COMPARING THE ARCHITECTURE OF INDUSTRIAL TERRITORIALISM:
What is the role of architecture in and beyond a transition to renewable *Energy at the End of the World*?

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I *The Territory and the City*
Introduction

1.1 Deconstructing Research Methodological Awareness

Research-methodological awareness sounds an exceptionally unglamorous concept. The words are long, loaded with meaning and as a united trio seemed (at least to me) somewhat impenetrable.

Deconstruction of the terms may help: 'Research' is sometimes seen to be troubling to the architecture community because of connotations of being backward-looking, of being based upon using past knowledge to build future knowledge. Consequently, there persists a feeling that somehow research is a burden to a practice such as architecture because it undermines unfettered creativity.[1] Yet I do not believe that such pure creativity exists, but rather that research is of vital importance in designing for a future by building upon the past.

The second term ('methodological') is daunting in large part by virtue of its sheer length, with the suffix 'ology' often seen to add a so-called 'meta' layer.[2] Yet the suffix stems from the ancient Greek *lógos*, which merely means 'explanation'- in this case explanation of method.

Lastly, I believe the term 'awareness' to be in general less troubling, but in combination with the other two it perhaps suffers the same fate as 'research': it negates the idea that architectural design is mystical and sacred, but rather suggests that it is an understandable process.

For me the importance of 'research methodological awareness' lies in rephrasing it thus: in seeking to alter the (future) world, we need to understand how past (context, methodology or theory-led[3]) research shaped today's world. This idea was reflected by Jorge Mejia Hernandez who argued that reform is superior to revolution[4]- reform builds on the past; revolution ignores it. I had always instinctively valued the contribution history could make to knowledge.[5] To have this instinct clarified- to have been made *aware* of why explaining the methods used to research the past in order to shape the future is vitally important- has been the single greatest contribution this course has made to me; while Hernandez's and Fransje Hooimeijer's lectures most affected my understanding of epistemology and epistemic framework by drawing attention to the link between invisible processes and architecture.

1.2 The Territory versus the City

As indicated by its title, the Chair of Transitional Territories proposes a territorial approach, viewing the North Sea and coastline at varying scales. An initial collective phase mapped, deconstructed and fictionalised cross-border themes and actors upon the North Sea, during which I spent significant time deconstructing the historical distribution of power and its production using the territorial framework set out by the studio, but then comparing it through time, of which more later. I observed that North Sea power has for centuries been concentrated in cities, which have thrived throughout that history by exploiting the territory around them. The term power turns out to have a double meaning, for one of (if not the) most significant producers of power has been the energy required for society: primarily timber in the pre-industrial age; then coal until around 1950; followed by oil and subsequently gas.

If a transition to a greater (dominant?) focus on renewables occurs, then many professions will have to react. One issue with such a scenario is the frequent (though not universal) unsuitability of current energy infrastructures to aspirations for a renewables-based future. Existing energy

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[1] Venturi frequently attacks this standpoint in his highly influential book, and I quote a short example here to illustrate the point: *'Architects and planners… peevishly denounce the conventional townscape… Cannot the architect and planner, by slight adjustments to the conventional elements of the townscape, existing or proposed, promote significant effects?... The ideas of order and circumstance, conventions and context- of employing standardisation in an unstandard way- apply to our continuing problem of standardisation versus variety.'* See Robert Venturi, *Complexity and Contradiction in Architecture* (New York: The Museum of Modern Art, 1966), 52.

[2] Mark Bevir, 'Meta-Methodology: Clearing the Underbrush', in *The Oxford Handbook of Political Methodology* (Oxford: Oxford University Press, 2008), 48–70.

[3] Ray Lucas discusses how 'a variety of combinations of context, method and theory [led research]… are the fundamental building blocks of any research project, allowing you to determine which aspect is driving your work.' He then provides a brief overview, and later more detailed examples. See Ray Lucas, *Research Methods for Architecture* (London: Laurence King Publishing, 2016), 11–14.

[4] Jorge Mejia Hernandez, 'On Heuristics' (5 September 2019).

