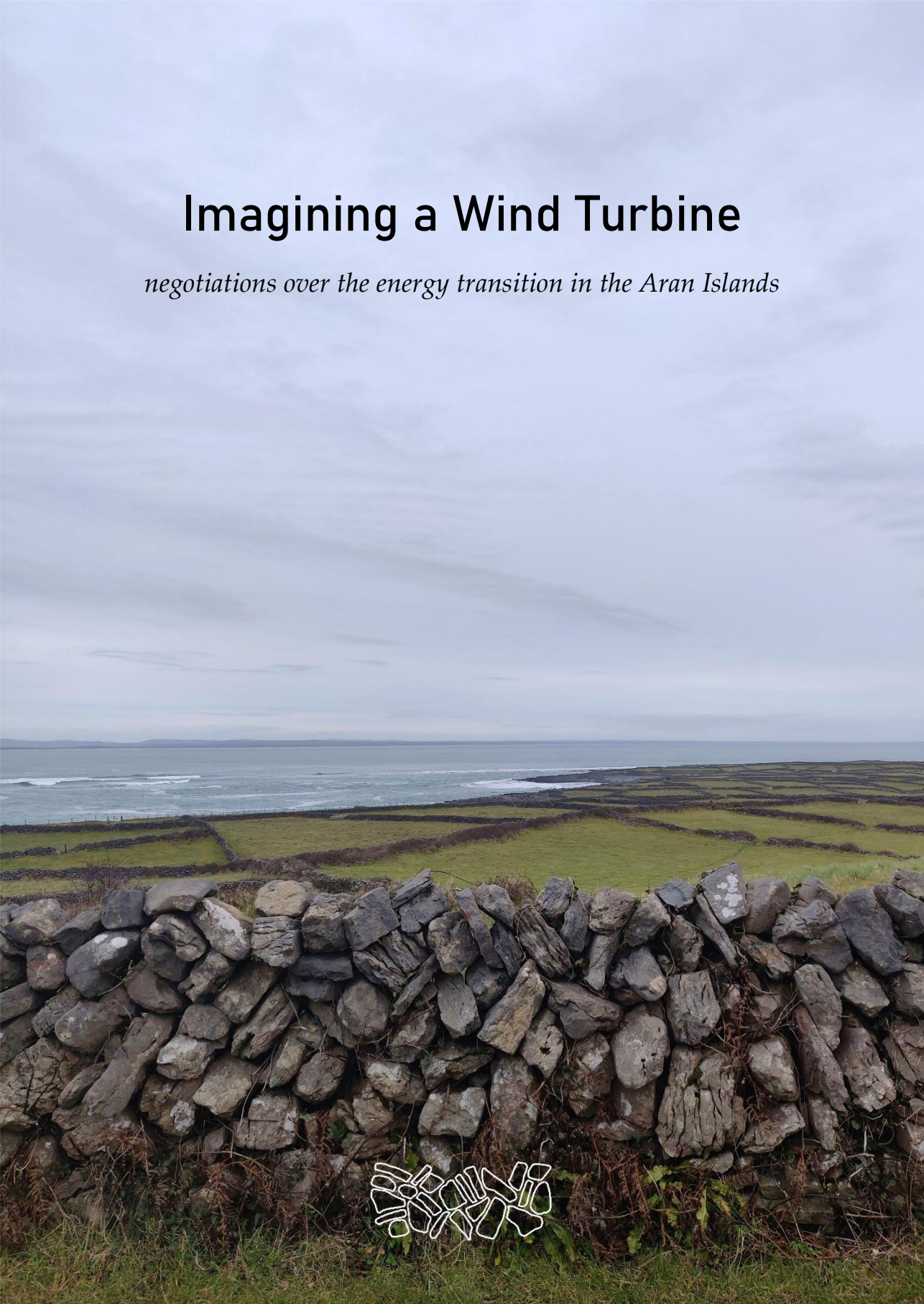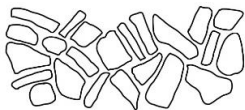# Imagining a Wind Turbine

negotiations over the energy transition in the Aran Islands

Imagining a Wind Turbine

Negotiations over the Energy Transition in the Aran Islands

Master's thesis MSc Cultural Anthropology: Sustainable Citizenship
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Abstract

This thesis investigates the envisioning and negotiation of the community-led energy transition on the Aran Islands, an Irish island group, through a combination of theoretical concepts and ethnographic fieldwork. It investigates the energy transition as a negotiation over energy infrastructure between people, institutions, technology, and the environment. It approaches infrastructure as embedded: "sunk into and inside of other structures, social arrangements, and technologies" (Star 1999, 381). Using an Actor Network Theory-informed approach, this thesis investigates the assemblage of connections that surround the islands' energy infrastructure, and actants that have agency within it. A key actant in this study was CFOAT, a local community energy project that works on the islands' energy transition. They envision that the production of renewable electricity locally, if community-owned, can increase the self-sufficiency of the islands in terms of energy autonomy and self-reliance of the island community. They are currently working on a wind turbine proposal. The four chapters of this thesis shed light on different aspects to be negotiated in the energy transition and in the wind turbine proposal specifically. Next to human actants, these also include non-human ones, like the material possibilities of infrastructure, wind, and policy frameworks. The thesis so attempts to capture intricate and complex aspects of the assemblage - whether already materialized or imagined.

Key words: *infrastructure, energy transition, islands, community energy projects, Actor-Network Theory, wind turbine*.

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Preface

This story begins at the end. On the 16th of March, early on a Monday afternoon, I went to the island's camping site. I was meeting Sara, the sociable and upbeat young manager of the campsite, who had invited me for a coffee and a tour to show their repurposed sea container-pods, solar panels, and other eco-friendly initiatives. I hoped this meeting would offer some insights into ongoing initiatives for the energy transition in the Aran Islands.

But when I arrived at the campsite, the atmosphere was tense. Sara and the campsite's summer volunteers were scrambling to pack up their belongings and close the campsite for the foreseeable future. "If you want to go home anytime the coming weeks, you have to leave the island today," she told me. The new coronavirus had recently 'arrived' in Ireland and while the extent of upcoming government measures were unclear at this point, people were preparing themselves. Rumours were going around that the island would go on lockdown. I called John, chairperson of Comharchumann Fuinnimh Oileáin Árann Teoranta (or: the Aran Islands Renewable Energy Co-operative, hereafter referred to as CFOAT) and one of my key research collaborators, and asked him for a second opinion. To my despair, he confirmed the rumours. It was not only the talk of the stopping of ferries to the mainland, but also of international flights being cancelled. It must have been about half past one when I got on my bike to race home, with the 'last' ferry leaving at five.[1] Factoring in the half-hour ride through a sudden downpour, this left me three hours to discuss the situation with those 'back home', clear out my room, pack my bag, change my flight, book a hotel in Galway, and book a bus to Dublin Airport the next day. My host (who was not on the island at the time) arranged a ride with our downhill neighbour and off I went.

This was not what I came here for. I came to the Aran Islands to study mobilization for their community-owned energy co-operative, focused on making the islands energy self-sufficient. CFOAT was about to embark on undoubtedly its biggest project: a wind turbine. Before anything else, they wanted to gauge support for the idea, starting with a Public Meeting outlining their proposal. But I could not be there for it – and, in fact, the Public Meeting would not happen anytime soon, as government measures to fight the spread of the coronavirus prohibited any public gatherings.

As the days and weeks back in the Netherlands passed, it became clear that I would not return to Árainn – at least not within the timeframe set for this thesis. At the time, I was reading Laura Watts' *Energy at the End of the World – An Orkney Islands Saga*, a book full of negotiations over renewable energy technologies and the marine energy

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[1] This was not the last ferry. The ferries later switched to an adjusted schedule, and restricted their accessibility.

sector in the Orkney Islands (2018). It was a source of recognition and inspiration during my time on Árainn and during my writing process. It made me realize I left the field with a depth of stories and insights on topics surrounding CFOAT's work. Stories of infrastructure and its breakdown, of storm and the influence of wind on Aran's landscape, and of the islanders' relationship with nature. These led to insight into what limits and what facilitates CFOAT's push for the energy transition, and what would influence the wind turbine's acceptance by islanders, stakeholders, and policymakers (should the project ever come that far). All that I learned connected together through the idea of the embeddedness of infrastructure: infrastructure is tied, in intricate ways, to technologies, social arrangements, and other infrastructures (Star 1999). On Aran, energy infrastructure is tied through the suspended electrical cables than span the fields and the cargo boat that sails the ocean to wider social, institutional, technological and environmental realities.

What you are about to read could not have been written without the input from my research participants. I felt very welcome among CFOAT board members and employees. They are always happy to facilitate students: they see it as an investment in the future. I am very grateful for their openness and willingness to sit down with me for several interviews (thank you, Vera, Nancy, Linda, Peter, and John), to give me access to minutes from past meetings, and for allowing me to sit in on board meetings (even those that took place online after I left the island). Through them, I also got to know Molly, my host, yoga teacher, friend, and manager of the Hill Farm, the house we lived in that is also a centre for Celtic spirituality, culture and the arts. It was a very comfortable place to live, a house with many rooms, a big vegetable garden, and beautiful views of the bay - a very nice basis from which to conduct my research. It was filled with nice food, good conversations, and lovely pets that I still miss to this day (you can spot Cliodhna, the dog, on page xi). I am also very grateful for the brief, pub-born friendships that were a welcome source of entertainment during my fieldwork, helped expand my network, and were a great insight into life on Árainn.

Furthermore, this thesis would not exist without my academic as well as social support system back home. This includes family, friends, and my boyfriend, who provided continuous support during my time in the field, after my early return and throughout the writing process. Dr. Nikkie Wiegink was an amazing supervisor and helped me reflect on and adjust my research focus, shed light on my findings through a fitting theoretical framework, crystallize my argument, and improve the legibility of it all. Finally, I would like to thank John for reading through my full thesis and providing valuable insights that clarified my findings, and my friend Lauren for proofreading this work and giving me confidence in my grasp of the English language.

Introduction

> *"This is an opportunity we must grab while we have it. All this energy, wind, wave and light, is available to us locally, and if we can harness it for our own community needs we will create a citizen's revolution where power reverts to the locality and is taken away from the big corporations. In the process, we will create sustainable communities, clean up our planet and stem climate change"*
> – CFOAT website, 2019

Islands have a unique position within the global climate crisis debate: they are "the planet's barometers of change, litmus tests, and canaries in a coal mine" (Lazrus 2012, 287). Many small islands and archipelagos around the globe already experience the effects of climate change. Sea level rise poses the direct threat of submersion to low-lying island nations, while other threats include frequent extreme weather circumstances and the destruction of ecosystems (Kuang et al. 2016).

However, islands also have a unique position in showcasing responses to the climate crisis. Multiple coordinated partnerships have been set up,[2] and examples of actions range from adaptation to rising sea levels and changing weather (see Mcleod et al. 2019) to taking an exemplary role in switching to a renewable energy supply.[3]

Yet, climate change might not be the only concern involved in the wish to move to a renewable energy supply. Many islands' electricity supplies are entirely dependent on generators that run on imported fossil fuels. Other energy needs, like fuels for transport and heating, usually have to be imported too. These imported fuels can be three to four times more expensive than on the mainland, and make islands vulnerable to price fluctuation and supply issues (Kuang et al. 2016). Meanwhile, islands are often naturally blessed with more than one locally available renewable energy source, like wind, solar, and marine energy (ibid.). Establishing a renewable energy supply that is (partly) owned by the island community may result in a series of benefits, including control over energy supply and cost, financial revenues, increased resilience, and increased community spirit and empowerment (Haggett & Aitken 2015).

Such community energy projects (hereafter referred to as CEP or CEPs) are increasingly being encouraged in energy policies of many European countries. The Clean Energy for EU Islands Secretariat sees islands as a specific actor in the energy

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[2] Examples include the UN conferences on Small Island Developing States (first meeting in 1994), the Global Renewable Energy Island Network (established in 2014 by the International Renewable Energy Agency), the Global Island Partnership (est. 2006), and the Caribbean Community's Regional Framework for Achieving Development Resilient to Climate Change (est. 2009).

[3] See also the SIDS Lighthouses Initiative by the International Renewable Energy Agency, via https://islands.irena.org/

transition because of their high potential for a community-driven transition within an isolatable grid (Castanié in Gash 2019; De Clerq et al. 2019). Indeed, a handful of islands and archipelagos already show the potential of CEPs for the island context: e.g. Samsø (Denmark), the Isle of Eigg and the Orkney Islands (Scotland) all get energy from community-owned wind-, solar-, or hydroelectric installations.

Being at the mercy of natural elements (wind, storms, and sea) is a reality of life in small islands (Péron 2004). The geographically peripheral Aran Islands, off the west coast of Ireland, lay exposed to the elements, most notably the strong winds blowing in from the Atlantic Ocean. Aran's infrastructures are vulnerable and dependent: links to the mainland can break or experience interruptions (e.g. during heavy storms), and all energy sources are transported through such links (e.g. fuels on the cargo boat, electricity through a subsea cable). Energy infrastructure, like all infrastructure, is embedded: "sunk into and inside of other structures, social arrangements, and technologies" (Star 1999, 381). Breakdown makes the infrastructure, and all that it stands in relation to, more visible (ibid.), and this "visibility of what would be hidden elsewhere (…) creates a particular relationship with that infrastructure" (Watts 2018, 76).

This thesis focuses on these Irish islands, where a group of locals set up the country's first community-owned energy co-operative, CFOAT.[4,5] Since their start in 2012, CFOAT has worked on many different projects, like the insulation of houses, promoting the use of electric vehicles, and most notably the proposal for a wind turbine, for which a public consultation campaign will commence shortly. Their mission is twofold: firstly, to make the islands energy self-sufficient through the use of renewable energy technologies. Secondly, the Aran Islands, like islands across Ireland, deal with issues of population decline and limited services (e.g. education, health, transport).[6] CFOAT hopes to strengthen the community's position through economic and social benefits from their projects.

This thesis shows the embeddedness of infrastructure in the context of the community-owned energy transition on the Aran Islands. In this transition, the environment of the islands provides opportunities, e.g. through a high quality wind resource. At the same time, islanders have to negotiate the suitability of renewable technologies for their context (e.g. from a cultural and technological perspective). In their bottom-up organisation for the energy transition, CFOAT encounters questions

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[4] CFOAT is used here (and among those involved) to refer to Comharchumann Fuinnimh Oileáin Árann Teoranta (Aran Islands Renewable Energy Co-operative). It is pronounced *see-foat*.

[5] John, email contact, 8 August 2020

[6] Interview with John, 10 February 2020, John's house; Interview with Peter, 4 March 2020, Peter's kitchen; and echoed by Comhdháil Oileáin na hÉireann, or: the Irish Islands Federation http://oileain.net/

of e.g. policy support, financial support, and local support. This thesis analyses such negotiations, most elaborately in light of the wind turbine proposal: a case study that shows the embeddedness of infrastructure and its influence on the work of CFOAT.

