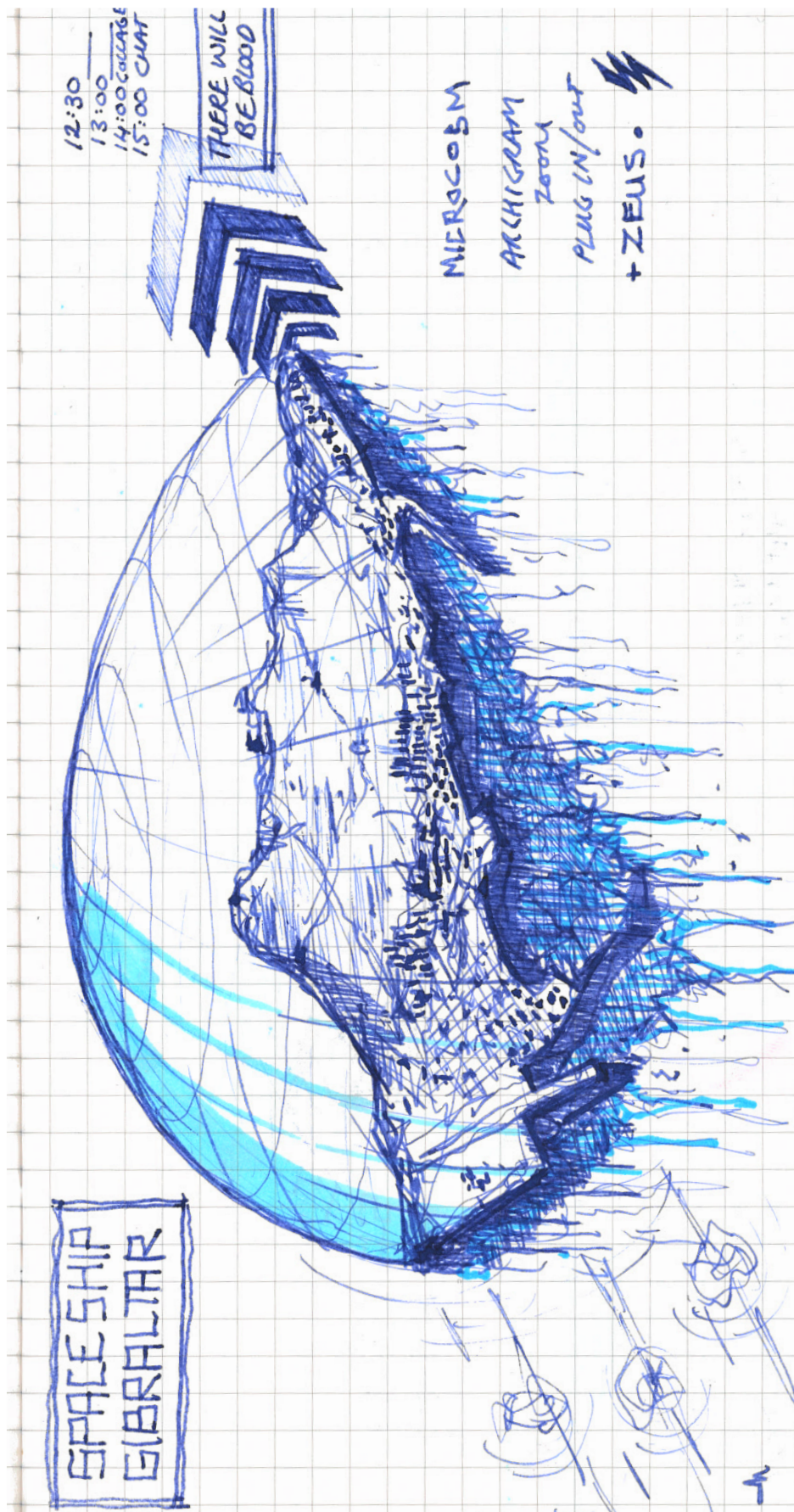
Drawing up rare footage of the deep-sea and interviews with leading scientists, policymakers, legal experts, and activists, the project scrutinizes the aesthetics of technoscientific

apparatuses and grapples with the tension between ecological protection of our oceans and political and economic exploitation.