[5] Instinct has been argued to be strongly shaped by childhood influences due to neural pathways developing during this time. Genetics also play a role. Therefore my childhood interest in history increases the instinctive appeal of history as a source of knowledge. See Anthony Barnett, 'Instinct', *Daedalus* 92, no. 3 (1963): 570.

infrastructure is focussed on centralised fuel-burning power stations which supply centralised cities through a radial electricity grid, comparable in many ways to Christaller's Central Place Theory.[6] The territory beyond the city is thus increasingly removed from these networks, and energy costs go up- at times resulting in 'fuel poverty', especially on islands at the end of the network.[7] Yet the territories with highest potential to generate renewable energy (which we can term renewably-rich locations) lie at the periphery and are greatly restricted by a lack of cable-capacity and infrastructure. These remote territories harbour a fabled way of life that is slowly being engulfed by the gravitational pull of globalised urbanism. If we make a transition to renewable *Energy at the End of the World* [8] these remote areas may suddenly become crucially important to the globalised world at large. Where fuel extraction is a de-territorialising force, renewable energy could re-territorialise. If we make a significant transition to renewable energy, we must therefore ask what the impact on the territory and the city is. And what is the role of architecture?

II *Natural Experiments of History*
Research-Methodological Discussion for the question: *What is the role of architecture in and beyond a transition to renewable* Energy at the End of the World*?*

2.1 Historical Research

Researching the architecture/infrastructure associated with energy or an energy transition will clearly be context-led, requiring at least a study of type (and in turn typology), and of location.[9] It is easy to believe that such a transition is a primarily technical undertaking: new generating infrastructure developed, new connective infrastructure laid where required, consumer infrastructure adapted, perhaps re-use or recycle outdated energy infrastructure. It is also easy to believe that such a transition takes knowledge acquired in the natural sciences and engineers solutions around this knowledge- leaving little place for the social sciences. Yet Dirk Sijmons challenges these casual notions in his 2014 book *Landscape and Energy*, where he dedicates entire chapters to the need for economic, political and emotional transitions alongside the more traditional Technological Transition.[10] This view is reinforced in Professor Laura Watts' ground-breaking book *Energy at the End of the World* which weaves history, place and community together as central actors to an energy transition already happening on the Orkney Islands.[11] These texts suggest that an energy transition is also of concern to the social sciences, to which I add that a dialogue between natural scientists, engineers and social scientists (including architects) is ultimately needed. I therefore feel justified in asking: what is the role of architecture in and beyond a transition to renewable *Energy at the End of the World*?[12]

Furthermore, the transition in question is crucially different from previous global transitions (i.e. the transition from wood>coal>oil and gas) because it is a transition away from energy storage mediums (fuels) towards an energy transmitting medium (electricity- which requires additional infrastructure).[13] However, there have existed examples of industries and communities which relied upon an energy transmitting medium rather than a fuel: *'Falling water is the oldest source of industrial power other than muscle.'* [14] Such an enhanced connection between industry and territory I term 'industrial territorialism'.

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[6] See Walter Christaller, *Die Zentralen Orte in Süddeutschland* (Jena: Gustav Fischer, 1933).
[7] Laura Watts, *Energy at the End of the World: An Orkney Islands Saga* (Cambridge, MA: The MIT Press, 2018), 53.
[8] Professor Laura Watts' recent ethnographical study of the bottom-up energy futures already being developed on the Orkney archipelago is of central importance to this thesis project both in context and theme. See Watts, *Energy at the End of the World: An Orkney Islands Saga*.
[9] See Lucas, *Research Methods for Architecture*, 11–12.
[10] Dirk Sijmons, *Landscape and Energy: Designing Transition* (Rotterdam: nai0101 publishers, 2014).
[11] Watts' book forms, in the words of VU University's Associate Professor Teun Zuiderent-Jerak, *'almost an entirely new genre'*. See rear-jacket review of Watts, *Energy at the End of the World: An Orkney Islands Saga*.
[12] Such an interdisciplinary field of interest requires an exceptionally diverse knowledge base, and I feel it would be arrogant to assume I can properly harness and control all of the required knowledge without some sort of head start. For my thesis, Professor Watts' ethnographic book is that head start. She has spent a decade researching some of the economic, political and emotional transitions taking place on the Orkney archipelago in the north of Scotland. Her book lends me a framework of actors in an energy transition, allowing me to try to position the role of architecture amongst the array of other actors. See Watts.
[13] There are of course significant efforts being made to increase the efficiency of electrolysing water (ideally seawater) to produce hydrogen and consequently create a clean fuel, but it remains uncertain if the energy cost can be sufficiently lowered. *'Despite enormous research efforts, large-scale energy storage by means of water electrolysis has not been realized yet.'* See Johannes Vos et al., 'MnOx/IrOx as Selective Oxygen Evolution Electrocatalyst in Acidic Chloride Solution', *Journal of the American Chemical Society* 140, no. 32 (July 2018): 10270.
[14] Richard Rhodes, *Energy: A Human History* (New York: Simon & Schuster, Inc., 2018), 185.