Ultimately, the question this thesis seeks to answer is: *how is infrastructural change for the energy transition envisioned and negotiated on the Aran Islands?* This thesis argues that the energy transition is a negotiation over infrastructure between people, institutions, technology, and the environment (most notably here: the landscape and geophysical forces). Using an Actor-Network Theory (ANT) informed approach, I utilize the visibility of an island's connectedness to tease out those connections that make up an assemblage, that I call the Aran Islands' Energy Infrastructure Network.

In its in-depth analysis of an Irish island group's CEP this thesis fills an empirical gap, as few studies focus on CEPs in Ireland (see Heaslip et al. 2016; Walsh 2016), and few studies focus on island CEPs specifically. Secondly, studying an island CEP ethnographically fills a methodological gap within CEP literature. Furthermore, using ANT to examine connections and actants in community-driven energy transitions is a novel approach (see Van der Waal et al. 2018; Vallecha & Bhola 2019), in which this thesis presents a new country and setting.

The embeddedness of infrastructure

> *"The contemporary dynamics of energy and environment cannot be captured without understanding how human aspirations for energy articulate with or against nonhuman beings, technomaterial objects, and the geophysical forces that are at the center of wind power"*
> - Howe & Boyer in joint preface to Howe 2019, xiii

The energy transition is fundamentally an infrastructural project. Infrastructures, in a narrow explanation, are "material forms that allow for the possibility of exchange over space" (Larkin 2013, 327). However, they are much more than just these material or technical aspects. Appel, Anand and Gupta point out infrastructure entails "dense social, material, aesthetic, and political formations that are critical both to differentiated experiences of everyday life and to expectations of the future" (2018, 3). Di Nunzio adds the notion of 'practices' to establish a definition that rings less passive: he sees infrastructure as "that assemblage of people, objects, practices and institutions on which both the realization and distribution of patterns of connectivity, movement, flow and presence are dependent" (2018, 2). I would like to add to that definition the aspects of narratives and the non-human that Murphy brings forward in her definition of infrastructure as "spatial arrangements of relationships that draw humans, things,

words, and nonhumans into patterned conjunctures" (2016, 104) – as these have proven to be very relevant in the energy transition on the Aran Islands.

The above-mentioned definitions establish infrastructure as a "fundamentally relational concept" (Star 1999, 380), reaching much further than its material aspects. This is captured in the 'embeddedness of infrastructure', the main theoretical concept that will be used in this thesis. Coining the term, Star recognizes that "infrastructure is sunk into and inside of other structures, social arrangements, and technologies" (ibid., 381). She further emphasizes that breakdown makes infrastructure visible, which can be "the basis for a much more detailed understanding of the relational nature of infrastructure" (ibid., 382). The Aran Island's electricity grid and energy supply chains, that are prone to interruptions, thus provide a good basis to study the embeddedness of infrastructure through the visibility of the infrastructure's connections. To capture such a complex network, and focus on the relations within it, I use an Actor-Network Theory (ANT) approach to study the embeddedness of Aran's energy infrastructure and its transition.

ANT has its roots in science and technology studies, and can be used as a tool to analyse a range of aspects like "built things, knowledge things, or people things (…) all together as disparate elements of a single system" (Larkin 2013, 329). ANT, which is not really a theory (Mol, 2010) but rather "a way of thoroughly exploring the relational ties within a network" (Dorsey & Collier 2018, 101), takes a material-semiotic approach (ibid.). It sees networks not as technical, mathematical, or geographical entities but rather as made up of associations and connections (that do not have to be either social or natural or technical) (Latour, 1996).

In ANT "actors are condensed bits of a network; networks are fashioned through the interactions of actors" (Latour 1996, 164). Latour, one of ANT's founding fathers, "presumes that everything and everyone is profoundly relational" (Gershon 2010, 163). Indeed, "arguably the most controversial, even infamous, proposition of ANT" (Baiocchi, Grayxbord & Rodríguez-Muñiz 2013, 327) is that everything has agency. In this critique of the separation between the human 'social' and non-human 'natural' world of objects in modern knowledge (Nimmo 2011), ANT emphasizes the "inseparability of humans and nonhumans [e.g. objects, technologies, things, ideas, animals]" (Nimmo 2011, 116). 'Actor' could also be termed 'actant' (Gershon 2010). Actants have agentive and productive power and can interact and influence each other in an assemblage (MacLeod et al. 2019): non-humans "might authorize, allow, afford, encourage, permit, suggest, influence, block, render possible, forbid, and so on" (Latour 2005, 72). ANT's 'symmetrical' approach to studying humans and non-humans means they are treated in the same terms (Nimmo 2011), while not assuming their

agency functions identically (MacLeod et al. 2019): ANT can make their power relations visible (Gershon 2010).

This approach to the energy infrastructure allows me to tease out some of the connections between people, institutions, technology and environment in the negotiation over the energy transition in the Aran Islands. The assemblage that emerges, a network of connections, will be referred to as the Energy Infrastructure Network in this thesis. My description of this assemblage cannot be exhaustive – because of limits to my time in the field and limits in what I can describe in this thesis, but more importantly because according to Latour "a network has no outside" and "the only question one may ask is whether or not a connection is established between two elements" (1996, 372).

An ANT-informed approach helps my analysis of the negotiation of energy infrastructure on the Aran Islands in several ways. It sheds light on the 'mundane' in everyday energy practices and the work towards desired energy futures. It looks at more negotiations than just those over cables and fuels, while simultaneously pointing out that this "matter really matters" (Gershon 2010, 165). ANT allows for a recognition of limiting and permitting factors in historical, material and social sense, and through policy frameworks. Moreover, ANT's openness to agency and material qualities of objects, things, and non-human actants allows for an in-depth analysis of wind and landscape, important actants in the Energy Infrastructure Network.

The research

Latour states that "the scale [of the network], that is, the type, number and topography of connections, is left to the actors themselves" (Latour 1996, 371). Methodologically, ANT-informed research involves 'following the actors' (Dolwick 2009) and "exploring and 'unravelling' agentic elements" (MacLeod et al. 2019, 181). The researcher must recognize the importance of a particular actant – which can then be analysed in-depth. ANT-informed research involves identifying: "what actors were assembled together, what actions were involved, what objects were making their presence known, and being mobilised, and which facts were being disputed" (Dolwick 2009, 41).

Ethnography is a 'natural' method for this type of iterative-inductive (O'Reilly 2012) and, frankly, 'messy' research that relies on interpretative skills of the researcher (Nimmo 2011). The most fundamental commonality between ANT and ethnography is a focus on practices: "everyday sayings, doings, and relations with objects that make up what people do in their everyday lives" (MacLeod et al. 2019, 180). Ethnography and ANT share the belief that "practices are inherently contingent, materially

mediated, and (…) cannot be understood without reference to a specific place, time, and concrete historical context" (Nicolini 2009, 1394).

The embeddedness of infrastructure became clear to me during a 6-week period spent on Árainn, the largest of the Aran Islands, in February and March 2020. The fieldwork was substantiated with extensive literature research that started in November 2019, and was ongoing before, during, and after the fieldwork period. Throughout this period, I studied the network of actants related to Aran's energy infrastructure using ethnographic methods. The most all-encompassing was being there. Participant observation involves "tak[ing] part in the daily activities, rituals, interactions, and events of a group of people as one of the means of learning the explicit and tacit aspect of their life routines and their culture" (DeWalt & DeWalt 2002, 11). On Árainn, this included experiencing storms and accompanying infrastructure breakdown, living my daily life on the island, meeting people in 'the shop' and pubs (that turned out to be the two main locations for socializing on Árainn during low season), and walking the island's stone paths, cliffs, Neolithic forts, and beaches, just like the islanders do. Cliodhna (see page xi), my host's dog, deserves a special mention for getting me out of the house even during storms, for walks to the beach or up near the cliffs, sensory experiences that gave me a deeper understanding of the islanders' connection to Árainn's landscape and to the power of wind here.[7] This focus on the 'mundane' and daily practices gave me insight into the relation to the 'mainland', to locally developed energy knowledges, and to specific non-humans actants.

A logical actant to follow, and a great starting point for my study of the negotiation over the energy transition in the Aran Islands was CFOAT, the local energy co-operative. I gained privileged access to meetings and documents of the energy co-operative to gain a deeper understanding of its history and projects. I attended one CFOAT board meeting and one turbine sub-committee meeting while in the field, and attended three board meetings online during lockdown. During these, I made my presence known but did not interfere in the conversation unless called upon (which rarely happened). Studying CFOAT's history, present, and their vision of the Aran Islands' energy future led to an understanding of actants like narratives, technologies, and policy frameworks.

Furthermore, I met several board members and employees separately for individual semi-structured interviews. I had six formal interviews with them, in which we discussed topics like island life, the relationship between the three inhabited Aran

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[7] Sensory ethnography will not be seen as a separate method of doing ethnography but rather as an integral part of it, following O'Reilly who states: "I prefer to think of all ethnography as involving and engaging the body and the senses rather than talking of a particular 'sensory' or 'embodied' ethnography" (2012, 100).

Islands and between the islands and the wider world, the participant's ideas on the energy future of the Aran Islands, and the co-operative and their role within it. Furthermore, I had several informal conversations with people in the field, findings from which I use in this thesis.

Interviews, observations and other fieldnotes were recorded in different ways. According to preference of the participant, I recorded or took notes of interviews. I also attempted to keep a log, but many notes from daily life were instead typed into my phone and later added into the log or straight into NVivo 12 Pro, the data analysis software I used. Recordings were transcribed in the days after the interviews took place. In NVivo, I coded my notes, interviews, and other sources for further analysis.

I have taken note of the Ethical Guidelines of the Dutch Anthropological Association and followed these to the best of my ability. For example, I was conscious of gaining informed consent from my interviewees and in more informal conversations. Participants' names mentioned in this thesis are pseudonyms, to protect their identity. Where possible, I double-checked what I wrote with my participants to see if I reflected their views accurately and to gain consent for publication. Furthermore, all data was stored on an encrypted drive to which only I have access.

Ethnography is also a practice in which the researcher "examines, reflexively, one's own role in the construction of social life as ethnography unfolds" (O'Reilly 2012, 3), and when taking an actor-network approach, the researcher must see themselves as part of the assemblage (MacLeod et al. 2019). I have found that it is not unusual for outsiders (or 'blow-ins') to take part in Árainn's social life for a while: many volunteers or employees from the mainland or abroad work here for the summer, and some stay longer. I came into the field as a white girl, in her early twenties, from a continental Western European country. Personally, I am very excited by the renewable energy transition, and the promise of community energy projects. However, my topic of interest made some people think twice. During my time on Árainn, it was not easy to find those that were vocal about their opposition to wind turbine developments on the island. I only managed to do so through informal conversations in the local pubs, and these people were not always willing to contribute more than their brief comments. The anthropologists Smith and High warn that "[b]y casting particular sorts of energy sources and energy futures as good or desirable, little room is left for understanding how the people we study make sense of the world" (2017, 5). I was aware of this, and if I felt tensions arise I tried to make it clear to participants that I was trying to study their perspective on the energy transition. This will be elaborated upon in Chapter 4, as I have found that their brief comments still led to very meaningful insights.

Although Irish is the primary language on the islands, all inhabitants also speak English and switch between the languages often in their everyday life. CFOAT meetings were held in English and in my informal interactions and participant observation I do not feel like I missed out on important information by not speaking Irish.

The fieldwork period was intended to be 12 weeks, but was cut short due to travel restrictions that were a result of the spread of the new coronavirus. This shorter period means that I have gathered less ethnographic material on community energy mobilization (my initial research focus) than I had hoped for and anticipated. However, the material I gathered did give me a very good insight into the embeddedness of infrastructure, that I here use as a lens through which to study the energy transition.

Furthermore, planned visits to Inis Meáin and Inis Oírr could not take place. I have therefore not had the chance to analyse the relationships between the islands, or perceptions of the energy transition and CFOAT on different islands. For this I can rely only on what I have learned from Árainn inhabitants and from secondary sources. In my experience, a lot of CFOAT's current and envisioned work is primarily focused on Árainn. As the proposed wind turbine location is on Árainn, relevant actants in this 'case study' centred around this island naturally (while the benefits are intended for all three islands).

This combination of ethnographic methods like participant observation, sensing the landscape, interviews, informal conversations, and interacting with Árainn's energy infrastructure, have together given me a valuable insight into what I call the Energy Infrastructure Network, and helped determine which actants to include in this discussion of the negotiation and envisioning of the community-owned energy transition on the Aran Islands.

Photo 1 - Cliodhna, a rescue lurcher, on one of our rainy evening walks in Cill Éinne
*8 February 2020*

Outline

The four chapters of this thesis will shed light on different parts of the Energy Infrastructure Network. Chapter 1 will introduce the Aran Islands through following and exploring the non-human actant 'wind' ethnographically. It will examine its influence on the landscape of the islands and the daily lives of the islanders. Chapter 2 will discuss the energy infrastructure on the Aran Islands in its historical as well as contemporary context. The chapter will highlight the islands' energy dependencies and vulnerabilities, and how these have led to situated energy knowledges. These knowledges, in turn, influence what are deemed suitable methods for the energy transition. The last two chapters of the thesis will show two important ways in which the energy transition on the Aran Islands is envisioned and negotiated: as a community-driven process in Chapter 3, and through the specific infrastructural intervention in the shape of a wind turbine in Chapter 4. Chapter 3 will discuss CFOAT's position as a community energy project, explore their vision of a self-reliant community, and discuss the opportunities and limitations CFOAT faces in interactions with institutions. Chapter 4 explains the 'resource' of wind power that is available on Árainn, and introduces three instances of negotiation that surround the proposal for a wind turbine that can capture that resource. The turbine is an infrastructural intervention that makes the embeddedness of infrastructure blatantly clear. Not only is it a material negotiation of blades, cables, and transformers; it also requires a negotiation of local support and of national heritage preservation.

Through the combination of the four chapters, the imagined wind turbine becomes a case study of the embeddedness of infrastructure in the Aran Islands, and especially within the energy transition as worked on by CFOAT. This thesis so sheds light on the realities and difficulties faced by geographically isolated islands in their energy transitions. In the conclusion, I will highlight how looking at the embeddedness of energy infrastructure helps understand the multiple negotiations that take place in community energy projects. I will also reflect on my ANT-informed approach.

To respect the primarily Irish-speaking communities on the islands, all places will be referred to by their Irish name. I use 'on Aran' as short for 'on the Aran Islands' – not to be confused with 'Árainn'. In popular use, Árainn goes by Inis Mór. However: "Árainn is the right name for it, Inis Mór (…) was made up by civil servants."[8] That being said, I did learn that the meaning of the Irish 'inis' is two-fold: it can mean island, as it does in the names of the Aran Islands, but as a verb it can also mean 'to tell'. So I will now tell, *inseoidh mé anois*, my stories from the Aran Islands.