17 Volcanoes: Works by Franz Wilhelm Junghuhn, Armin Linke, and Bas Princen. Installation view, 2016,



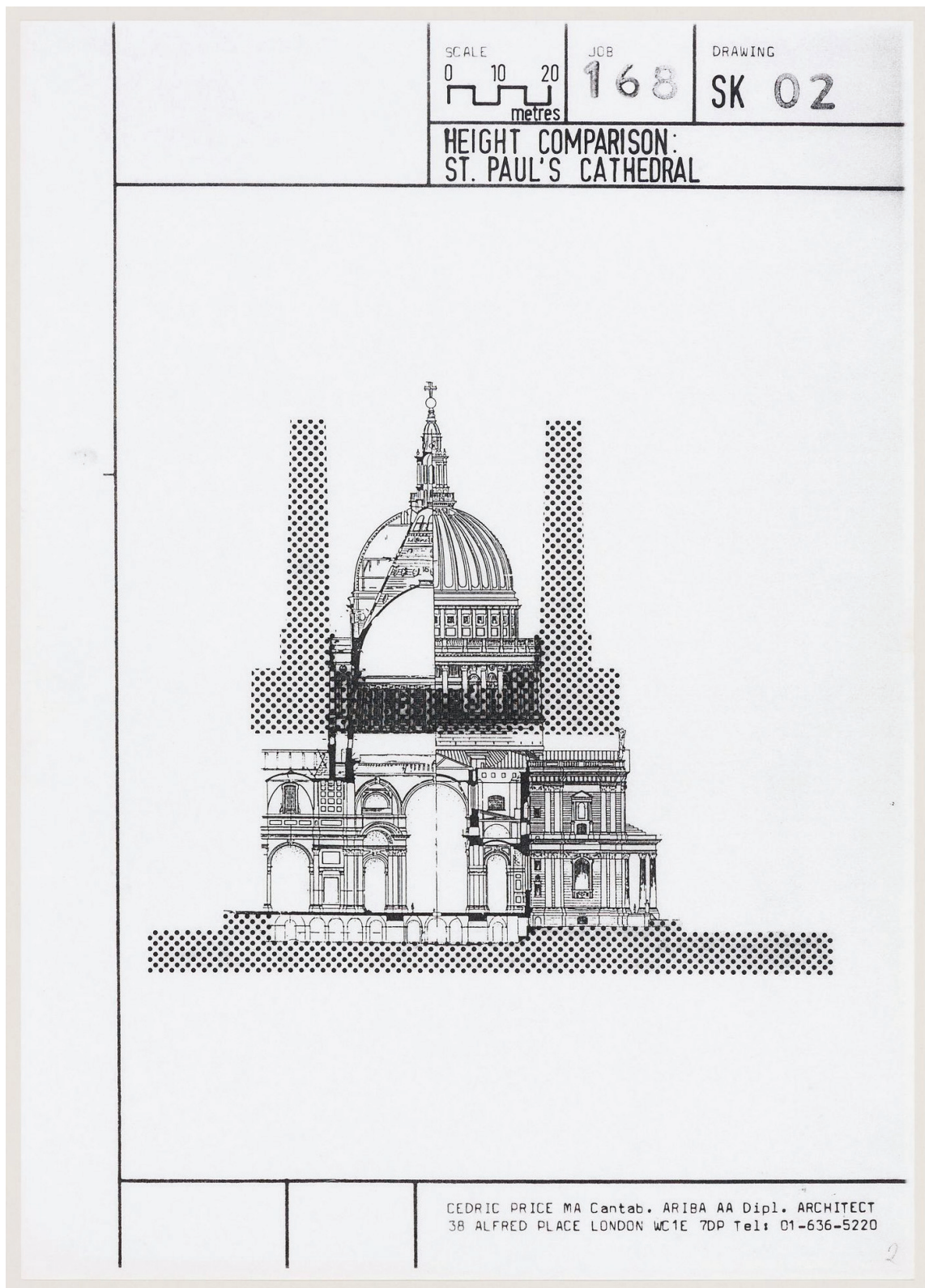
Spacedhip Gibraltar: Sketch by Author.