Thus, an indication of the role which architecture might play in and beyond an energy transition is perhaps to be found through what David Wang refers to as 'Historical Research'.[15] Indeed, there have been several such examples of water-powered industrial complexes, as well as other industries (such as charcoal burning metal smelters [harnessed locally available timber], or whisky distilleries [harnessed local water and peat supplies]) which are connected primarily to the territory and not to the city. This offers the possibility for comparison.

2.2 The Comparative Method and Natural Experiments

I therefore propose that it is valuable to analyse the context of and the effect on the territory and community of various such projects. I argue that these projects can to an extent be considered 'natural experiments' that occurred according to different industrial and architectural ambitions which can be used as 'inputs' for the experiment. The 'output' that results will be the effect on the territory and on the city, on community, on material flows and on the infrastructure needed to support the harvesting of that energy source for productive industry. Results will be analysed and contrasted in a matrix with the intention of identifying patterns, inconsistencies and points of interest with which to build a design brief.

By seeking to draw connections between input and output functions, I aim to indicate the potential significance of energy harvesting upon architecture, industry and the territory, and in doing so begin to answer heuristically what the role of architecture can/should be in a renewables world. I propose to try to align these results with the research compiled by Laura Watts on the Orkney Islands for an overall picture of the role of architecture in and beyond a transition to renewable energy.

I was inspired to adopt this method by the (I believe brilliant) work of Jared Diamond. Diamond works across an array of disciplines (including geography, history, biology, anthropology and linguistics) and has used the comparative method to approach incredibly complex interdisciplinary questions such as *The Fates of Human Societies* and *How Societies Choose to Fail or Succeed*, with the ultimate aim of the advancement of science.[16] He relies heavily upon the comparative method and in particular *Natural Experiments of History*.[17] His work reflects my interest in interdisciplinary science and the choosing of such a multi-faceted theme for my thesis.

Criticism of the comparative method sometimes takes the attitude that it is generalised and offers inconclusive results. This critique extends to the notion of Natural Experiments: *'While the idea that certain historical situations approximating the tightly controlled conditions of a laboratory experiment is a seductive one, the reality is that such situations are probably quite rare.'* [18]

This is a very important point. When researching using the comparative method, a researcher must therefore cite natural experiments with caution and qualify factors which increase the variables going into the experiment. While this may sit uneasily with the Natural Sciences' love of the laboratory, I suggest that to reject the method out of hand is to reject the possibility of advancing scientific knowledge in complex, interdisciplinary fields by using history. I believe that would be a mistake.

III *Tests in Time*
Research-Methodological Reflection

3.1 Evolution of the Comparative Method and Natural Experiments

Comparison is an age-old analytical tool, though the origins of the comparative method likely lie in theology with the earliest examples seeking to understand the origins of religion.[19] However, it was not until Darwin's *'theory of evolution had supplied the key to the genetic relationships of all living organisms*

[15] See David Wang, 'Historical Research', in *Architectural Research Methods*, 2nd ed. (John Wiley & Sons, Inc., 2013), 173–214.
[16] Jared Diamond, *Guns, Germs and Steel: The Fates of Human Societies* (New York: W. W. Norton & Company, 1997); Jared Diamond, *Collapse: How Societies Choose to Fail or Succeed* (London: Penguin Books, 2011).
[17] Jared Diamond and James Robinson, eds., *Natural Experiments of History* (Massachusetts: Harvard University Press, 2010).
[18] Thomas Currie, 'Tests in Time', *Cliodynamics: The Journal of Theoretical and Mathematical History* 1, no. 1 (2010): 119.
[19] John Irving identifies Charles de Brosses' 1760 work *Du culte des dieux fétiches ou Parallèle de l'ancienne religion de l'Egypte avec la religion actuelle de Nigritie* as a particularly early example of the use of the comparative method. See John Irving, 'The Comparative Method and the Nature of Human Nature', *Philosophy and Phenomenological Research* 9, no. 3 (March 1949): 545.

that the comparative method began to take on a truly scientific and philosophical importance.' [20] Throughout the 19th century, the method was in turn rapidly applied to a wide array of fields by such giants of philosophy and sociology as Karl Marx, Emile Durkheim, Alexis de Tocqueville and Max Weber. Darwin relied heavily on the method for his much less famous *The Expressions of the Emotions in Man and Animals* (1872) and this work, along with John Snow's *On the Mode of Communication of Cholera* (1855) raised the status of so-called 'natural experiments'. Natural experiments are an important research tool for social scientists, as they allow researchers to study phenomena which cannot be replicated in a laboratory. David Freedman defines such experiments as an *'observational study where assignment to treatment or control is as if randomized by nature.*' [21] This is especially relevant when studying either extremely complex natural or historical phenomena.