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[8] Interview with Peter, 4 March 2020, Peter's kitchen
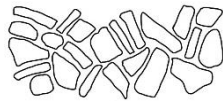
Chapter 1 – Islands in the Wind

Storm Dennis was supposed to be weaker than Ciara, that passed the previous weekend – but its winds have been howling, waking me up, and urging me to get out of bed to check if that rattling sound means some part of the house is about to blow away, into the Atlantic that surrounds the island. Now, in the morning, I need to cycle down to the shop to restock. 'The shop' is the only supermarket on the island and is a supermarket, newsstand, coffee shop, ice cream shop, and off licence all-in-one, with an extensive selection of houseware products and an ATM as well. It is in the next village, and in breezy conditions it would take about ten minutes to cycle there. Not today, though... As I cycle along the road, I cycle the majority of my route past drystone walls. Every time there is a break in the walls, the wind hits me and steers me nearer to the sea, the beach, or to the stone wall on the opposite side of the road. Along the way, the wind carries different smells – that is, for those brief moments when it does not knock the air out of my lungs. Some gusts bring along the taste of sea salt, or the slightly foul scent of seaweed. But as I pass some of the houses along the road, another sensation is carried along: it smells earthy, somehow with a hint of sweetness. It is the smell of burning turf, one of the fuels used for heating. As the island does not have its own peatlands, the turf blocks are imported. This is one of the many ways in which the natural environment influences energy infrastructure and daily life, I will learn.

Introduction

"Surrounded by water, islands enjoy changeable and sometimes unique environmental histories due to their geographic peripherality. Islands have a complex relationship with nature and more particularly with weather" (Heaslip 2017, 166). The Aran Islands, surrounded by the Atlantic, are exposed to exceptional wind power. In the energy transition, wind is an important factor for its productive potential. But this power is not just a number in a business case calculation: it is a force to be reckoned with on the Aran Islands. It is an inherent part of the islands, changing the landscape and demanding adaptivity from their inhabitants. During my time on Árainn, I experienced several storms that were strong enough to lead to cancelled flights, ferries, delayed cargo, and the cancellation of activities on the island.

This chapter will introduce the Aran Islands, and Árainn specifically, through tracing the wind's impact within the 'weather-world' (Ingold 2004). The lifestyles of islanders as 'aeolian subjects' (Howe 2019) will be discussed secondly, establishing a power relation between wind and those that live in it. Through this, and because of the promise wind energy holds (that will be studied in Chapter 4), wind is established as an actant in the Energy Infrastructure Network.

The weather-world of Árainn

Writing on wind and weather as fluxes of the *'medium'* air, anthropologist Ingold notes that "in the fields of anthropology and material culture studies there is a persistent tendency to write as though people and material objects were indeed *all there is*" [italics original] (2007, 30). Wind, the fluxes or currents of medium air, is not an object. Still, it is essential to life and it has creative power, or: winds "*are* agency" (ibid., 31). In Ingold's view, weather and land, sky and earth, are not distinct domains separated by a ground surface. Rather, wind and weather form the land in a *binding* of air and ground, through leaving their traces on the land: the weather-world. Wind is important as inhabitants "make their way through a world-in-formation rather than across its pre-formed surface" (ibid., 32). They live in a zone where the weather-world intermingles, and they are intermingled in it, too.

During my time on Árainn, storm upon storm battered the island. While the frequency of heavy storms has been increasing[9] and this has been called the worst winter he had ever seen by one participant,[10] storms like these are nothing new for the Aran Islands. Wind continuously changes the landscape and impacts where and how islanders live. I will follow the wind, hereby introducing this 'weather-world' of the Aran Islands, focusing on Árainn specifically. As the wind usually blows in from the Atlantic on the southwest (see Figure 1), let's start tracing the impact of the wind on the landscape there.

The Aran Islands are situated at the mouth of Galway Bay, off the west coast of Ireland. They are a group of three inhabited islands and some smaller, uninhabited islands, surrounded by the Atlantic Ocean. Árainn, the largest and most north-western Aran island, is oblong: it is 14 kilometres long, but just 0.75 kilometres to 3.25 kilometres wide (Laheen, 2010) (a map of Árainn can be found on page 48). On one side, it is separated from the mainland by 9 kilometres of sea (Erdmann et al. 2015). On the opposite side, facing the open ocean, it has high cliffs, with drops of 10-70 metres (Cox et al. 2012). Árainn's cliffside is home to some of the island's most famous sights: two Neolithic cliff-top forts and the 'Wormhole', a massive rectangular pool in the cliffs that is connected to the ocean tide and is well-known for being used in a Red Bull cliff diving competition.

Geologist Michael Williams, who has done extensive research on these cliff faces, shows how wind affects their erosion. He writes that "gales affect this coastline on more than 30 days per year on average (…) these winds drive waves with a fetch of thousands of kilometres" (Williams 2004, 169). Waves that occur during such storms

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[9] Interview with Linda, 26 February 2020, in a pub
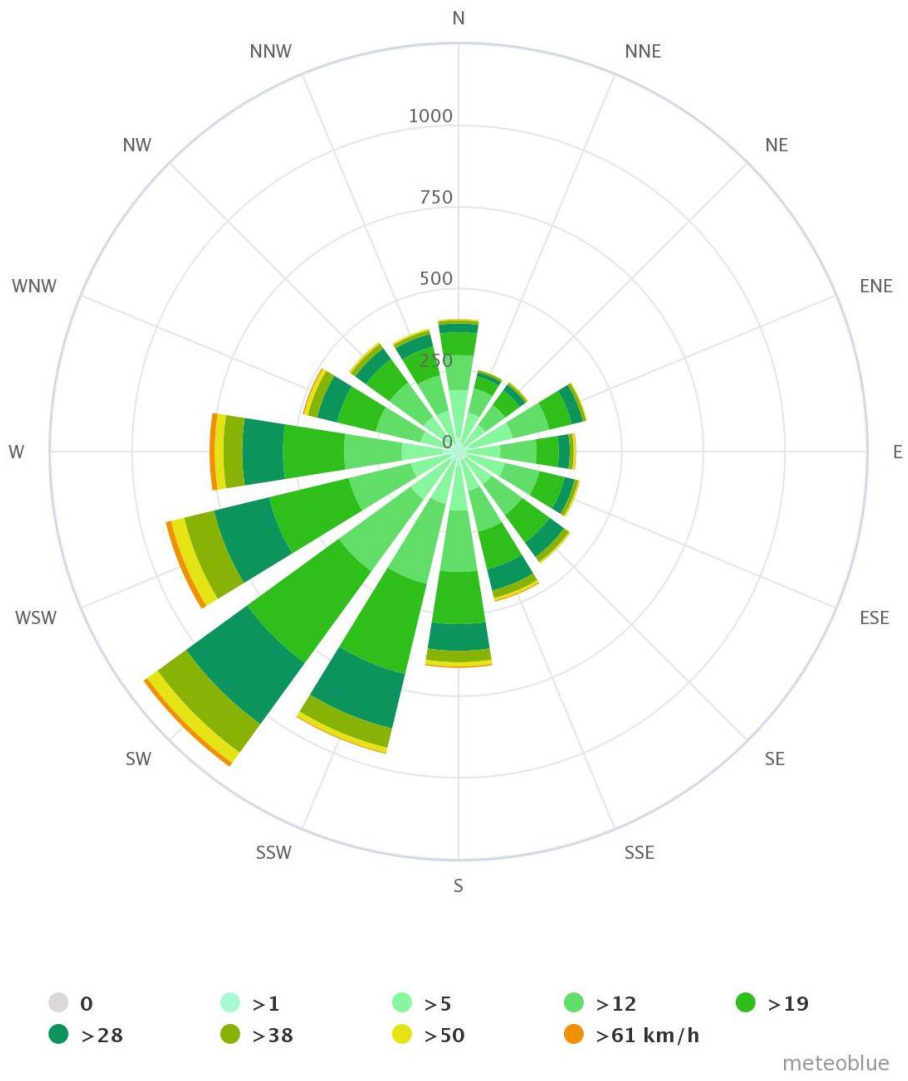[10] Interview with Peter, 4 March 2020, Peter's kitchen

Figure 1 - Wind rose for the Aran Islands, which shows the amount of hours wind blows at a specific speed from a specific direction, averages from 30 years of data. SW means the wind blows from the south-west to the north-east.
(source: https://www.meteoblue.com/en/weather/historyclimate/climatemodelled /aran-islands_ireland_2966947, accessed 14 May 2020)

can displace huge slabs of rock – sometimes leading to cliff erosion of 6 metres per decade (ibid.). These boulders can fall into the sea – but some also line the cliff's edge above. Here, waves have actually hoisted up the rocks, reached above the cliffs and left the rocks there. According to Williams, waves have moved clasts weighing more than 5 tons at more than 50 metres above sea level (2004).

Following the wind further inland, we reach a landscape of mossy hills, natural wells, and many stone walls. This is not a static landscape (Jones 2004): the landscape holds proof of the many interactions between wind, earth, and people. Nowadays, there are barely any trees left on the Aran Islands. There are several possible causes for this: legend holds that the human action of cutting down trees made the top soil blow away. Archaeologist Jones (2004) reverses the sequence by arguing that Atlantic gales that blew away the top soil caused the low amount of trees to begin with. Regardless of cause and effect, the fact is that there are little to no trees and other shrubs to hold the fertile top soil in place against the wind. As a result, farming is labour-intensive. Farmers have had to create fertile patches of land manually, levelling the ground, and creating suitable topsoil by spreading alternating layers of sand and seaweed, and seaweed is still used to fertilise the ground today (O'Sullivan 2017). The fields are shielded from the wind by the many drystone walls. This landscape with thousands of small fields divided by stone walls is one of the island's most recognizable features. The walls are carefully constructed using stones from the fields, stacked like an open maze so the wind will not topple them over.

While these fields stretch all the way to the 'back' of the islands (meaning, the south or cliffside), almost all the clusters of houses on the Aran Islands are located on the north side of the island, facing Galway Bay. This is where daily life centres: leeward, sheltered from the wind.[11] The island communities are small. With 840 permanent residents, Árainn's is by far the largest of all Irish offshore island communities. About 160 people reside on the middle island Inis Meáin, and about 260 on easternmost Inis Oírr. During summer, the number of people on the islands nearly triples (Transition Agenda, 2019). They welcome many visitors. Tourists visit sites like the Neolithic Black Fort (Dún Duchathair), the bigger Dún Aonghasa, the Wormhole, one of the many monastic sites, or the seal colony. Some attend Irish language courses. College students return and seasonal workers 'blow in' to work in hospitality. On Árainn, the hustle and bustle of rental bikes, mini buses, and pony and trap rides settles after 5, when the ferry leaves from Cill Rónáin.[12] With its pier, 'the shop', and several pubs, it is the main town of the island.

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[11] Interview with Peter, 4 March 2020, Peter's kitchen; see also O'Sullivan 2017 and Cox et al. 2012.
[12] Interview with Linda, 26 February 2020, in a pub

This leeward position of the north shore does not mean this side is untouched by sky and sea. It features craggy coastlines that show signs of marine erosion like blow-holes and caves (Williams 2004), and depositions of sand have partially buried a medieval church (Jones 2004). Moreover, storms can do damage to the infrastructure of the clusters on this side. In early February, I had my first meeting with John. I planned to cycle to his house, but we were in the tail of a heavy storm and luckily he offered to come pick me up in his electric car. John is a blow-in that deeply cares about his environment: he is chair of the renewable energy co-operative, keeps count of Árainn's migratory bird populations, and that day we checked the coastline for storm damage. A bit north of Frenchmen's Beach, outside Cill Rónáin, is a good spot to go: it is notorious for its high waves during strong winds. And indeed, some of the drystone walls had been thrown down, and rocks lay scattered on the road. John describes a freak instance during a rare north-easterly storm some years ago, that damaged parts of the island's lower road that runs parallel to the coastline.

These storm damages, as well as periods of drought during recent years, have been explicitly linked to climate change (Fallon-Griffin, 2019). Peter, a founder of CFOAT who has been living on Árainn since the early eighties, tells me this year's winter is the worst he has seen due to the amount of storms. The climate has been changing since about 25 years ago, he adds. "Before that, the summers used to be very bright and dry and the winters were sharp and cold. Now, we're getting much warmer and wetter winters and cooler and wetter summers."[13] Linda, CFOAT's bookkeeper, sees the impact of climate change exactly in these storms: while storms have always been violent here, they now occur much more often, especially in the last five years.[14] Indeed, if storms become more prevalent, their impact will only become bigger.

Aeolian lifestyles

In her work on wind power in Mexico, anthropologist Cymene Howe shows that within the apparatus of renewable energy, wind's meaning is changed "from element to condition and from an experience into a resource that generates power"(2019, 24). This power-generating potential is an important aspect of wind in the energy transition. However, reducing wind to a number would not do justice to the experience in the Aran Islands (just like in Howe's Oaxaca and Watts' Orkney Islands), nor would it be a fair description of this actant in our Energy Infrastructure Network.

Wind impacts the landscape and layout of the islands. But indeed, it also fundamentally impacts how inhabitants move in this weather-world. Howe argues

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[13] Interview with Peter, 4 March 2020, Peter's kitchen
[14] Interview with Linda, 26 February 2020, in a pub

Photo 2 - A view towards the east of Árainn and Galway Bay
3 February 2020

Photo 3 - Big waves crashing at the cliffs above Cill Éinne
17 February 2020

that "wind insists that everything is much more than a*nthropos*" (2019, 2). "An oscillation of gases and heat differentials, wind is an insistent reciprocal exchange between air, beings, and objects" (ibid., 11). In this relationality of wind, people are configured as subjects. Howe coins the term *aeolian subjects* (from the Spanish energía eólica, meaning wind power), "who live in, from, and through the wind in its various formations and effects" (ibid., 29).

Wind on the Aran Islands does not only affect the landscape or location of residential areas. In my interview with CFOAT board member Nancy, she mentioned in passing that "wind is very much part of this island, d'you know, just the experience of it."[15] Islanders live in a constantly windy reality, and it affects their everyday life, from cancelled meetings and stones on the road to cancelled ferries and delayed cargo. Its remote location, on the ocean, makes daily life on the Aran Islands a life determined by wind and weather and, occasionally, an infrastructural challenge.

While the island communities were historically almost fully self-sufficient, the current generation of islanders depend heavily on their connections to the mainland. There are several of these links: the local airline and ferry service used for transport of people and small goods they carry, and a cargo boat that stocks the supermarket, pubs, restaurants, brings in fuels for the cars, tractors, stoves, heaters, et cetera, and also ships packages, cattle, cars – basically everything that needs to be delivered to the island. Islanders cross over to the mainland often: to travel, to visit friends and family, but also to go to the hospital or dentist. A veterinarian visits the island once every couple of weeks. It is logistical matters like this that are easily overlooked when thinking about island life, that pose challenges for islanders regularly.

However, all these services are weather-dependent. When visibility is low or in windy or rainy conditions, the airline drops out first. "You always have to be prepared to take the ferry," Linda tells me.[16] The ferries were described to me as "good 'bad weather boats'"[17] that can deal with some big waves, but they stop sailing in heavy storms too. When storms are forecasted, islanders take flights and ferries days early to make sure they reach their mainland appointments on time. Storms can delay the cargo boat deliveries, too. If that happens, the island's small supermarket is without some fresh fruit and vegetables, and other foodstuffs. An islander's pantry and freezer are always well-stocked.