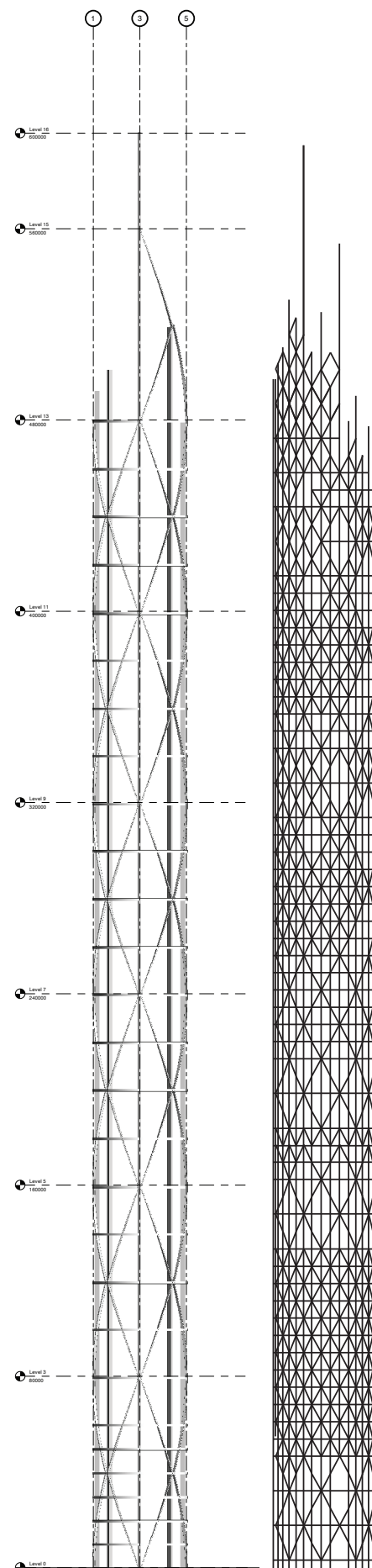
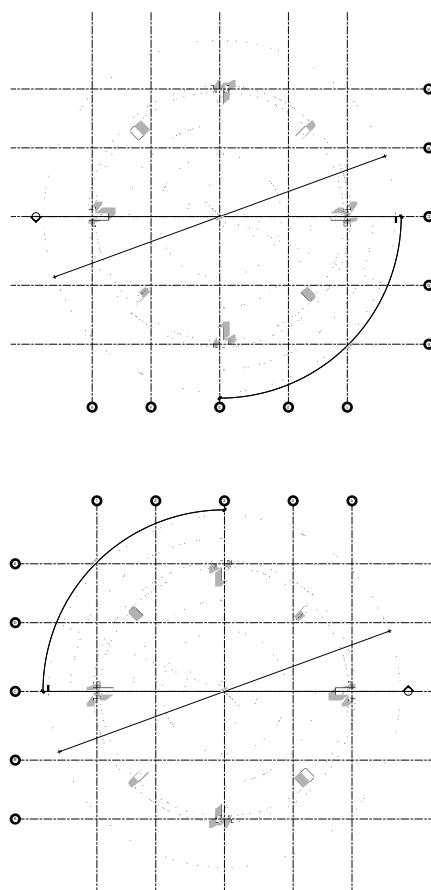
Sketches by Author.





Cedric Price's comparison of the scale difference between St Pauls Cathedral and Battersea Power Station.

Calculations of the potential energy gain from a single energy tower.







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Above: server farms inside the rock

Below: Tunnels inside the rock.





Below: Borders of contention.

Above: Solar Nomad hand print



WWII Calpe Power Station. Position inside the rock, produced enough power to run the whole city during the wars. Photo Newage2