In 1905, Sir Banister Fletcher employed, for the first time to my knowledge, the comparative method to architecture. *A History of Architecture on the Comparative Method* sought to identify features of specific architectural examples that led to the formation/characterisation of particular styles.[22]

Yet the power of the comparative method really exploded into significance through the 1960s-70s, when it was recognised that the method was especially valuable for undertaking a *'systemic analysis of a small number of cases, or a 'small N'* which severely limit the validity of statistical analysis.[23] Provided the complexity of input variables can be minimised (or at least randomised as in natural experiments), such research can prove extremely valuable- perhaps even more so than more traditional statistical or experimental methods, which in many cases prove unachievable in terms of time, energy or financial resources. In such a scenario, *'the intensive comparative analysis of a few cases may be more promising than a more superficial statistical analysis of many cases.'* [24]

3.2 The Comparative Method as entrance to Interdisciplinary Research

Thus, from theological beginnings, the comparative method has evolved to be of great value to social scientists. It has also become increasingly ambitious in its use, covering broader (often interdisciplinary) topics with the aim of the advancement of science. As mentioned above, I greatly admired Jared Diamond's extensive use of it throughout his work, without which such broad, interdisciplinary topics would (in my view) be unapproachable.[25]

As knowledge expands, and as phenomena appear often increasingly interconnected and thus increasingly complex, I feel that actors engaged in the shaping of the world must seek to transcend their narrow disciplines, and that architects are such actors. Thus, while there is a tendency to view a transition to renewable energy as something new and unheralded, it is vital to remember that there have been moments in history where energy was extremely connected with the territory, and that architecture and community (almost) certainly had a relationship that shaped/reacted to industrial territorialism.[26] This is a complex, interdisciplinary point of research departure, weaving across boundaries of psychology, ethnography, history, the natural sciences and architecture- to which the comparative method is well-suited.

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[20] Irving, 545–46.
[21] David Freedman, *Statistical Models: Theory and Practice* (Cambridge: Cambridge University Press, 2005), 6–9.
[22] Fletcher explains in his Preface how *'for instance, the special character of Gothic architecture becomes manifest when put in comparison with the Classic and Renaissance styles; and furthermore, the shades of difference in the local or national phases of each, can also be equally drawn out by a similar comparative treatment.'* See Banister Fletcher, *A History of Architecture on the Comparative Method* (London: Batsford, 1905), ix.
[23] David Collier, 'The Comparative Method', in *Political Science: The State of the Discipline* (Washington DC: American Political Science Association, 1993), 105.
[24] In 1971 Lijphart argued that *'if at all possible one should generally use the statistical (or perhaps even the experimental) method instead of the weaker comparative method. But often, given the inevitable scarcity of time, energy, and financial resources, the intensive comparative analysis of a few cases may be more promising than a more superficial statistical analysis of many cases.'* See Arend Lijphart, 'Comparative Politics and Comparative Method', *American Political Science Review* 65 (1971): 685.
[25] In the prologue of their book, Diamond and Robinson argue extremely convincingly for the comparative method and its use of natural experiments, which I feel is worth quoting at length: *'The controlled and replicated laboratory experiment, in which the experimenter directly manipulates variables, is often considered the hallmark of the scientific method. It is virtually the only method employed in laboratory physical sciences… Without question, this approach is uniquely powerful in establishing chains of cause and effect. That fact misleads laboratory scientists into looking down on fields of science that cannot employ manipulative experiments. But the cruel reality is that manipulative experiments are impossible in many fields widely admitted to be sciences. That impossibility holds for any science concerned with the past… In addition… manipulative experiments that are possible in the present would often be condemned as immoral and illegal… One therefore has to devise other methods of 'doing science': that is, of observing, describing, and explaining the real world, and of setting the individual explanations within a larger framework.'* See Diamond and Robinson, *Natural Experiments of History*, i.
[26] Benjamin Vis, 'Towards Radical Comparative Urban Studies', in *Cities Made of Boundaries* (UCL Press, 2018), 12–14.