According to Island Studies scholar Conkling, living on an island means living "a life closer to nature than most mainlanders do. The rhythms of tides, wind, and

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[15] Interview with Nancy, 21 February 2020, souvenir shop
[16] Interview with Linda, 26 February 2020, in a pub
[17] Interview with Peter, 4 March 2020, Peter's kitchen

storms determine what you do and will not do" (2007, 199). Interdisciplinary energy researcher Eimear Heaslip investigated community perceptions of energy and consultation efforts for the energy transition on the Aran island of Inis Oírr. In her 2017 dissertation, her participants elaborate at length on this influence of wind and weather on their lives, findings that were in line with my experiences on Árainn. Limited by Inis Oírr's geographic peripherality, "your day depends on what the weather is like… if you were on the mainland you could [easily] go [somewhere] or do [something], whereas here you might have the same plan, but the weather might [ruin] that plan, so you [need to] have a backup plan… like if I don't get going, this is what I will do" (Orla in Heaslip 2017, 196, formatting mine). Indeed, Philip adds: "School, work, play, you have to plan your freezer, your fridge, everything… You have to think ahead always… Forward thinking is a good island thing" (in Heaslip 2017, 197). Because of their geographic remoteness, "island communities are socially and culturally divergent from mainland communities" (ibid., 193). Knowledge of the environment, the ability to adapt quickly to changing weather, and skills like forward planning were seen by Inis Oírr islanders as knowledge that is local to the island – and I experienced similar forms of knowledge on Árainn.

I personally faced a steep learning curve on the weather-dependency of life on the island. These ranged from always being prepared with a waterproof jacket (for sudden rain showers – I do not think I have seen one umbrella being used on the island, as they would blow away), to joining my host in walking the dog on the beach when the weather was good (you do not know what might happen later), and to knowing which website to use for the most reliable weather forecasts.[18] The ride offered by John was the first of many rides I was offered during different storms. Cycling during these gales is unpleasant, if not dangerous, and there was no public transport system I could use. I also understood that it is not uncommon for meetings to be cancelled and schools to be closed during storms. All in all, the lifestyles of Aran islanders are determined to a large extent by wind and weather.

Chapter conclusion

Wind is an important topic in the energy transition of the Aran Islands, as CFOAT is proposing to put a wind turbine on Árainn. Therefore, wind is an important actant in our Energy Infrastructure Network for its productive capacity. However, the strong winds here are not just a number in a business case. In this chapter, I have attempted to write an ethnography of wind on Árainn. This has allowed me to shed light on the

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[18] It is https://www.yr.no/place/ireland/connaught/inishmore/

agency of the 'non-human' wind in relation to the landscape of Árainn and the lifestyles of islanders. Wind can do damage to the cliffs, and blows away what it encounters on its way across the island, influencing the landscape. It also directly alters the islanders' daily schedules. Moreover, it can sever important infrastructures on the island and links to the mainland: these, too, are embedded in the exposure to strong winds. This holds particularly true for the energy infrastructures, which are the focus of the next chapter.

Photo 4 - The transformer repair
22 February 2020

Chapter 2 – An Interrupted Infrastructure

On a Thursday in late February, just after hitting my three-week mark of arrival on Árainn, I experience my first power outage. I wake up to realize what has happened: even though the storms of the past two weekends have had no effect, a simple night of rain and wind has thrown the grid off. ("It must have been the ghosts," someone said later. Or, more comfortable for me to hear: ordinary lightning.) The solar panels will keep the lights running as long as the battery is charged, but there is no way I can do the laundry that I was planning to, or use the electric kettle for my cup of tea. Luckily, the kitchen stove is fuelled by gas, I sigh in relief, while silently cursing the 'green' air-to-water heat pump, that provides heating and warm water, for running on electricity.

I walk over to the bucket that has always been a decorative piece of furniture in my mind. The black rocks it holds shimmer in the light as I try to scoop them up: this is not the type of stuff you use for a barbecue, this is the real deal. I've never lit a stove like this before, nor have I seen actual coal, as far as I know. With some virtual help from my host, who is on the mainland for the weekend, I light the stove: clean out the ashes of the last fire, light firelighter blocks that light sticks or logs, then add coal or peat - both fossil fuels that to my naïve mind were outdated and should no longer be needed, but will be essential to keeping myself warm in the coming days.

In the afternoon, I suddenly hear the grid mechanic step into my house to see if he can fix the issue. Front doors are left open on the island – everyone knows everyone anyway. He looks relieved at first, as the lights are on. When I explain that the lighting is backed up through our solar-powered battery, he continues to explore what the problem is. It is not a straightforward case: "I should have become a doctor", he sighs. The next day, he and the local electrician come back and give me the disappointing message that a transformer on one of the poles needs to be replaced. Luckily there are spare ones on the island, that is not the problem. The problem is that it is a labour-intensive job and - more importantly - a dangerous task even on the best of days. The transformer has defaulted in bad weather, and the wind has not stopped blowing since.

On Saturday, when the winds are not gale-force and the weather is deemed safe enough, they bring help and come to the pole next to my house. This task involves the transformer (a silver box so big it almost reaches my waistline from the ground up), pulleys, ropes, carabines, and spiked climbers that are attached to the feet of the lucky man who gets to climb up the wooden pole. "We've christened this pole 'Annie'!" he calls out when he's reached the top. After about two hours of work, the men are done, and turn the power back on. I have left the lever of the electric kettle down, and as it starts making noise I know that I am on the grid again. Three faces appear in the doorway, and after realizing their work is done and a 'god bless ya' I am left to get my life back in order, with a warm shower, heated rooms, and Wi-Fi.

Introduction

Inis Oírr inhabitants remember childhood experiences of 'blackout winters' where grid interruptions could last weeks on end (Heaslip 2017, 167). While such power outages don't seem to occur that often, nor for that length of time, anymore, they are not uncommon on the Aran Islands. My host warned me that this might happen during storms, and other islanders I talked to about my experience reacted casually and mentioned recent power failures they experienced. A couple of weekends later, an island-wide power outage lasted a few hours. On February 11th, in absence of flights or ferries, an Irish Coast Guard rescue helicopter had to bring grid technicians to Inis Meáin to restore its power.[19]

Breakdown makes infrastructure, and what it stands in relation to, more visible (Star 1999; Watts 2018). While the breakdown described in the vignette made the network of cables, poles, and transformers more visible for me (and the spiked climbers, carabines, and men that are needed to repair these), it also brought to my attention a dependency on gas, coal, timber, and peat. Energy infrastructure is not only about electricity: energy here is also about fossil fuels, gas stoves, and burning peat. On the Aran Islands, all of these are embedded in, or 'sunk into', the Atlantic Ocean, through a dependency on imported fuels via cargo ship and a subsea cable.

While an energy infrastructure should not be analysed by its material qualities alone, an in-depth description of the cables, stoves and ships that make up Arans' cannot be left out in order to understand our Energy Infrastructure Network. This chapter will firstly elaborate on the embedded, material past and present of the energy infrastructure. This will shed light on the dependencies and vulnerabilities in the islands' energy infrastructure, that I will illustrate through the case of the subsea cable. Experiences with such limitations have led to the development of situated energy knowledges on the Aran Islands: views and practices surrounding energy usage on the islands. These locally held views are "are socially, spatially and politically constructed and are core components of community low carbon energy transitions" (Heaslip 2017, 14). These will be analysed lastly, as they influence what infrastructural futures are envisioned by islanders, and will be negotiated in the energy transition.

A brief energy history

Historically, the Aran Islands have been largely self-sufficient. The islanders built their own houses, made their own clothes and produced their own food: they grew it on small patches of land, fished the surrounding seas and herded cattle. The islands have

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[19] Rescue 115. 2020. "*TASKING UPDATE*." Facebook, February 11, 2020. https://www.facebook.com/SAR115/posts/2471184213131767

always been reliant on the mainland for their fuels, though. There was little timber available and as the rocky surface lets rainwater through quickly the islands have not formed peat (O'Sullivan 2017), so the islanders had to import turf for cooking and heating. This was shipped in from Connemara, and islanders paid for the turf by cash, livestock, or fish.[20] Moreover, the islanders brought oil lamps from the mainland, and some had homemade oil lamps filled with shark-, seal- or fish oils (O'Sullivan 2017).

Electricity only arrived on the islands in the 1970s. An Inis Meáin islander states: "when I was a kid, I went around with a candle and people still dressed in traditional clothes. Ireland was 20, 30 years behind the rest of the world, and Aran was 20, 30 years behind Ireland" (Ruairi in McCarthy 2018). Electricity was supplied through diesel generators. Diesel was brought in on the cargo boat, along with all the other fuels for the islands used, including oil, gas, coal, and heating oil. Electricity was only used for lighting in the beginning (Aoife in Heaslip, 2017) but as the infrastructure improved, its use increased. The arrival of electricity not only changed practices of lighting on the island: islanders could now also store food in their freezers, and it allowed them to develop the tourism industry (Heaslip 2017).

Current energy infrastructure

Since the nineties, electricity is provided to the islands through a 3MW subsea cable that runs from Ros an Mhíl on the mainland to Cill Éinne on Árainn, branching off to Inis Meáin and Inis Oírr from there. Once it has reached the island, electricity travels through a (sometimes vulnerable) meshwork of cables strung over wooden poles. Infrastructure is material and aesthetic (Appel, Anand and Gupta 2018): approaching a village from a distance, the scenery resembles a pin cushion. If I cycle home in the dark, the recurrent poles are a better indicator of where the road is than the scarcely scattered streetlights. Sometimes, when I walk underneath the suspended cables, I can hear the electric hum in the wind.

In my experience, electricity usage knowns no restrictions nowadays: it is not just used for lighting, but also for kettles, electric showers, tv's, phones, laptops, or for the (for now) odd electric car. But electricity is not the only energy demand on the Aran Islands. Other energy consumption comes from the transport and heating sectors. The largest impact comes from the ferries and small airline service: 62 per cent of energy is used for transport to and from the islands. Another 8 per cent of energy usage is for transport on the island, and staggering 24 per cent for heating. Electricity amounts to just 6 per cent of final energy consumption on the islands (numbers based on Árainn

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[20] Interview with John, 10 February 2020, John's house; and O'Sullivan 2017

and Inis Meáin) (Transition Agenda, 2019). Annually, inhabitants of Árainn and Inis Meáin collectively pay over 300,000 euros for their electricity (ibid.) and almost one million euros for all imported heating fuels (e.g. kerosene, gasoil, coal, diesel, propane, butane, peat, and wood). Burning them makes up for 22 per cent of the CO_2 emissions of these islands. Inis Oírr reports that the price for their fuels is on average 28 per cent higher than on the mainland, due to import and storage costs (ibid.).

Energy infrastructure, in an island context, is a story of logistical challenge, dependency, and vulnerable links. Islanders get fuel for their cars at a pump at Árainn's recycling plant. Fuels like timber, peat, and gas canisters can be bought at the shop and taken home, or can be delivered. These are all brought in by the cargo boat – that is occasionally delayed during storms. Electricity is transported through the subsea cable, that feeds the suspended cables. As is visible from the introductory vignette, these cables are vulnerable to wind too. But even the subsea cable has its vulnerabilities.

In Watts' (2018) account of energy infrastructure in the Scottish Orkney Islands she exposes the quite literal bottleneck for the development of the marine energy industry: the electricity grid cable that connects the Orkney grid to the mainland grid, with all the politics that surround it. She takes the reader on a trip to where the cable 'lands', at Rackwick Bay on Hoy. This set me out on a quest to find the subsea cable on Árainn, and I was excited to find out it runs from the mainland at Ros an Mhil to Cill Éinne, where I lived. However, as much as I looked around Cill Éinne's harbour during low tide, I could not spot a cable emerging from the sea. It was not until two nights before my sudden departure that I found out it had been hiding in plain sight all that time. I walked into a pub to find the electrician that helped restore power to my house, chatting to the barkeeper. I did not recognize him at first, without the thick layers of padded overalls, wool hat and waterproofs he wore during the stormy days of my off-grid life. Back then I already explained what I was researching and that I would love to learn more about the grid, and now he asked me if I want to see where the cable connects. It turns out I have walked past it countless times. The cable runs its last metres underground, underneath the airfield, surfacing inside an unobtrusive grey concrete box next to the road where I often walked the dog.

While its landing is 'invisible', the position of Aran's subsea cable on the seabed is easily found: a simple Google Search results in a freely available nautical map.[21] Still, the subsea connection, even with its negotiated visibility,[22] is a vulnerable

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[21] Gps Nautical Charts. n.d. "Approaches to Galway Bay including the Aran Islands (Marine Chart 3339_0)." Accessed April 16, 2020. http://www.gpsnauticalcharts.com/main/3339_0-approaches-to-galway-bay-including-the-aran-islands-nautical-chart.html

[22] Researcher Nicole Starosielski investigates the visibility of undersea cable networks. See Starosieski 2012.

Photo 5 - Suspended electrical cables, distributing electricity to Cill Éinne homes
8 February 2020

link. Its precariousness became painfully visible in August 2016, when the cable was struck. After the breach, conspiracy theories surfaced over what caused the damage (including Russian submarines, see Bradley 2016), but the electrician told me that it was a ship that let down its anchor. While power to Árainn was restored within hours, the damaged was done between Árainn and Inis Meáin, meaning Inis Meáin and Inis Oírr were without power for some days until generators were brought in (the old diesel generators had still been there as backup generators, but they were found to be no longer functioning[23]). The repair itself took a couple of months, a 26-strong project team, and 97 separate diving operations (Irish Times, 2016).

This experience of the vulnerability of the subsea cable seems to have had a direct impact on the islanders' wish for more control over their energy. Vera, a native Árainn islander, young mother, and one of the two employees of CFOAT, explained to me in an interview that during the days the islands were without power, Inis Oírr inhabitants that had solar photovoltaic panels installed still had some electricity and could keep their fridges and freezers running. This instance, she said, made the islanders more aware of the necessity to control their own energy supply. Indeed, this driving force in the islands' energy transition is also recognized from the outside, as Ruth Buggie of the Sustainable Energy Authority of Ireland, explains that "the islands have a much higher motivation in that they are in a vulnerable place from an electricity supply point of view, they have lost power on the islands in the past."[24]

Transitioning in island realities
At first sight, small islands seem like ideal places for a community low carbon energy transition: they are naturally rich in renewable energy sources (Kuang et al. 2016), offer "a huge amount of opportunities, because they are often small systems where you can try and test technologies that we have available for the clean energy transition" (Castanié in Gash 2019), and because there is a stronger sense of community which helps overcome problems of collective action (Bomberg & McEwen 2012).

However, transitioning in island realities also poses many practical challenges. For example, it requires negotiation of peripherality and small scale. Using Donna Haraway's concept of situated knowledges (1988), Heaslip explores specific knowledge on energy held on Inis Oírr. Such situated energy knowledges, she explains, develop through experience with technologies on the island. These experiences, in combination with wider knowledge on limitations of island life, inform

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[23] Interview with Vera, 26 February, the Hill Farm
[24] Ruth Buggie in Part 2 of Morning Ireland's Sustaining the Islands series, a radio report made by Juliette Gash, published in August 2019. Available through https://soundcloud.com/morning-ireland/sets/sustaining-the-islands

local views and practices of energy usage, and so influence the envisioned suitability of specific sustainable energy practices and technologies. Situated energy knowledges, so, "are socially, spatially and politically constructed and are core components of community low carbon energy transitions" (2017, 14), and show a negotiation between people, technology, and the environment.