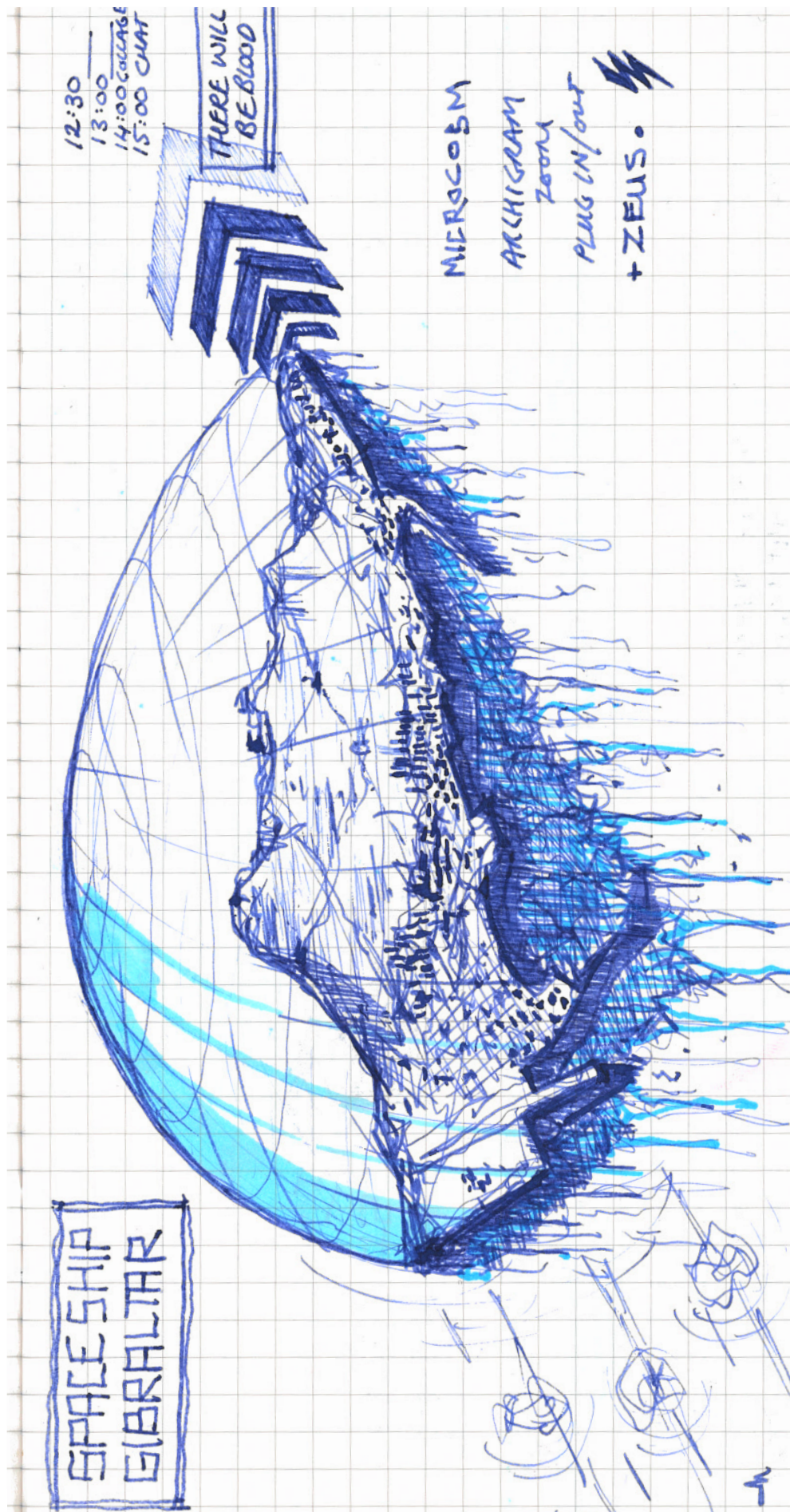




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Abandoned WWII Tunnels that currently used partially for the housing of data centers.





Early sketches: Author

## Description

The age old battle with resources is something that has defined the spatial structuring of human settlements as far back as history can be traced. The access, supply and storage of these resources is something that has dictated the economic success, survival and even extinction of nations.