Clarity and rigour are important because ultimately, the study of architectural precedents as a starting point for design is a hugely simplified version of the comparative method. If architects adopt precedents for superficial reasons, then the risk rises of what Michel Foucault terms *'immediate continuity'* [27] and architecture becomes slave to the *Zeitgeist*. This is the lure of Pinterest. Given that fuels have resided at the spirit of virtually all time, this risks pre-determining the role of architecture in a transition to renewable *Energy at the End of the World* by seeking to improve the connection between territory and city.

Instead, by using clear input and output variables for my 'tests in time', and by recognising the necessary inconsistencies in my research method (caused by the need to look at varying periods of history), I believe that an answer to the question 'what is the role of architecture in and beyond a transition to renewable *Energy at the End of the World*?' might be proposed and a valuable design brief for industrial territorialism on the Orkney Islands consequently constructed.

IV *Gravitational and Centrifugal Forces* **Positioning**

4.1 Mapping the Territory versus the City

Elements of city-territory dissonance were discussed by Professor Fransje Hooimeijer in her lecture *on Investigating Territorial Scales* and I found her reference to the Dutch children's book *Torenhoog en mijlen breed* by Tonke Dragt particularly relevant. She described how the story tells of a futuristic world where planet Earth has become one large urban conurbation (the city), but that other planets such as Venus are forested, natural worlds (the territory)- greatly feared by (virtually) all humans on Earth.[28] A comparable future is described in Aldous Huxley's *Brave New World*, which explores the relationship between the urbanised, industrialised 'World State' and the territories of 'Savage Reservations'.[29] In both these examples, the mutual relationship between city and territory is/develops into one of suspicion and indifference to the alternative, incompatible way of life.

Fransje Hooimeijer's lecture addresses these notions of incompatibility and indicated how aspects of the 'natural' territory can be brought into the city, which I think Hooimeijer would agree reflects a rather 'Dutch' model of such relationships. Other models propose inter-city/territorial connectivity as the key issue.[30] In the 1930s, the geographer Walter Christaller developed the aforementioned Central Place Theory, which proposed that a systemic, fractalised pattern of urban development had arisen naturally across the case study of south Germany. Through mapping, Christaller proposed that settlements developed organically according to a triangular/hexagonal lattice upon the territorial surface in order to minimise transportation time between settlements.[31] Subsequent attempts to model city-territory relationships generally focus on the literal connection between the city and its surrounding territory (Hillier and Hanson's mapping and development of Space Syntax Theory[32] or Deleuze and Guattari's concept of the rhizome[33] can also be understood as deriving from this mentality). Globalisation seeks to reduce the space (by reducing time) between important city/territory nodes, which in turn becomes the destruction of the territory: the gravitational pull of the city attracts and engulfs the territory.

Yet I argue that this conclusion is not a Natural Law but rather a result of methodology: the relationship between the territory and the city is often researched at the level of small-scale mapping (i.e. large areas represented by a small map area). This is true both of the novels I have cited (planetary scale and World State/Reservation scale, respectively) and of the theoretical models of Christaller, Hillier

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[27] Alain Findeli translates and quotes Foucault's *L'archeologie du savoir* thus: *'I will only accept those units presented by history to immediately put them under close scrutiny and in doubt; to untie them in order to possibly recompose them more legitimately; to know if one should not reconstruct new ones; to replace them in a more general space and, by erasing their apparent familiarity, to include them within a theory. Once these types of immediate continuity are suspended, a whole domain is indeed liberated.'* See Alain Findeli, 'Design History and Design Studies: Methodological, Epistemological and Pedagogical Inquiry', *Design Issues* 11, no. 1 (Spring 1995): 43–65.

[28] Fransje Hooimeijer, 'On Investigating Territorial Scales' (26 September 2019); Tonke Dragt, *Torenhoog En Mijlen Breed* (Amsterdam: Uitgeverij Leopold BV, 1969).

[29] Aldous Huxley, *Brave New World* (London: Chatto & Windus, 1932).

[30] Benjamin Vis refers to an array of models where *'the relative placement and assessment of the importance of sites within settlement patterns have often been tackled by applying size-rankings and spatial pattern analyses.'* See Vis, 'Towards Radical Comparative Urban Studies', 18.

[31] Christaller, *Die Zentralen Orte in Süddeutschland*.

[32] Bill Hillier and Julienne Hanson, *The Social Logic of Space*, 1st ed. (Cambridge: Cambridge University Press, 1984).