There are several ways in which the geographic context of Aran poses technological limitations, and so shapes specific energy knowledges. I will consider three of these ways here: the availability of engineers for installation, maintenance, and repairs of sustainable technologies, the reality of dealing with extreme weather, and experiences with specific technologies on the islands.

CFOAT's first project was the retrofitting of houses and public buildings. Their start in 2012 was good timing, John explains.[25] Through a contact, CFOAT got to take part in the pilot for a government grant scheme aimed at the retrofitting of houses and public buildings. Heating fuel is one of the biggest sources of carbon emissions on the Aran Islands (Transition Agenda 2019) and a big expense for those dependent on it. In order to get the islands' largely self-built housing stock suitable for renewable heating systems, they need to be insulated to a very high degree.[26] This is a very costly process, that can include e.g. the installation of interior and exterior insulation, double glazing, and sustainable heating and electricity technologies like solar heat pumps and PV panels. The project was very successful early on, when contractors could not get much work on the mainland due to the economic crisis and were willing to travel to this islands. Changes to the scheme and economic situation since have made it more difficult to make use of this grant: it is hard to find qualified contractors that are willing to travel to the islands, and added costs of travel and accommodation are not covered anymore. Many families are still on the waiting list for retrofitting efforts.

The islands' peripherality influences the availability of craftsmen and engineers for the installation of sustainable technologies, and also for maintenance and repair works. Engineers from the mainland are not always willing to come out to the islands on short notice, or might be unable to do so in adverse weather conditions. Furthermore, these new technologies are often complex. In one of CFOAT's board meetings, a discussion arose over the public image of air-to-water heat pumps (a sustainable method of residential heating). Repairs on broken units had recently proven a hassle, as engineers were not available to come to the islands. Peter, who is a retired plumber himself, explains that a technician would need to be a plumber, electrician, and refrigeration expert to become a heat pump specialist. Vera's efforts to

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[25] Interview with John, 10 February 2020, John's house
[26] Minutes of CFOAT board meeting on 28 January 2014.

find someone with the right qualifications on Árainn willing to take a course in domestic heat pump repairs have not yet succeeded. Due to the small scale of the islands, it is not easy to imagine such renewable technology repair services ever being a permanent presence on the islands, as it would not be economically viable for them.[27] Another sustainable practice that CFOAT tries to encourage on the island is the use of electric vehicles. The islands seem like ideal places for these cars with limited ranges. However, there is no mechanic that knows how to work with electric vehicles, so no way to get an EV fixed or serviced quickly and without the added cost of shipping it back and forth to the mainland. The first local insight that influences the imagined suitability of renewable energy technologies comes from this geographical and technical limitation: Heaslip's participants describe "the need for what they termed 'simple technologies' that could be fixed by people living within Inis Oírr" (2017, 213).

The second local insight that influences visions of the energy transition is a local energy practice that Heaslip coined 'backup plans': "the energy practices [islanders] employed to cope with this unpredictability in their daily lives caused by extreme weather events" (Heaslip 2017, 167). As established before, being an aeolian subject calls for adaptivity. When my heating system was not functioning during the power outage, I had the option to fuel the stove with timber, coal or peat to heat the house. Houses on Aran all have such 'backup plans' built in. These "adaptive approaches to energy" (ibid.) are passed down through generations and considered when building new houses. They lead to the wish that any new energy infrastructure allows for an "adaptive energy supply with energy backup facilities" (ibid., 168) in the islands' energy transition.

Thirdly, experience with renewable technologies on the islands has already proven the suitability of some techniques. There is a large rusted container in the garden at the Hill Farm, that used to be a wood pellet stove. These stoves, that were promoted through a government initiative, were a failed experiment. John explains: "the problem was threefold: the price of fuel pellets, the problem of storage of the fuel (it must be kept dry), and the nature of the pellet stove which required constant feeding with pellets manually."[28] Heaslip's participants add that the stoves did not produce enough heat to warm up the house, and add that it was a lot of trouble to get the pellets to the island (Alice and Clara in Heaslip 2017). Yet, there are also technologies that have proven valuable within the island context: solar water heaters can be seen on many rooftops, and there are solar photovoltaic panels in use as well. Furthermore, while repairs and maintenance might be an issue, there are currently about twelve

[27] Peter and Vera in a CFOAT board meeting, 19 March 2020, online
[28] John, email contact, 8 August 2020

electric vehicles in use on Árainn, and there are also several houses that are heated through air-to-water heat pumps: the upside of these technologies is that they typically need less maintenance than their less sustainable alternatives.

The wind turbine CFOAT is proposing will not be the first time wind energy technology is used on the Aran Islands. Inis Meáin used to have three small turbines, that were sold off after financial difficulties within the island's co-operative. There was great local support for them, though.[29] On Inis Oírr, however, a wind turbine is not seen as suitable as "[the technologies] would have to blend in with the scenery as well, especially out here … because it's such a special place" (Orla in Heaslip 2017, 262), and I learned that the possibility of a solar farm on Inis Oírr is being explored. Community perceptions of suitability of the sustainable technologies play a big role through community acceptance and support. The perceived suitability of a wind turbine on Árainn will be explored further in Chapter 4.

Heaslip argues that situated energy knowledges, like those described above, "are socially, spatially and politically constructed and are core components of community low carbon energy transitions" (2017, 14). These locally held energy knowledges are informed by experience and limitations of the islands' geographic context. Recognizing them helps understand which sustainable solutions are negotiated by the people within our Energy Infrastructure Network.

Chapter conclusion

The Energy Infrastructure Network approach allows for recognition of materials and their inherent vulnerabilities as well as experiences and ideas held by the islanders as actants. These help understand what visions play a role, and what negotiations (need to) take place in the Aran Islands' energy transition. This chapter has taken the material past and present of the Aran Islands' energy infrastructure as a starting point. It has provided a description of the current energy situation of the islands to analyse its dependencies and vulnerabilities. Experiences with such geographic and meteorological limitations and material vulnerabilities have led to specific energy practices among islanders. These locally held knowledges and experiences shape material possibilities as well as motivations and visions for the islands' energy transition. The rest of this thesis will continue looking towards the future of Aran's energy infrastructure, through exploring how the energy transition is envisioned and negotiated in two important ways: as a community-driven process, and through the material infrastructure of a wind turbine.

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[29] In Part 2 of Morning Ireland's Sustaining the Islands series, a radio report made by Juliette Gash, published in August 2019. Available through https://soundcloud.com/morning-ireland/sets/sustaining-the-islands

Photo 6 and 7 - Energy infrastructure at the Hill Farm: a rusty wood pellet stove on the right, and large propane gas cannisters (6), and solar panels (7) 24 February 2020

Chapter 3 – Imagining a Community Energy Project

It is warm in the souvenir shop as I walk in - a welcome break from the cold of my now off-grid house, and the wind and rain I endured on my bike ride here. Two tourists, regular visitors to the island, sit at the bar and chat to Nancy, who is standing behind it. We are in a souvenir and coffee shop in one: postcards, books, jewellery, artwork, and Aran wool accessories surround me, and make for a colourful (if not distracting) environment. I sit down at the bar and Nancy makes me a cappuccino. She puts it down between jars of homemade cookies (peanut butter, pecans, or M&M, 2 euros each).

Nancy has a weathered voice and speaks in nautical metaphors, giving away her seafaring past. Originally from Dublin, she and her partner sailed to the Aran Islands in 1979 to deliver a wind turbine that would power Inis Oírr's lighthouse. The islands were in desperate need of captains for the cargo boat, and they decided to stay - ironically, shipping fossil fuels like coal and diesel. She no longer sails: she is the island's seamstress and works in this shop, combining several jobs as is common for the islanders. She is also a board member of CFOAT.

At this point I am a couple of weeks into my fieldwork, and I am trying to get more insight into the wish for energy autonomy that is sometimes expressed in CFOAT documents. I ask Nancy about this, and we struggle with the concept for a bit. I have read this as a wish for complete grid autonomy ("to be cut off from the mainland", I say) while Nancy explains a less drastic vision of increased self-sufficiency and a self-supporting community. The project, to her, is all about working together: "we need to do this with the help of other people, the mainland, the government, Europe, other organisations, technology." The autonomy is found in "being able to stand up on our own feet as a community, and to make decisions for ourselves as well," and she sees it as a way to "drop the shackles of the dependency on oil, and all the politics that go with that in the world."[30]

<u>Introduction</u>

An important actant in the energy transition of the Aran Islands is CFOAT, the energy co-operative owned by the local community. It was the starting point for my research and is a central actant in the Energy Infrastructure Network. While it is difficult to separate CFOAT from the wind turbine proposal, the last two chapters of this thesis will follow this artificial divide. This shows two important ways in which the energy transition on the Aran Islands is envisioned and negotiated: as a community-driven process in this chapter, and through the specific infrastructural intervention in the shape of a wind turbine in the next.

Looking at CFOAT more closely, this chapter zooms in on a part of the Network where relationships to the outside world are negotiated. Infrastructural

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[30] Interview with Nancy, 21 February 2020, souvenir shop

futures are embedded in who tries to 'make' them, and in the opportunities and challenges these people are met with. For Community Energy Projects (CEPs) such as CFOAT, relations to the outside world are a two-fold notion. At the heart of CFOAT's vision, as we will see firstly, lie ideas of autonomy. These relate to control over-, and self-sufficiency in energy supply, and to support for the Aran Island community. The energy transition can only hold these promises if it is led and owned by the community itself. However, as Nancy explained, CEPs need to work together with the outside world to obtain their goals. The second part of this chapter will focus on the negotiation between CEPs and institutions. CFOAT functions within a political framework, and is both facilitated and limited through government policies. But before CFOAT's vision and surrounding negotiations are discussed, the definition of a CEP will be explored.

Community Energy Projects

As the term 'community' became widely used in relation to energy projects, Walker and Devine-Wright have sought to define 'community renewable energy' (2008). They found that a CEP involves a dimension of process (who develops and runs the project) and of outcome (who is it for, how are economic and social outcomes distributed). A working definition of 'community energy project' (CEP) for this research is: a renewable energy project where a community exhibits "a high degree of ownership and control, as well as benefiting collectively from the outcomes" (Seyfang et al. 2013, 978 based on Walker & Devine-Wright 2008). CEPs can focus on both the supply (i.e. renewable energy generation) and demand side of energy (i.e. energy efficiency), and commonly combine different technologies and strategies simultaneously (e.g. technological and behavioural). Furthermore, they are typically based on communities of place (Seyfang et al. 2013).

While policy discourses often centre around sustainability considerations as a driver for CEPs (Heaslip et al. 2016), local support for CEPS often relies heavily on a different set of promises. CEPs are "empowering and enabling communities to collectively change their social, economic and technical contexts" (Seyfang et al. 2013, 979). In the 'quest for autonomy' (Bomberg & McEwen 2012, 436), energy infrastructures become perceived as vehicles for community survival, empowerment, and self-reliance, through more political power, energy security, and economic benefit from the CEPs (Heaslip et al. 2016; Bomberg & McEwen 2012; Haggett & Aitken 2015).

It is good to be aware that the term 'community' can be problematic in the context of renewable energy projects, for example when determining the community benefits schemes of commercial wind farms, but also in case of 'community' energy projects (see Walker & Devine-Wright 2008; Walker et al. 2007). In her analysis of a

wind energy project in the west of Ireland, Walsh emphasizes that "care must be exercised in applying the community label as it presupposes a project that is both for and by the community" (2016, 15) - while the project was not.

CFOAT is a CEP by the above definition. It is set up and run by the community, for the benefit of the community. Only permanent residents and businesses of the islands can become shareholders in CFOAT, with a limit of one share per person and two for businesses, at a cost of 100 euros per share. CFOAT currently has about 90 shareholders. Together, they elect the CFOAT directors that work on CFOAT's projects on a voluntary basis. The board currently consists of ten voluntary directors (or: board members), like Peter, Nancy, and chairperson John, and are supported by Vera and Linda, two employees who take on the "day to day business" (a range of tasks, e.g. administrative tasks, bookkeeping, and coordinating the EU projects).[31] CFOAT's biggest projects (for the community[32]) so far have focused on energy efficiency measures like retrofitting, electrification of electricity demand through an electric vehicle pilot, and work on the wind turbine. Before applying for planning permission for the turbine, CFOAT will liaise with the island community on Árainn (where the proposed turbine site is) to see if a vast majority of permanent residents are in favour of having a turbine on the island[33] – if that majority is not there, CFOAT will not go ahead. If the proposed wind turbine gets built, CFOAT's share of the turbine profits will be treated as a community development fund. The shareholders decide together what the money will be invested in.

A community on its own feet

After a sub-committee meeting on the wind turbine project, Vera offered to bring me back to the Hill Farm by car. On the drive along the coastline between Cill Ronáin and Cill Éinne, we discussed the meeting and wondered how the island community will respond to the turbine proposal. Vera "played the devil's advocate" for a while. She believes that on Árainn, the wind turbine proposal will not be supported for its environmental merits. The electricity currently used is produced on the mainland: so why should the renewable electricity be produced here? If there was threat of a developer putting a wind turbine on the island, the case for community ownership would be easily made - but Árainn is too far out and there are too many restrictions to make it interesting for a commercial developer (more on this in Chapter 4). Energy self-sufficiency, that CFOAT aims for through local renewable energy

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[31] Interview with Vera, 6 February 2020, the Hill Farm
[32] The two CFOAT employees spend most of their time on EU-funded projects, see page 33
[33] Wind turbine sub-committee meeting, 20 February 2020, Co-op offices

production, will not happen on the Aran Islands unless the transition is driven by the community. And: the only reason for the community to support the wind turbine proposal, according to Vera, are the community benefits CFOAT envisions. [34]

The local community facilitates many of their own service-provisions, in energy too. This happens through their own community development co-operatives (on Árainn and Inis Oírr) and development company (on Inis Meáin). These represent the island communities externally and campaign on issues like transport services, waste and water infrastructure, health and education. Moreover, they provide some services locally. On Árainn, the co-op (as it is referred to in daily life) is involves in e.g. the library, community employment schemes, and the recycling and fuel distribution centres. While community development co-operatives are legal entities, are the official representatives of the island communities, and are government-funded, they are not a level of government and therefore have no jurisdiction.[35]

CFOAT was preceded by a sub-committee of Árainn's development co-operative, that started in 2002 and was focused on alternative energy technologies. This committee invited guest speakers and organized day trips to renewable energy facilities on the mainland. CFOAT was established in 2012, when a German blow-in (who had privately invested in wind turbines before) asked the guests of his birthday dinner in a Cill Mhuirbhigh restaurant to join him in setting up an energy co-operative.[36] This founding board, of whom some are still board members, formulated a vision that is laid out in the co-operative's aims and objectives (Figure 2). These show that CFOAT's envisioned energy future is about utilizing local sources of energy to support the community across the three islands.[37] Two main areas of benefit that are part of this vision are that of increased energy autonomy, and of the so-called 'secondary benefits' of owning a renewable energy generator.