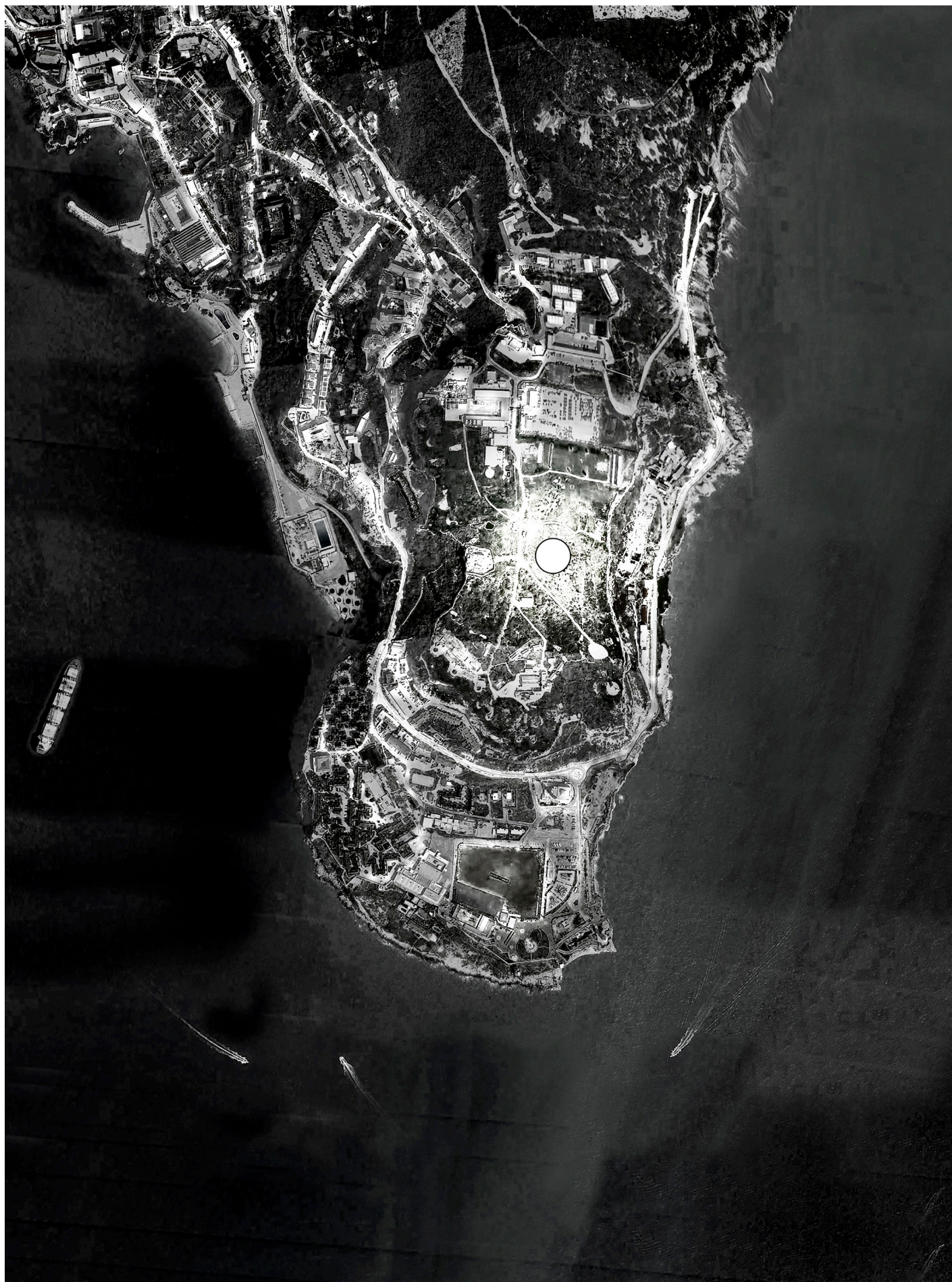
Without direct access to resources, Gibraltars necessity of dependence relies on its tailored relations with outside agents and territories. The project places energy resources as the central theme in a series of research subjects, touching on different anecdotes that each relate to ideas and impacts specific to Gibraltar. In an aim to place Gibraltar in an unconventional light, the project exposes sites and situations commonly invisible or not seen, placing them as points of ordinary interest and comparison. By juxtaposing seemingly unconventional relations between subject matter, the project intends to provoke new possible relations, exposing an unseen narrative for Gibraltar.

Gibraltar is currently the number one marine fuel bunkering supplier in the Mediterranean, what does this mean to be the gas station of the Med?

The rock currently houses over 55km of unused military tunnels, a small percentage of these have been repurposed, one section in particular hosts a 3000m<sup>2</sup> server farm. With growing demands in data farming and storage, can the rocks capacity be exploited further as a global stronghold for digital information?

In highlighting six anecdotes, the research study will spatialize these stories, placing them together in an attempt to tell an untold story about Gibraltar. The intended format also allows new anecdotes to arise during the project and give lead to new fields of research. Gibraltar is hence used as an index and access point into different conversations that apply to multiple global examples of similar conditions.





The tower and the glowing landscape.