[33] Gilles Deleuze and Félix Guattari, *A Thousand Plateaus: Capitalism and Schizophrenia* (Minneapolis: University of Minnesota Press, 1987).

and Hanson. In tackling such large areas, these works of fiction (can we call these thought experiments?) and of research lean towards the experimental or statistical methods. This is also true of the general approach of the Transitional Territories Studio which, as already mentioned, began by mapping at North Sea scale.

This is not to say that small-scale mapping is wrong or not valuable, and indeed mapping remains an important part of my research. I merely suggest that such mapping alone will often (inevitably?) depict an incompatible dissonance between city and territory, for it depends on abstracting differences in order to map them. Thus, territorial features become abstracted in one direction while city features are abstracted in the other. I argue also that pre-eminence of fuels as an energy source have acted as an inherently de-territorialising force, for fuels can be transported from the territory to the city with minimal infrastructure, This has favoured the growth of cities and the exploitation of the territory, and consequently our reliance on fuels (which continues to this day) has validated the small-scale mapping method set out by the experimental and statistical methods, to the detriment of the territory. Thus, the city has mined the territory.[34]

However, we may (and we certainly seem to aspire to) depend ever more upon renewable energy sources and ever less on fuels. My graduation project assumes that we continue to transition towards a primary energy mix based upon renewable sources. Where fuels are less so, renewable energy generation is inherently more territorial and would require significant infrastructure to de-territorialise it by transporting that electricity from territory to city. Whether we build that infrastructure or how the built environment reacts to such a transition has the potential to significantly alter the status quo relationship between the city and the territory.

4.2 Analysing Symbiosis

I therefore argue that an alternative analytical methodology is and has been worth exploring to compliment/qualify the territorial mapping with which the research began. By moving away from the statistical or experimental methods and instead adopting the comparative method, I have sought to heuristically learn about the role of architecture in a transition to *Energy at the End of the World* through conducting historical research. I identified how from a brief period near the beginning of the industrialised era there arose examples of industrial architecture which were specifically connected with their territory because the energy harnessed could not be conveniently translocated to the nearest city.[35] Prime examples researched and compared from this period include New Lanark Mills, Stanley Mills, a variety of whisky distilleries, Bonawe Ironworks, Carron Ironworks and the Lochaber Smelter. Further industrial examples which have by choice been located in a specific territory (rather than the city) in the more modern world are also studied. Methodologically speaking, I have chosen such a context-led research method because of a desire to engage with very specific territories and to propose a project that is optimistic yet nevertheless anchored in the 'real' world. I argue that despite many of my examples being separated from today's world by time, they are in fact the best 'precedents' for what the role of architecture can be in and beyond a transition to *Energy at the End of the World*. By assembling the results in a matrix, they give an insight into successes and failures of different strategies and relationships between industry, community, territory and the city which can be used to help shape a project brief. There are limited examples of this industrial phenomenon, and the information about each is variable. Thus, the comparative method appears to me essential to construct a dialogue between natural scientists, engineers and social scientists about how an energy transition might (and I believe should) enable the territory to exist in symbiosis with the city - held in place by the centrifugal force of industrial territorialism which counteracts the gravitational pull of globalised urbanism.

[34] Furthermore, while we have access to more data than ever before, data will always be incomplete and can by its sheer quantity be misleading. Resolution of data is also an issue, particularly when moving from such small-scale maps to the scale of architecture. See Vis, 'Towards Radical Comparative Urban Studies', 18.
[35] Rhodes, *Energy: A Human History*, 185.

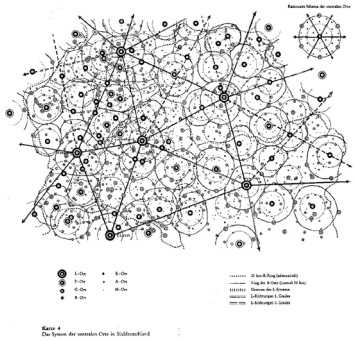

Fig 1: Central Place Theory. The small-scale mapping method used (to great effect) by Christaller places central importance on the literal connection between city and surrounding territory. Globalisation seeks to reduce the space (by reducing time) between important city/territory nodes, which in turn becomes the destruction of the territory. The gravitational pull of the city attracts and engulfs the territory. *Walter Christaller*