A brief note on energy autonomy

These benefits of control over energy supply and of ownership of electricity production (most notably profits, the magnitude and meaning of which will be discussed later in this chapter and in Chapter 4) are made possible by the 'techno-logic' of renewable energy. As explained by German politician Hermann Scheer, energy production from renewable sources like solar and wind power can take place locally

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[34] Conversation with Vera, 20 February 2020, driving between Cill Ronáin and the Hill Farm

[35] John, email contact, 8 August 2020; Heaslip 2017

[36] Interview with Peter, 4 March 2020, Peter's kitchen

[37] It is not the only body working on the transition: Inis Oírr has a very active energy sub-committee within their island co-operative (Heaslip 2017). It works on the energy transition, together with CFOAT as well as independently, and its efforts have been lauded by several of my participants.

Comharchumann Fuinnimh Oileáin Árann Teoranta

Ionad Colm Ó hIarnáin, Cill Rónáin, Inis Mór, Aran Islands, Co. Galway

The objects of the Society are:-

- To secure the future energy needs of the three Aran Islands by gaining a controlling interest in the local sources of alternative energy production.

- To reduce and gradually remove the dependency of the Aran Islands communities on fossil fuels (oil, gas, coal, including transport) by replacing them with alternative and more sustainable sources of energy.

- To preserve the islands' unique language, heritage and culture by providing sustainable employment and a sustainable environment for people to live in.

- To facilitate the conversion of homes and other buildings on the three islands to be more sustainable in their energy usage.

- To provide low-cost energy to industry so as to create employment on the islands

- To create, provide and encourage employment in projects of sustainable energy

- To facilitate and at least part-own initiatives and projects in research and development into sustainable energy.

- To provide education and training to both residents and non-residents in sustainable living.

- The create on the three Aran Islands an example of best practice In sustainability to the rest of Ireland and to the world.

- To use the three Aran Islands as a platform from which to promote sustainability and environmental protection worldwide.

Figure 2 - Aims and objectives of CFOAT, available through http://www.aranislandsenergycoop.ie/wp-content/uploads/2016/02/AIMS-OBJECTIVES-Fuinnimh-GaeilgeBearla.pdf

or regionally in a way that is impossible for nuclear and fossil energy infrastructure, that is characterized by long supply chains. In his vision, renewable energy technologi(e/c)s make a decentralized ownership over energy supply possible, leading to autonomy over energy supply (Scheer 2007). Because of these technological aspects, renewable energy has an "energetic potential not only as a source of power but as a source for imagining politics (…) anew" (Howe 2019: 19). Germany's Energiewende (energy transition) is an example in this sense, as it is "marked by high penetration of locally- and co-operatively-owned renewable generation, as well as significant remunicipalisation of energy infrastructure and services" (McHarg 2016, 15). It serves as inspiration for the 'energy democracy' movement, which emphasizes democratic control over energy production, in which citizens are not mere consumers, but also produce, own and share energy (ibid.).

However, renewable energy can also be used to "repeat the extractive logics that have sustained carbon modernity" (Howe 2019, 15; see also Argenti & Knight 2015). The technical (and increasingly the economic and social) potential of renewable energy infrastructures beg the question: how will we structure ownership, influence, and political power over them?

Visions of self-reliance

In the case of the Aran Islands, CFOAT strives to make the renewable energy infrastructures community-owned. If the community owns the generation capacity, they have some control over their electricity supply, and become less dependent on the mainland for their energy. Furthermore, they will own the profits from selling electricity, that CFOAT aims to use to strengthen the local economy and support the community. CFOAT strives towards energy self-sufficiency (Gash 2020), but I also recognized a vision of economic and social self-reliance.

At this stage, the goal of 'self-sufficiency' is envisioned through offsetting annual production and demand. A local renewable electricity generator should produce the islands' annual electricity demand, but not necessarily at the time it is being demanded: the electricity will be fed into the grid at the moment it is produced (depending on the intermittency of wind, in this case).

In the long term, however, a locally owned and operated smart microgrid are envisioned. As John explained to me, these are still complex technological issues, and the feasibility of this ideal is still being investigated.[38] In simplistic terms, 'micro' indicates a small grid that uses local production facilities and storage, with a

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[38] John, email contact, 8 August 2020

connection to the utility-scale grid that it can use or disconnect from flexibly, while 'smart' indicates a grid that can align internal supply and demand through advanced information- and communication technologies (Kuang et al. 2016). On Árainn, an independently functioning grid would require local energy production, robust storage methods, and smart technologies, as well as further electrification of e.g. transport and heating on the island and more production capacity to cover this extra demand.[39] The connection through the subsea cable would still be important, although its role would shift towards balancing the grid and exporting excess energy from local production.[40] This all would make the islands less dependent on imported energy in the shape of electricity and fuels. Furthermore, it would give them control and ownership over their own energy supply.

But local energy production would also lead to autonomy in a different sense. Indeed, Nancy expressed a vision of a community that is empowered and self-reliant, through energy production.[41] A big part of this envisioned empowerment comes from what CFOAT calls 'secondary benefits'. While referred to as secondary, these economic and social promises a local electricity generator hold seem to be the primary motivation for the project. Through targeted investment of electricity profits the wind turbine (in this case) is seen as a tool to help deal with two major vulnerabilities that are currently inherent to the Aran Islands: firstly, that of the tourism-based economy, and secondly, that of population decline.

In early February, when the coronavirus was not yet on our minds, John already warned me of the danger of tourism being the Aran Islands' main source of income. The islanders "leave themselves vulnerable to a market that they have no control over," he said.[42] A little over a month later, Árainn islanders decided to request tourists to stay away from the islands by a telephone vote.[43] The rest of the country went on lockdown shortly after. Linda, CFOAT's bookkeeper, estimates that 90% of incomes on the island are dependent on tourism.[44] In a news article on the situation on the island, published in early May 2020, an islander states: "There is no fall-back. Our livelihood has been put to sleep. And we like to be independent on Aran. That is what motivates us" (Duggan, 2020).

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[39] Interview with Peter, 4 March 2020, Peter's kitchen; Transition Agenda 2019

[40] John, email contact, 8 August 2020

[41] Interview with Nancy, 21 February 2020, souvenir shop

[42] Interview with John, 10 February 2020, John's house

[43] Comharchumann Forbartha Árann. 2020. "Statement." Facebook, March 15, 2020. https://www.facebook.com/comharchumann.arann/posts/3163287623695154

[44] Interview with Linda, 26 February 2020, in a pub

Another threat for Irish island communities is population decline.[45] In 1841 there were 106 inhabited islands off Ireland (Royle 2003), in 2016 only 27 were inhabited.[46] On Árainn, Peter describes the population as a "demographic time bomb ticking away."[47] Young people from the island go to the mainland to go to college, and many do not come back because of a lack of job prospects.[48] There are few opportunities for year-round employment on the islands,[49] and it is not uncommon for islanders to engage in multiple areas of employment. These declining population sizes mean that some services that make life easier, like a local dentist, are not available on the Aran Islands. Others, like the postal service and police service, are under constant pressure, and one of Árainn's schools closed recently.

Local renewable energy generation is envisioned as a solution to both of these problems. This new, independent source of income could diversify the economy in multiple ways. It could be a source of year-round employment directly within CFOAT and on maintenance of the generator (in this case, the wind turbine). Indirectly, the investment of electricity profits into the community allows a much broader vision of "an improvement in the quality of life, pride of place, comfort of the home, and general prosperity."[50] The shareholders decide on where investments will be made, but my participants have suggested further sustainability efforts like the retrofittings of homes; refurbishing the community hall; funding local sports facilities; boarding school grants for students; an arts & crafts centre; the development co-operatives; a museum; a public transport system; and child care services. John envisions that job creation (also through these investments) and the "re-energizing"[51] of community life could help the island battle population decline by providing job prospects for young islanders, as well as attracting new people to move to the island.[52] Overall, community ownership of an energy generator is envisioned to be an enormous impulse for the island community.

Renewable energy technologies make local, small-scale production of electricity possible. This allows communities to own and control their energy generators which, in turn, can lead to increased energy autonomy and help support the local community. On Aran, CFOAT envisions the energy transition as a tool for

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[45] This is echoed by Comhdháil Oileáin na hÉireann, or: the Irish Islands Federation, http://oileain.net/
[46] "Populated off-shore islands," Department of Culture, Heritage and the Gaeltacht. Accessed March 11, 2020 https://www.chg.gov.ie/gaeltacht/islands/populated-off-shore-islands/
[47] Interview with Peter, 4 March 2020, Peter's kitchen
[48] Interview with John, 10 February 2020, John's house
[49] Interview with Peter, 4 March 2020, Peter's kitchen
[50] John, email contact, 8 August 2020
[51] Peter called this "re-energizing" in our interview, 4 March 2020, Peter's kitchen
[52] Interview with John, 10 February 2020, John's house

"revolutionizing" the economy,[53] and "re-energizing" the community.[54] It can bring a stable income stream that is controlled by the islanders, and will be invested within the island community. The envisioned technical, economic, and social outcomes point to a broader ideal of self-sufficiency: that of a community able to stand on its own feet.

Policy possibilities

Political scientists Bomberg and McEwen, who studied CEPs at length, hold that 'non-material resources' such as the quest for autonomy help galvanise local support and so partly determine success for CEPs. However, perhaps more important is their ability to exploit 'structural resources'. These refer to the political environment that structures and constrains opportunities in terms of supporting policies as well as "the wider political opportunity structures characterising a political system, including its openness, access to policy-making systems and engagement with state or other policymakers" (Bomberg & McEwen 2012, 437).

In their attempt at making infrastructure, CFOAT is "embedded in a network of political relationships that can facilitate – or hinder – action" (ibid.). These supporting policies and opportunity structures can be seen as Latour's 'things' that "might authorize, allow, afford, encourage, permit, suggest, influence, block, render possible, forbid, and so on" (Latour 2005, 72). In CFOAT's case, things might include e.g. technical, organizational, and financial support policies. They point out relationships in the Network where a lot of negotiation with the outside world (and often: institutions) takes place. While there are many structural resources to explore, the remainder of this chapter will focus mostly on those relevant to CFOAT's wind turbine. This includes the necessity for outside support for CEPs, Irish renewable energy targets and policy support for CEPS, and CFOAT's ability to successfully navigate and negotiate the possibilities of this network.

CEPs' need for support

While those leading a CEP might have a vision, they do not necessarily have an expertise in renewable energy project development. The project relies on this (mostly volunteer-based) group, along with internal challenges they might face like management and commitment of board members, available time, knowledge, and skills (Seyfang et al. 2013). There is a wide variety in the backgrounds of members and employees of CFOAT: Vera has a university degree in communication, John is a writer and Celtic priest, Nancy is Árainn's seamstress... Their variety in age, occupation,

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[53] Interview with John, 10 February 2020, John's house
[54] Interview with Peter, 4 March 2020, Peter's kitchen

social circles and even living location on the island of its members and employees, will undoubtedly help in the process of raising support for the wind turbine. In the technical, financial, and legal parts of their project, though, the lack of experience and expertise in renewable project development sometimes poses challenges. At times, board members are reinventing the wheel or lack specific technical knowledge.

Therefore, CFOAT relies heavily on collaborations, research projects, expert input, knowledge sharing, et cetera. The 'social' network CFOAT has built is extensive, and includes people within government bodies that they work together with, like the Sustainable Energy Authority Ireland, and other people working on community energy, like their partners in Community Power Ireland. Another example is the Clean Energy for EU Islands Secretariat. Launched in 2017 and "created to facilitate the clean energy transition on EU islands from the bottom up" (date unknown), it aims to help local citizens, authorities, businesses, and academic institutions to work together for a clean energy transition. Because it was selected as one of the pilot projects, the Secretariat has written a Transition Agenda for CFOAT, a document outlining a 'strategic roadmap' for the energy transition on the islands. They have also produced visual impressions of the new wind turbine, that can be used during the public consultation process.

Indeed, and perhaps most of all, CEPs like CFOAT rely on government support. Scholars have argued that governments should provide support to CEPs in multiple areas: Seyfang et al. found that there is a "strong need for consistent policy support, as well as intermediary networks, to ensure [CEPs] have the resources they need to progress and achieve their objectives" (2013, 988). Haggett & Aitken argue that the role of the government should include the "provision of tools, knowledge and networks" (2015, 101).

Governments across Europe have started to encourage community-owned energy initiatives in the past two decades, hoping it will help them reach their sustainability targets (McHarg 2016, Haggett & Aitken 2015) and because "supporting community energy helps to generate support for renewable energy more broadly" (Bomberg & McEwen 2012, 439). In some cases, government support has translated to specific policy-initiatives. While the institutional (top-down) encouragement of bottom-up CEPs might seem contradictory, it is critical to their success – through funding, but also through 'in-kind resources' (Bomberg & McEwen 2012), like administrative and technical support.

Irish support for CEPs

In CFOAT's national context, the Irish government is criticised for a lack of action and little political pressure towards reaching their 2020 sustainability targets (Transition Agenda 2019). Ireland is bound to EU carbon emission reduction targets, and has a 2020 policy goal in which 16% of final energy use must be from renewable sources, with a share of 40% of renewable sources for electricity. However, Ireland is not on track to meet these targets.[55] Moreover, Strain and Barry found that Irish renewable energy targets were under-ambitious, and national policy for onshore wind projects was incoherent and "not supportive of community participation and ownership" (2017, 4).

However, during my time in the field, the new Renewable Energy Support Scheme was published, a climate action plan that should allow a move to 70% renewable electricity by 2030 (Dept. of Communications 2020). In this auction, energy developers can submit bids for a guaranteed price they want to receive for units of renewable electricity their projects will generate. In a game-changing move, the scheme has a community preference category through which community-owned projects can obtain a contract (O'Sullivan, 2020). This, in combination with other community-focused guidelines in the scheme, shows a shift in Irish energy policy. The minister emphasized: "We must ensure local communities are involved in projects in their area if we are to deliver on the scale up that is required" (Dept. of Communications 2020). The recognition and support for CEPs has been described as "a very positive step in the right direction for energy democracy" (Ruddock in O'Sullivan 2020).

This new scheme is both a supporting policy and an example of access and engagement (and: negotiation) between CFOAT and governmental institutions. After meetings with civil servants and a visit from the Minister for Energy, the CEO of Sustainable Energy Association of Ireland and other key people to the islands, CFOAT was used as an example in an important 2015 energy policy document,[56] in a chapter devoted to the role of citizens in the energy transition. John remembers: "when the [document] was eventually published we could see that we had had a big influence on the way it emphasised community participation."[57] The document was specifically mentioned as having led to the creation of the new support scheme.[58] Furthermore, John and Vera were directly involved in drafting that scheme, representing the point of view of community projects within the consultation.

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[55] *Renewable Energy in Ireland 2020 Update*. Dublin: Sustainable Energy Authority Ireland, 2020.
[56] *Ireland's Transition to a Low Carbon Energy Future 2015-2030*. Dublin: Department of Communications, Energy and Natural Resources, 2015.
[57] John, email contact, 8 August 2020
[58] *Renewable Electricity Support Scheme (RESS) – High level design*. Dublin: Government of Ireland, 2020.

Negotiating funding

A lot of work needs to be done before CEPs can apply for an RESS auction: they need planning permission and a grid connection (an entirely different material, technological and institutional negotiation in its own right). To reach such milestones, CEPs often have to overcome "formidable barriers" (Bomberg & McEwen 2012, 435), that might include the liaison with communities, and legal, financial, and technical viability issues that need to be negated (Heaslip et al. 2016, see also Haggett et al. 2013 and Creamer 2015 on financial issues). In my time with CFOAT, I have seen some of these challenges in practice.