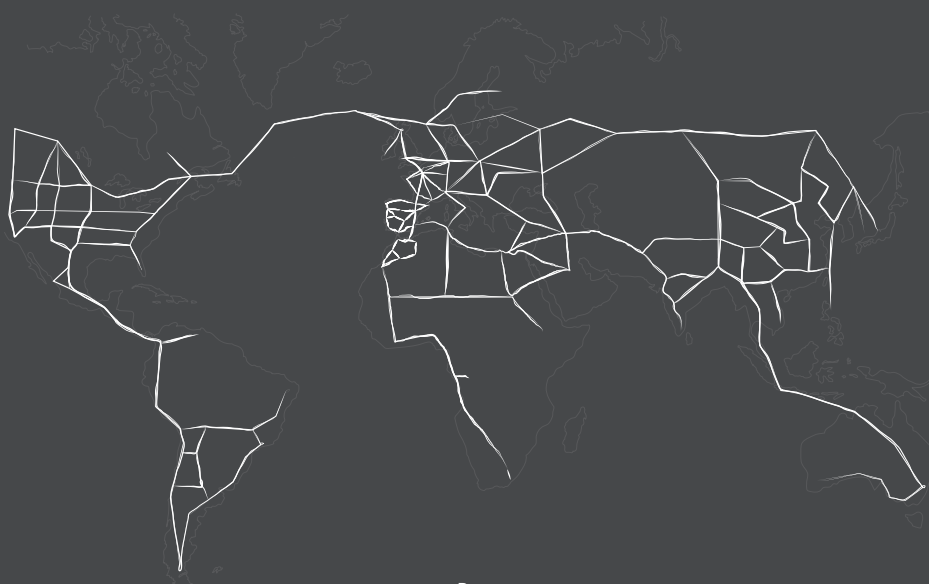




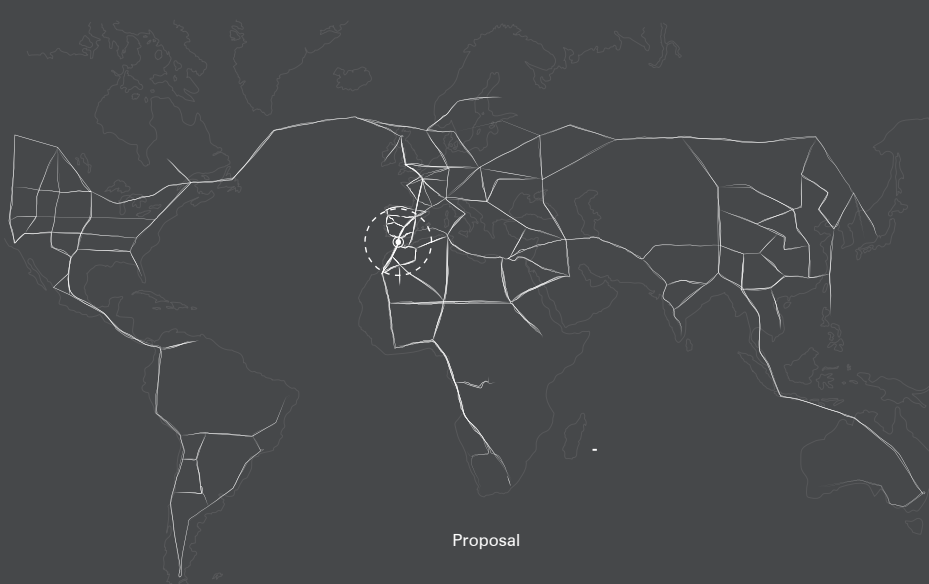
View toward Africa



# 1. GLOBAL NETWORKS

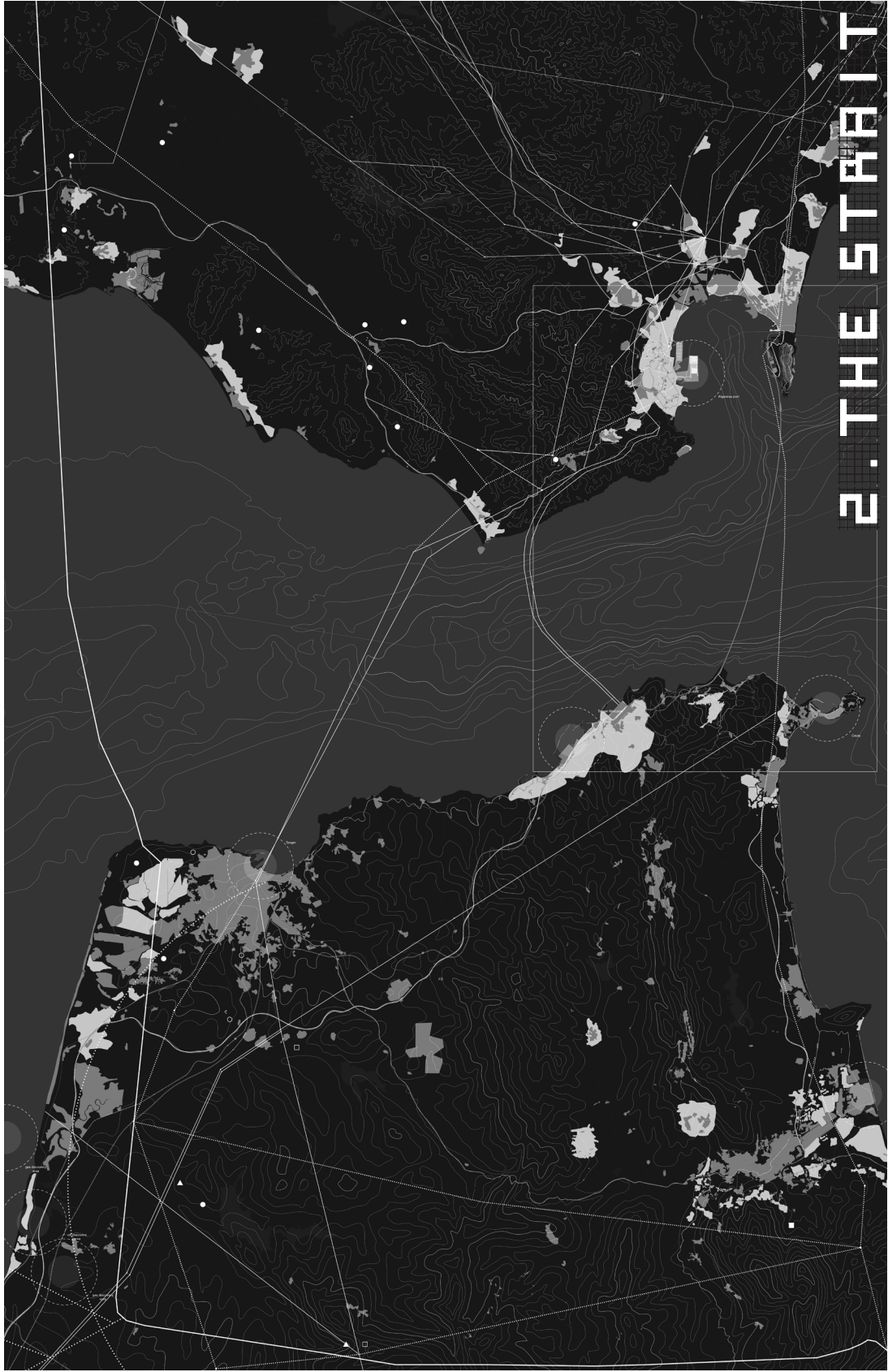


Present

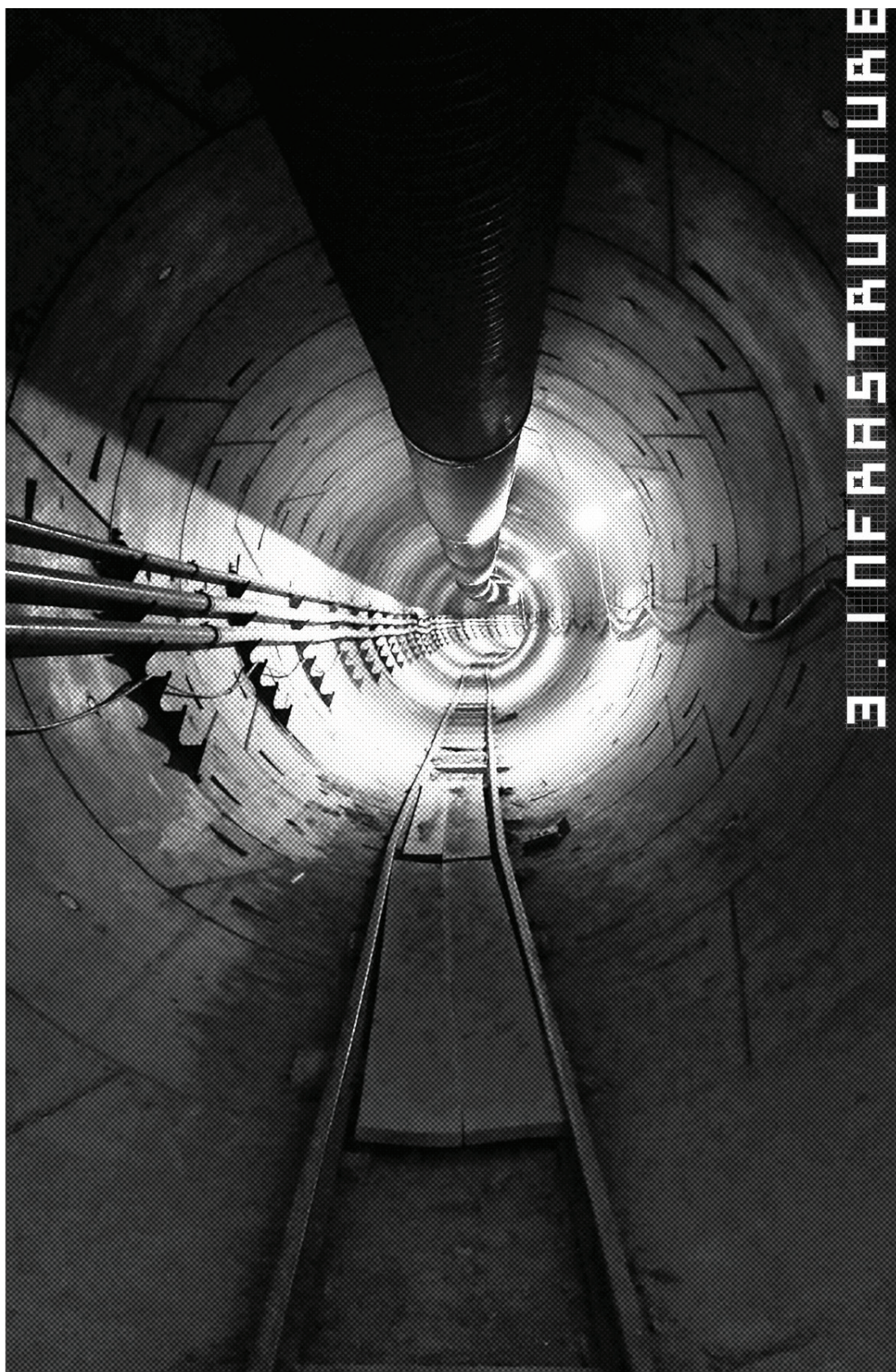


Proposal

The project establishes new connections between old, new and existing energy infrastructure nodes and networks, to harness evolving energy fluxes.







## 3. INFRASTRUCTURE









5. APPLICATIONS





781 SÉNÉGAL. — Chef Indigène et son Griot

504000 41705 7

Forbes, photo, Dakar





*Top*  
Armin Linke Exhibition:  
Anthropocene Observatory

*Bottom*  
Armin Linke, Iron Mountain  
Preservation Facility, Boyers  
(Pennsylvania) USA, 2018

In the case of energy, it is a theme that can be woven into almost any topic of discussion. It is the life force of all forms of economical production and evolution.

While energy is something that can be investigated broadly speaking, from high-tech scientific solutions to quantitative mathematical calculations based on efficiency, its heterogeneity allows for multiple forms of access. The project does not combat or wrestle with the topic of energy specifically, but rather uses it as an entry point into additional situations that hold influence to its effect. In electing to use the channel of speculation, the project picks upon a series of anecdotes that in one way or another link back to the energy situation in Gibraltar. The primary intention of the study is to view the topic of energy in a different light, posing new questions that relate to Gibraltar specifically, whilst also entering into a global debate.