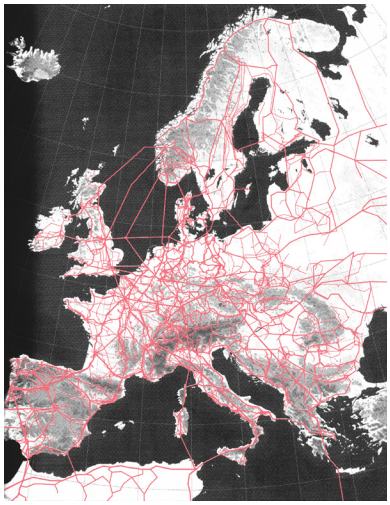

Fig 2: The legacy of energy storage mediums (fuels) and of small-scale mapping such as is seen in Central Place Theory is a continued attempt to centralise all systems, perhaps leading to this proposition for 'Electricity Highways' by 2050. Yet maximum efficiency and the societal value of the remote, energy-rich territory may not best be served by this method- energy transmitting mediums (electricity cables) clearly require significant infrastructure to continue the process of de-territorialisation. Industrial territorialism is one such alternative, and requires an alternative methodology. *Dirk Sijmons*

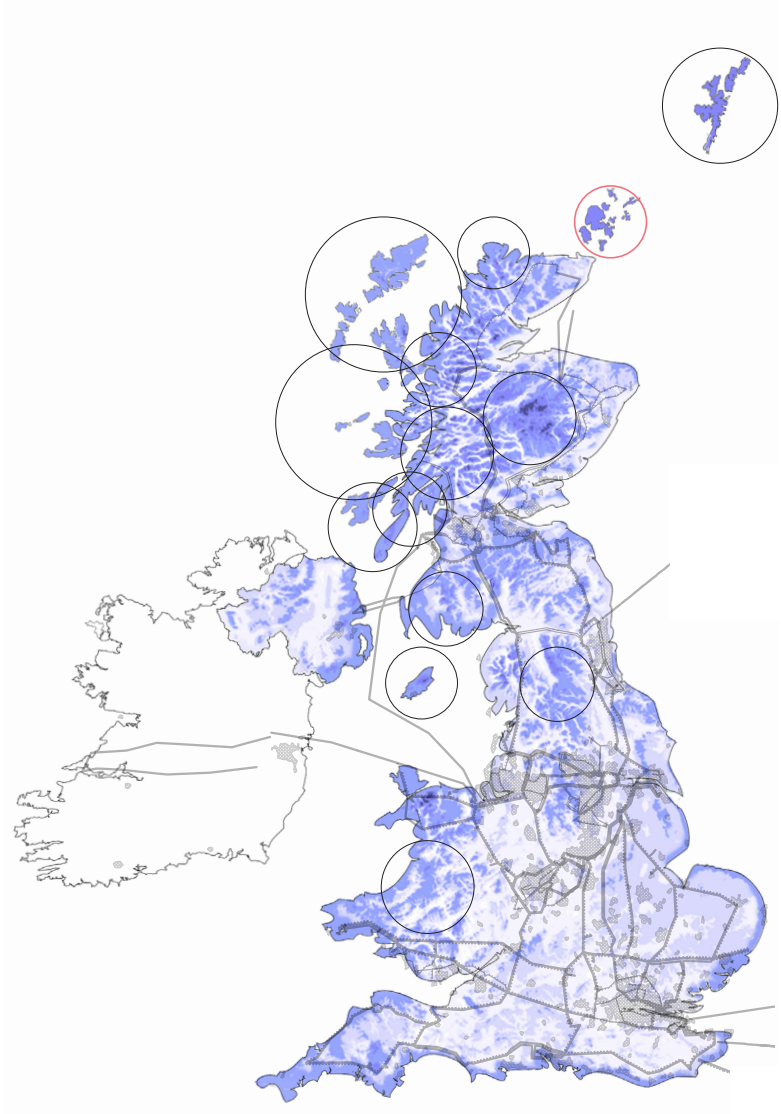

Fig 3: Dissonant mapping small-scale mapping. Urban areas are shown in checked hatch and high voltage electricity grid in grey lines, all overlaid upon a map of average windspeed for the UK (darker blue equals windier). Note the inverse relationship between urbanisation and windspeed, and the consequent disconnect of territories rich in renewable energy from centralised infrastructure. Renewable energy is therefore inherently more territorial. Beyond this scale, I abandon the small-scale mapping method and instead focus on context-led research. What is the impact on the territory and the city? In doing so, I seek to answer the following question: What is the role of architecture in a transition to *Energy at the End of the World*?