In one of the board meetings I attended, Linda presented the quarterly budget overview. She explained that if none of the four hoped-for sources of funding come through, it will be hard for CFOAT to break even this year. She has been limiting her working hours for CFOAT to lower the cost of her employment.[59] This is nothing new: structural funding for the co-operative is hard to find. CFOAT takes part in several EU research projects (for example two projects on hydrogen utilisation) and has been approached for other studies. Partaking in these studies is a way for CFOAT to keep its head above water financially (and to work towards the goal of helping research & development into renewable energy technologies). Funding income from these projects has already allowed CFOAT to provide jobs to several islanders, and helps pay for structural costs like legal and administrative fees. In return, Vera and Linda spend the majority of their time on these projects and the large administrative burden that comes with them.

Structural funding is not the only financial challenge CFOAT faces. Projects like a wind turbine require funding to cover the 'capital gap' (Walsh 2016): the high-risk costs that need to be made during the pre-planning phase (see Walsh, 2016; Seyfang et al. 2013; Bomberg & McEwen 2012). This includes costs for e.g. feasibility studies, grid connection, and environmental impact assessments. Among the ideas for the new support scheme was a 'soft loans' structure, aimed at helping community energy projects through this process. The money should be paid back if the project gained planning permission, but would be considered a grant if it not. However, these loans have not been made available yet. Finding funding requires flexibility from CEPs, and Vera was already working on applications for funding from an EU initiative aimed at bringing island energy projects to an investable stage.[60]

CEPs, while initiated and led by local people, need institutional support – in fact, their success might depend on their ability to exploit such structural resources.

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[59] Linda in a CFOAT board meeting, 19 March 2020, online
[60] Vera at Wind turbine sub-committee meeting, 20 February 2020, Co-op offices, talking of NESOI

CFOAT is negotiating these possibilities, e.g. through making use of funding opportunities, building an extensive network, and enjoying strategic support from an EU secretariat. However, there are many obstacles to overcome, for which government support is needed. At the same time, institutional support is not a one-way street: CFOAT also exploits structural resources through actively contributing to the formulation of policy frameworks.

Chapter conclusion

This chapter has looked at the envisioning and negotiating of the energy transition on the Aran Islands as a community energy project. It has zoomed in to CFOAT, a part of the Energy Infrastructure Network where visions of self-sufficiency require negotiations with the outside world. Renewable electricity generators make decentralized energy production possible, enabling Aran islanders to own energy and use it to their benefit: in increased energy autonomy, as well as through investing the profits into the community. This vision is important for the islands: it can "revolutionize" a vulnerable economy, as well as "re-energize" a community under pressure. However, to get energy projects to an operational stage, CEPs require institutional support – e.g. technical, organizational, financial, and policy-related. Structural support for CFOAT is hard to find yet. However, the Irish government is increasingly involving communities in their energy policy and CFOAT tries to exploit, and actively negotiate, such structural resources. We have seen that institutional support is necessary, especially in negotiating structures as big as a wind turbine. The proposal for a wind turbine has been an integral part of CFOAT's vision from the beginning, and this (for now, imagined) turbine is a point in the network is a vision that also points to a range of other negotiations. These will be analysed in the next chapter.

Chapter 4 – Imagining a Wind Turbine

On an afternoon in early March, I sit down in one of the island's pubs for a coffee and to do some work. Although it is big, the bar feels cosy, with wooden floors, dark ceilings, and walls covered in paintings and newspaper clippings. After about an hour of work I get ready to leave and head to the shop before it closes. As I pay and walk out, a group of men sitting around the bar want to know who I am, and I introduce myself. When I explain to them what I am here to research, some of them voice opinions on CFOAT and wind turbines, and want to share these - and so I agree to come back to chat with them.

When I get back, we sit down at a table in the corner. Almost immediately, one of them takes the lead and loudly voices his insights on wind turbines He is a blow-in, meaning that while he lives here now, he is not originally from the island. He refers to a big wind turbine project in his home country, saying "there is no wind there!" He also refers to Germany, a country that "has built many wind turbines over the past decades, but still burns coal!" He insists that wind turbines just don't work - regardless of whether the wind is blowing. There is no arguing with him (not that I would want to) - he is against having a wind turbine on the island, in this landscape. There is something about the island that made him stay here, and a wind turbine does not fit in with that 'something'.

<u>Introduction</u>

In the visit of Saint Colmcille, a legend from Árainn's folklore, Colmcille lays a curse on the island after his claim to a piece of land is denied (O'Sullivan 2017). No trees would grow or turf would form on the island, meaning there were no local fuel sources. However, as put by John: "we have wind and we have solar and we've got waves, and Colmcille knew nothing about the possibilities of those as energy sources, so we're working on that now!"[61]

This chapter will focus on the energy transition on the Aran Islands as it is envisioned and negotiated in the proposal for a wind turbine. Zooming in to this (for now, imagined) part of the Energy Infrastructure Network sheds light on the landscape and nature of the Aran Islands, those that live within it, and the wind they live in. CFOAT's proposal for a wind turbine makes the embeddedness of infrastructure blatantly clear: placing a wind turbine on Árainn requires negotiations of (among others) the environment, local support and heritage policy. In a way, this chapter is the culmination of the previous chapters: it will refer back to the power of wind, material

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[61] In Part 2 of Morning Ireland's Sustaining the Islands series, a radio report made by Juliette Gash, published in August 2019. Available through https://soundcloud.com/morning-ireland/sets/sustaining-the-islands

realities in installing a wind turbine, and political possibilities for community-owned wind turbines.

This chapter will firstly analyse the wind 'resource' of the Aran Islands. Secondly, it will turn to three instances of negotiation surrounding the wind turbine proposal: material negotiations of erecting a wind turbine on Árainn, raising local support, and finally the protection of national heritage.

<u>Wind forecasts</u>

In early March I interviewed Peter, in the kitchen of his comfortable house. I was surprised to find out he built most of the house himself. His experience in plumbing helped, he explained. His house was part of one of the first rounds of the retrofitting program through CFOAT. "That's what CFOAT started off as," he recalled, "to support our program of upgrading people's homes, to make them warmer, and more energy-efficient. But always in the background we had the idea that we should be able to generate our own energy on the island, without having too much of an impact on the landscape. The most economically viable method seemed to be wind: actually, one 2.3MW wind turbine on the island would be sufficient to provide energy to all the homes on the island[s]."[62]

Ultimately, the island microgrid would need a mix of energy sources, and CFOAT is looking at wind, solar, and wave energy. John explains that currently, the envisioned method for energy production is a wind turbine.[63] Wave energy is not developed enough to be economically feasible yet, [64] and solar requires large plots of land. Ultimately, though, John says the turbine proposal has just "come to a head first."[65]

As was described in Chapter 1, the Aran Islands deal with strong winds. This wind power influences the landscape and island lifestyles - but it also holds a promise. The reduction "from element to condition and from an experience into a resource that generates power" (Howe 2019, 24) that was not made then, I will briefly make here, to illustrate the promise of wind power that CFOAT sees.

A wind turbine could produce a lot of electricity on Árainn. In the Energy Master Plan, a commissioned review of the energy situation and opportunities on Árainn and Inis Meáin, the Aran Islands' wind is described as an "extremely high quality wind resource" (Rivas, Stanley, and Forkan 2018, 48). Figure 3 displays mean wind speeds at 75 metres height, which is around the lowest hub height available for

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[62] Interview with Peter, 4 March 2020, Peter's kitchen
[63] John, email contact, 8 August 2020
[64] Interview with Peter, 4 March 2020, Peter's kitchen
[65] John, email contact, 8 August 2020

the turbine model CFOAT is currently looking at.[66] The capacity factor is a percentage that indicates how much of its capacity a wind turbine produces on a yearly average, and depends on e.g. wind speeds. In a 2014 feasibility study for CFOAT's earlier turbine proposal (more on which later), a capacity factor of 38,6% was assumed for this model[67] - compared to an average capacity factor of wind turbines in Ireland of 27,5% in 2017.[68]

Next to its high production potential on Árainn, wind energy technology is an established technology with proven profitability. My participants described it as 'bankable': they believe it would be possible to get affordable loans to pay for the wind turbine.
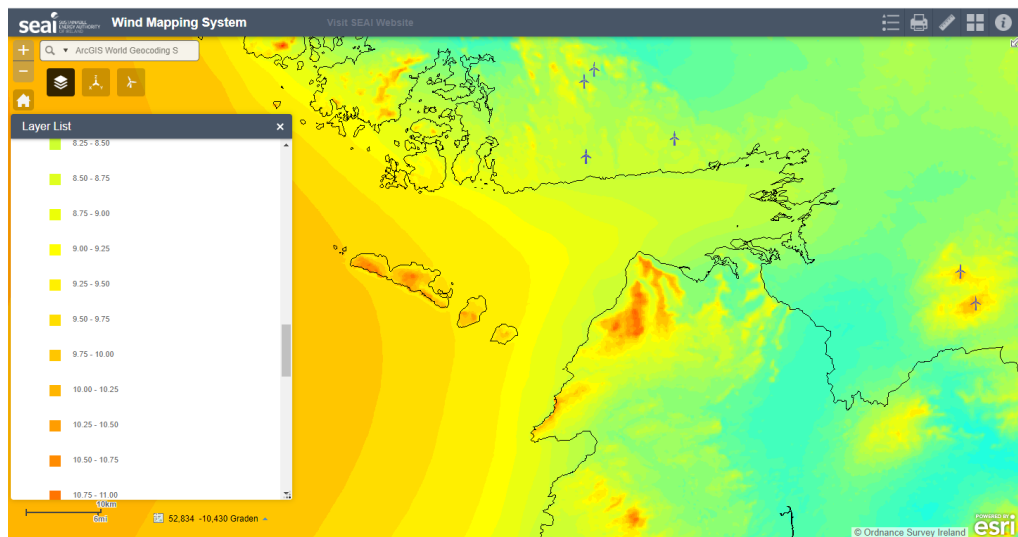

Figure 3 - Screenshot of mean wind speeds at 75 meters altitude over the Aran Islands and neighbouring mainland areas. Wind speeds on Árainn range from 9,20 to 11,00 meters per second. Wind turbine symbols indicate current wind farms.
Source: SEAI's Wind Mapping System, accessible through https://gis.seai.ie/wind/
Screenshot by author.

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[66] Hub height means the height from the turbine's ground platform to the rotor. The model CFOAT is currently using as an example has available hub heights ranging from 78 to 138 metres. Generally, wind speeds increase with altitude.

[67] *Fuinneamh Oileain Arann Comharchumann Teoranta (Aran Islands Energy Co-op) Wind Turbine & Community Engagement Report*. Cahir: Tipperary Energy Agency Limited, 2014.

[68] *IEA Wind Technology Collaboration Programme 2017 Annual Report*. Roskilde: IEA Wind Technology Collaboration Programme, 2017. Available through:
https://community.ieawind.org/HigherLogic/System/DownloadDocumentFile.ashx?DocumentFileKey=3f9ff5cc-2a0a-c84f-8392-5c54e345f51c

The high potential for production, coupled with affordable financing, lead CFOAT to envision high profits from the turbine. On a promotional leaflet that was distributed on Árainn in late 2019, CFOAT states that "one 2.3mW turbine could be expected to turnover approx. €250,000.00 per annum into the local community, after the initial payback period of 5-10 years."[69] These numbers are based on a calculation provided by a wind turbine sales representative. While they are an estimate, they provide an insight into the magnitude of the promise of 'secondary benefits' this turbine holds in the eyes of CFOAT.

Negotiating a wind turbine

Before a turbine can be placed on Árainn, several instances of negotiation will need to be worked through. While some issues will likely only surface once the proposal is actually made, I have felt some of the tensions, indicating the necessity for negotiation, in the field already. The rest of this chapter will be devoted to three sets of negotiations that surround CFOAT's wind turbine proposal. First is the possibility for a large wind turbine on a small island, in the material negotiation between technology and environment. Secondly, CFOAT will only pursue their wind turbine project if a vast majority of the Árainn community backs the plan: they need to negotiate local support among people, especially relating to ideas of the environment. Lastly, the proposal will be a negotiation of the preservation of national heritage, in a three-way negotiation between people, environment, and institutions.

Material negotiation

As was explained in Chapter 2, not all renewable energy technologies are suitable for the islands context. Erecting a wind turbine on Árainn requires a negotiation between environment and technology – mediated, to be complete, by people and institutions. I will briefly show this negotiation of fitting a turbine into the landscape, because after all, an ANT-approach directs our attention to how non-humans interact, too.

Looking at the environment in terms of wind resource, Árainn's context seems ideal for a wind turbine. However, the island context makes for extra considerations in the placement of a wind turbine. Firstly: getting the turbine there. Is the pier big enough for such big structures as blades and other components, and the ships that carry them? And secondly: could these components make their way to the designated spot? John explained that four representatives from a wind turbine producer visited the island

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[69] Leaflet "Wind Turbine on Árainn", published and distributed by CFOAT in 2019. As a side note: turnover here means the expected profit that can be invested in the community.

and "they walked every step of the way" that the turbine would need to follow. While some stone walls would need to be knocked down and the electricity and telephone poles would need to be taken down to let the big components through, ultimately a 2.3MW turbine would be feasible, they said.[70] Furthermore, a wind turbine is not a standalone infrastructural object: it normally also requires other material objects, like access tracks, borrow-pits, and transformers (Harvey & Moloney 2013). These need to be considered in the design, too.

Negotiating local support

The visual impact of such a wind turbine design is a big influence in the second set of negotiations that will need to take place: that for local support. This negotiation requires sensitivity towards different ideas on what belongs in Árainn's landscape.

CFOAT intends to start the process of gauging support for the turbine with a Public Meeting. In this meeting, the location will be proposed and the secondary benefits the community could gain from a turbine will be explained. There seems to be a sense within CFOAT that not all islanders know about the 'secondary' benefits yet: "all they imagine to begin with is a turbine on a hill."[71] Others are unaware of the size of them: "they think it's jumpers towards the local football team."[72]

This proposal will not be the first time CFOAT proposes the idea of a wind turbine on Árainn: in 2014, the board commissioned a feasibility study and subsequently proposed a wind turbine on a very visible location along a main road. Vera (who was not an employee of CFOAT at the time) describes that people walked into the room and photomontages of the proposed turbine were everywhere.[73] Peter said "we were very naïve at the time, and the reaction was very loud and very vocal in opposition, so that was a good lesson that we learned."[74] My participants explained that the opposition was not aimed at the idea of a wind turbine on the island, but rather at the chosen location, and at CFOAT for undertaking this endeavour without consulting with the inhabitants first. After this experience, new criteria for a turbine location were set: further away from - and out of sight of - residential areas, not on a main tourist route, and "not in an area of visual beauty" (Transition Agenda 2019, 28). CFOAT has found a new location, more than one kilometre away from any residential buildings. Vera explains that a public meeting is really the step that needs to be taken

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[70] Interview with John, 10 February 2020, John's house
[71] Interview with John, 10 February 2020, John's house
[72] Interview with Linda, 26 February 2020, in a pub
[73] Vera at Wind turbine sub-committee meeting, 20 February 2020, Co-op offices
[74] Interview with Peter, 4 March 2020, Peter's kitchen

now: "it might take some time, but in the long run it will be a huge benefit to slow down now and get the support in place."[75]

This might become a lengthy process indeed as, as portrayed in the introductory vignette, some islanders want no wind turbine development on the island at all. Devine-Wright and Howes (2010) propose a framework for understanding such opposition to wind energy projects, based on the idea that these developments can disrupt the bond between people and place. I have found that this framework is a useful tool to make sense of some tense conversations I have had with participants.