The intended method will make use of traditional and evolving architectural tools, in an attempt to trace the impacts and spatial consequences resulting in the conversation around energy. Cartographic exploration will be used to grater understand local and global fuel supply networks, while three dimensional model scanning techniques will be adopted to understand the cave networks in detail, posing calculated efficient solutions to maximize data framing and storage.

Expanding on the schizophrenic nature of the project, the format will take on multiple different forms of architectural representation. Using traditional and more contemporary mixed media, the final exhibit will display the findings in models, cartographic studies, a short documentary and three dimensional photogrammetry. The intended format also allows new anecdotes to arise during the project and give lead to new fields of research.









Early conception of the project and the idea of the protagonist behind the screen, a work station where everything is somehow interconnected.



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## Afterword: Reflection of Project in Relation to Discourse

The collective project spawned from an onsite reading of Gibraltar as a place that has always been in change. Its geo-strategic locality has shaped its past of many masks, changing political and economical character to fit the needs of its survival. In a way the infrastructural and geopolitical propositions were early grounding points in the discussion of a realistic survival strategy for Gibraltar's sustainable future.

My research contribution stemmed from a personal fascination in geopolitics, energy technologies and the manner in which the spatial consequence these meta-topics might overlap in the architectural discourse, telling this story through the lens of Gibraltar. The power struggle ended up being the challenging relations between architectural design and infrastructural necessity. Projecting into a future which is seeming unknown, one can only use one's thoughts and ideas in precedent examples and conceptual projections.

The final conclusion was one grounded in a rebirth of energy production at the scale of the individual. While cities and nations of the future might need energy infrastructure at a monumental scale, technologies will empower the individual, allowing one to disconnect from a reliance in the grid, hence the rebirth of the solar nomad.





The Berlage Center for  
Advanced Studies in Architecture  
and Urban Design

Faculty of Architecture and  
the Built Environment

Delft University of Technology