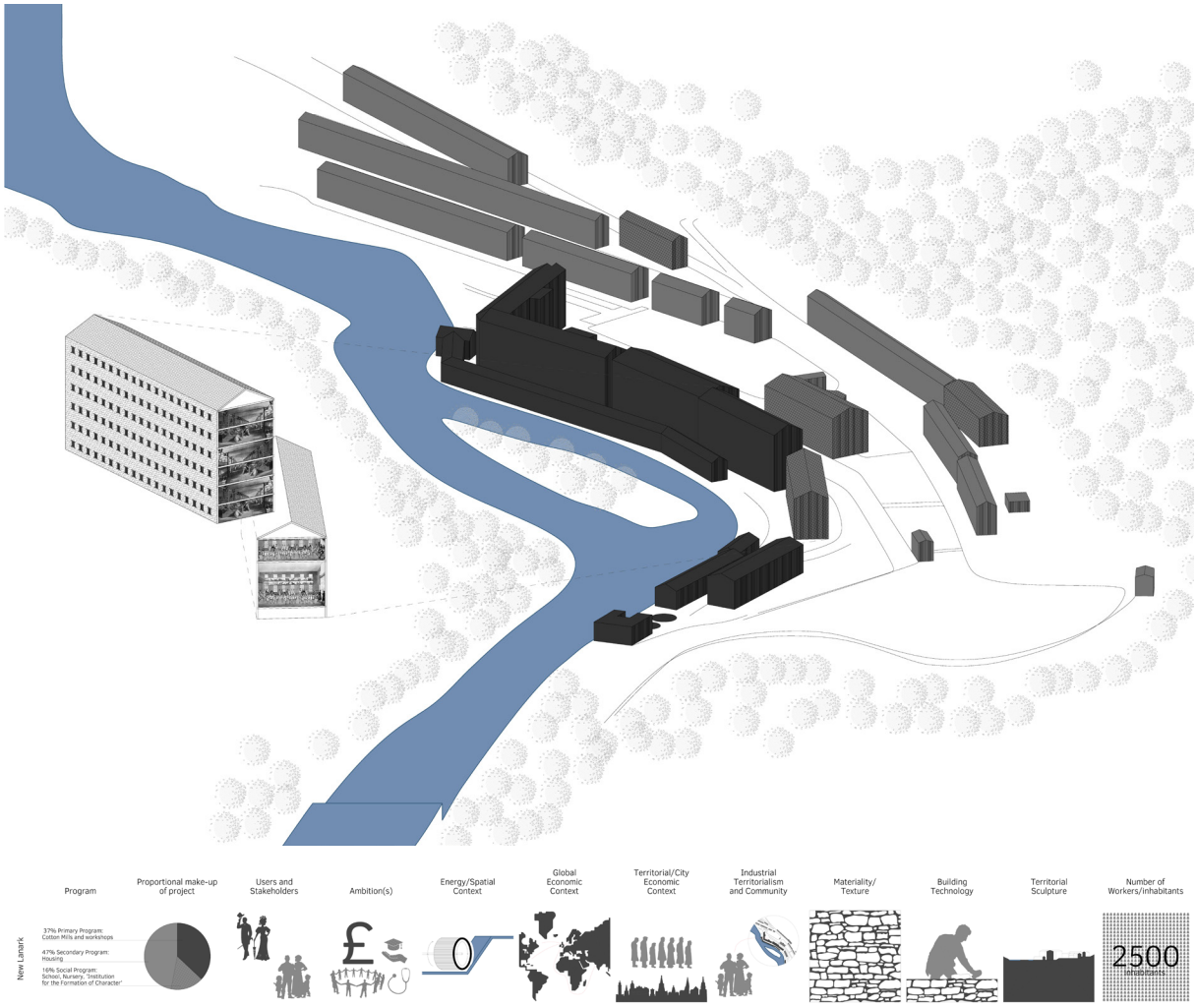

Fig 4: New Lanark Mills, Scotland (1786-1968) is a prime example of an architecture of industrial territorialism. Built to take advantage of the ony waterfall on the River Clyde to power the cotton mills, the project formed a village complete with workplace, housing, school, nursery, shop and was developed with a strong social agenda and territorial community in mind. By drawing components of the project and then contrasting these with other researched examples, a catalogue of successful and unsuccessful industrial territorialism is assembled. The assemblage of all projects forms a matrix which allows patterns to emerge as moments of inspiration (or not) from which to begin to construct a design brief for industrial territorialism in locations where there exists *Energy at the End of the World* but limited infrastructure.

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