Place attachment indicates the "emotional bond between individuals and/or groups and the familiar locations they inhabit or visit such as the home or neighbourhood" (2010, 271). Herein, place is seen as something that can be attached to for a physical and a social dimension (Van Veelen & Haggett 2017). The physical dimension includes a reliance on local resources, and the emotional connection to a landscape: places, typically natural landscapes, can "provide opportunities for psychological restoration" (Devine-Wright & Howes 2010, 272). The social dimension emphasizes social ties and "emotional attachment based on personal, historical or cultural connections to the area" (Van Veelen & Haggett 2017, 536).

The landscape of the Aran Islands carries deep spiritual meanings for many people. The islands have a long history of being places of pilgrimage and have countless sites of historical and spiritual significance, like old church ruins, standing stones, and holy wells. Traces of monks and saints go back centuries, while the Neolithic ring forts are also seen as proof of the 'spiritual energy' the islands have (Official Guide.. n.d.). Nancy describes the island's landscape as 'ancient' and appreciates that it has not been 'cemented over': "you're close to the hand that raised those rocks or built these things, so you get a sense of being very close to the stories, the mythology, the people that were here before, like going back two, three thousand years?"[76] Several of my participants on Árainn have, on separate occasions, talked about the 'energy' the landscape holds (for some, this was the reason they moved to the island).[77] In my understanding, this spiritual energy is a deep feeling the landscape holds for them, related to the 'uniqueness' of the terrain, a sense of time in the landscape, and the sense of – and exposedness to – power in the natural forces that surround the island (wind, tides, waves, et cetera). For the islanders, the entire island is seen as the 'place' they are attached to. The place and its landscape are not a backdrop: they are inhabited, and islanders are not passive in this relationship. Archi-

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[75] Interview with Vera, 26 February 2020, the Hill Farm
[76] Interview with Nancy, 21 February 2020, souvenir shop
[77] Note that I use 'place' or 'location' and 'landscape' interchangeably here, as my participants have used them interchangeably too.

Photo 8 and 9 – Ancient structures at the Neolithic Black Fort (Dún Duchathair) and the sun setting behind the remains of 11th century church Teampall Bheanáin

tect and scholar Laheen emphasizes the value of the Aran Islands' manmade drystone walls and other traditional practices. She argues that they tie together a 'cultural landscape' that is "intensively marked by the activities of the community. […] This kind of response to the natural environment reflects a community living in close contact with natural forces, a relationship with the natural world that is rare in contemporary life" (2010, 134). As Ingold puts it: "landscapes are woven into life, and lives are woven into the landscape" (2004: 333).

Devine-Wright and Howes argue that "how changes to places are interpreted, rather than the form of change per se, is critical in determining whether the pattern of association between place attachment and acceptance is positive or negative" (2010, 272). This way, both opposition and support for CFOAT's project can be understood.

The encounter I describe in the introductory vignette was not a standalone experience. Indeed, I have had several encounters with islanders opposing the idea of a wind turbine. These all happened over pints in one of the island's pubs, and most of these people were not open to another conversation on the topic. Some only wanted to comment wind turbines are 'ugly' and 'noisy', while what struck me in two other conversations was that the negative perceptions held by these participants related to ideas of exploitative wind energy projects led by developers. What was clear for all these islanders was that this island should not be 'tainted' with a wind turbine. The man from my vignette was very specific about this: he moved to the island because the place is very special to him, there is something about it – something in which a wind turbine does not fit. A wind turbine poses a disruption to his place attachment.

Still, the CFOAT board members and employees I spoke to exhibited a similar attachment to place, and some of them have also moved here because of the same experiences (e.g. spiritual energy, living close to nature). However, for them, the imagined wind turbine fits the nature of the island, at least for now. Peter stated that "one of the best resources that the islands have, apart from its people, is an abundance of wind,"[78] and Nancy told me: "the idea that we could actually harness it, and make power of it, give us our light, our heat, our energy, I think, is intelligent (…) it's an awful shame not to harness that energy."[79] Of course they also recognize the visual impact of the turbine – however, they emphasize how it will support the community (Nancy) and that it need not be there forever (Peter). "In the next 30 years we were hoping that marine and tidal energy will become much more economically viable," Peter adds.

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[78] Interview with Peter, 4 March 2020, Peter's kitchen
[79] Interview with Nancy, 21 February 2020, souvenir shop

For some islanders the imagined wind turbine relates to exploitative developers, or to an ugly and noisy machine, while for others it is a symbol of empowerment and an intelligent harnessing of local resources that they, as aeolian subjects, are intimately connected to. Indeed, in CEPs, Van Veelen and Hagget (2017) found that place attachment not only informs responses to the project (as it would in developer-led projects), but is a driver for them as well.

The infrastructure's future on Árainn is dependent upon (among other factors) the social support for CFOAT's turbine proposal – and the meanings the islanders will see connected to that imagined turbine. In the process of raising local support, it will be crucial to establish positive associations with the imagined wind turbine, as something that fits in this windy landscape and can be productive for the community. The wind turbine so shows how infrastructure is embedded in symbolic meanings, and the presence of narrative and semiotic actants in our Energy Infrastructure Network.

National heritage negotiations

If CFOAT does not reach majority support for the turbine proposal, they will not go ahead with the project. If they do, more issues are foreseen: "it's not just local support, that's vital that we have that, but one of the biggest problems we have is that because of the uniqueness of the island, the planning laws are the most stringent of probably any place in the country, and getting planning permission will be our biggest hurdle" says Peter.[80] Indeed, the third set of negotiations required for the wind turbine is that of national heritage preservation.

Onshore wind farms might impact Ireland's heritage, that consists of "landscape, cultural heritage, and natural heritage assets" (Harvey & Moloney 2013, i). Whereas the Aran Islands used to be a pilgrim destination for the religious and spiritual, since the eighties they "have become a 'Mecca' for those interested in Irish culture" (Slater 2003, 105). Due to their peripherality and "remoteness from the centres of power during the centuries of [English] colonisation and plantation" (Laheen 2010, 24), the islands (along with other parts of Western Ireland) have retained more of their traditional practices, and are now seen as "archetypically Irish" (Carden 2014, 263). The islands are part of the Gaeltacht area (Irish-speaking region) and are an important summer school destination for young students learning the language. Moreover, the ways of life on the islands are deemed important in preserving Irish heritage, e.g. traditional farming practices are being studied and revived here.[81] This heritage (which includes cultural-, landscape-, and natural heritage) is used in marketing the islands as

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[80] Interview with Peter, 4 March 2020, Peter's kitchen
[81] For example through the AranLIFE project that focused on local farming knowledge, that ran from 2014 to 2018.

a tourist destination, but it is also why "parts of Ireland's western coast have been singled out in government policy (...) since the nineteenth century," writes Carden (2014, 263). She continues: "concern has consistently centred on how to create sustainable industries in order to raise living standards, stem emigration, and maintain ways of life seen as both unique within Ireland and, somehow, fundamental to it" (ibid.).

Within the Irish government, the islands fall under the responsibility of the Department of Culture, Heritage and the Gaeltacht, that states "a central objective of the Department (…) is to ensure that sustainable vibrant communities continue to live on the islands" and that they "hold a wealth of cultural heritage."[82] As we have seen in Chapter 3, Irish island populations are declining rapidly, and they are under constant economic threat (Royle 2003). In the same publication, the Gaeltacht Department describes another offshore island's energy co-operative that works toward a wind turbine as "an innovative solution to address depopulation and emigration."[83] If such energy co-operatives are indeed seen as a way to 'ensure that sustainable vibrant communities continue to live on the islands' in order to preserve this valuable heritage, it would be to the government's advantage to support such CEPs.

However, policies focusing on landscape and natural heritage provide a contradicting tension in the government's position. Árainn's special nature is not only recognized by its inhabitants: it is also recognized and protected by multiple levels of government. The islands fall under the jurisdiction of Galway County Council, which is also where CFOAT will have to apply for planning permission for the turbine project. In the Council's Landscape Character Assessment, large parts of the island are classified as 'unique', the rest as 'special' in terms of 'landscape sensitivity'. This means they are the most sensitive to change through development. 'Unique' is the highest rating, and the report explicitly states this should exclude any wind farm development in those areas.[84] Furthermore, large parts of the island are protected under several European and national directives. Everything outside of the inhabited areas is designated as a Special Area of Conservation, that extends to about a mile into the sea. This designation is intended to protect specific habitats (and their inhabitant species) that are best examples of their kinds. The areas around the coast on the east, south, and

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[82] *Islands Policy Consultation Paper* (page 1). Department of Culture, Heritage and the Gaeltacht. Published December 2019, https://www.chg.gov.ie/app/uploads/2019/12/2019-islands-policy-consultation-paper.pdf
[83] Ibid., page 16
[84] *Landscape and Landscape Character Assessment for County Galway*. Prospect Hill: Galway County Council, 2015.

west are designated as a Special Protection Area, which serves to protect species of wild birds (Harvey & Moloney 2013).[85]

The location that CFOAT is now proposing is within a Special Area of Conservation. In fact, one of the first steps CFOAT has to take in their wind turbine project is to get permission from the National Parks and Wildlife Service to propose a development in this area. CFOAT hopes that a display of community support will help in gaining this permission – but they are aware of the challenge these protected areas will pose for their planning application.[86]

CFOAT's wind turbine proposal exposes a contradiction tension in Irish heritage preservation efforts, affecting both the continuation of community life on the Aran Islands, as well as the protection of their unique landscapes.

Chapter conclusion

This chapter has zoomed in on CFOAT's wind turbine proposal. Infrastructure is embedded: current infrastructure, but imagined infrastructure, too. The imagined turbine makes this embeddedness blatantly clear. The technological possibility to transform wind power to electricity so also relates to wind's power to transform the island communities, through the secondary benefit of high profits. The turbine fosters connections between actants that are already relevant within Aran's current energy infrastructure, as well as introducing some new topics for consideration like the power of non-human wind, and values held by the local community. While the process will undoubtedly bring about more instances of negotiation, such as over grid connection, this chapter has focused on the negotiation of material possibilities for a wind turbine, feelings of place attachment, and narratives around the preservation of national heritage, to draw attention to the diversity of relationships present within the Energy Infrastructure Network.

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[85] Precise position of the designated areas can be found through SEAI's Wind Mapping System, using the layers under 'NPWS'. The dataset was created by National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs

[86] Interview with Peter, 4 March 2020, Peter's kitchen; Interview with Linda, 26 February 2020, in a pub

Conclusion

This thesis has aimed to describe how infrastructural change for the energy transition is envisioned and negotiated on the Aran Islands. It has mainly focused on the vision of CFOAT, a local energy co-operative that "acts as a facilitator in the islands' clean energy transition" (Transition Agenda 2019, 21). CFOAT aims to make aiming to make the islands energy self-sufficient (also for its 'secondary benefits') through placing a wind turbine on Árainn.

In this thesis, I studied the energy transition as a negotiation over infrastructure between people, institutions, technology, and the environment (in Aran's context, the landscape and geophysical forces). I have approached infrastructure as an inherently relational concept, an "assemblage of people, objects, practices and institutions on which both the realization and distribution of patterns of connectivity, movement, flow and presence are dependent" (Di Nunzio 2018, 2) with the addition of non-humans and narratives to this definition (based on Murphy 2016). Breakdown makes infrastructure, and what it is embedded in, more visible (Star 1999) – something that is relevant for the Aran Islands, small islands where storms regularly lead to interruptions of transport- and energy infrastructures. This thesis has utilized this visibility of an island's connectedness to tease out those connections that surround the islands' energy infrastructure.

The emerging assemblage has been conceptualized using Actor-Network Theory (ANT) and has been referred to as the Energy Infrastructure Network. The ANT-approach has allowed me to focus on humans as well as non-humans, and on material as well as semiotic actants. My ANT-informed ethnographic approach "involve[d] exploring and 'unravelling' agentic elements" (MacLeod et al. 2019, 181), such as the power relation between wind and its aeolian subjects.

This approach to studying the energy transition on the Aran Islands has led to a description of the envisioning of-, and negotiation over, infrastructural futures between people, institutions, technology, and the environment.

The Aran Islands have a very special, and highly valued, environment. For some, it holds a spiritual energy. Strong winds are an inherent part of the experience of the Aran Islands. These winds were used as a starting point in this thesis, to introduce the islands, their landscape, and the weather-bound lifestyles of the islanders. These winds make the islands vulnerable to infrastructural interruptions. Furthermore, the islands are fully dependent on the mainland for their energy supply, which also puts islanders in a vulnerable position.

The production of renewable electricity locally, if community-owned, is envisioned to increase the self-sufficiency of the islands: both in terms of energy autonomy, as well as in terms of self-reliance of the island community. However, in their push for the energy transition, community energy project CFOAT depends on its negotiation of institutional support that can enable or limit the project's possibilities. Their wind turbine proposal is a wonderful case study of the embeddedness of infrastructure. It allows for visions of very high electricity production and profits that could be invested into the community, through harnessing Árainn's wind. At the same time, it points to negotiations over the technological possibility of fitting a turbine on Árainn, and to its place within the landscape, that is highly valued by local people as well as by institutions.

The Aran Islands are undoubtedly not unique in such negotiations between people, institutions, technology and environment. Indeed, many challenges and opportunities CFOAT faces are shared with other CEPs. Other geographically peripheral islands might be met with similar topics in their (community-owned) energy transitions – just like other remote locations, or those facing extreme weather circumstances. The ANT-informed approach, while fundamentally inexhaustive, has proven a useful tool to study negotiations over energy infrastructure. Using the Energy Infrastructure Network as a methodological tool to examine the inherent relationality of energy infrastructures has helped capture this intricate and complex assemblage - whether already materialized or imagined. The energy transition, then, emerges as fundamentally material and relational. This approach has allowed for recognition of the agency of non-humans, material objects, and things, and draws our attention to the relations between all actants, where the assemblage evolves and where things are made (im)possible.

As Watts puts it: "infrastructures (…) are place-based processes, not standalone objects (…). The islands' infrastructures – wind turbines, electricity grids – become entangled in island lives as they are installed and maintained, and become integral to how the islands are made as a practice" (2018, 168). On Árainn, where place-attachment runs deep, the first negotiation that will need to take happen is for local support. But even this takes place within the Energy Infrastructure Network: people talk (or refuse to talk) of the turbine's links with landscape, envision what the local electricity generation might bring to their community, and whether institutions will limit or enable such a development. Whether the Aran Islands will make a community-owned wind turbine part of their infrastructure, remains to be seen.
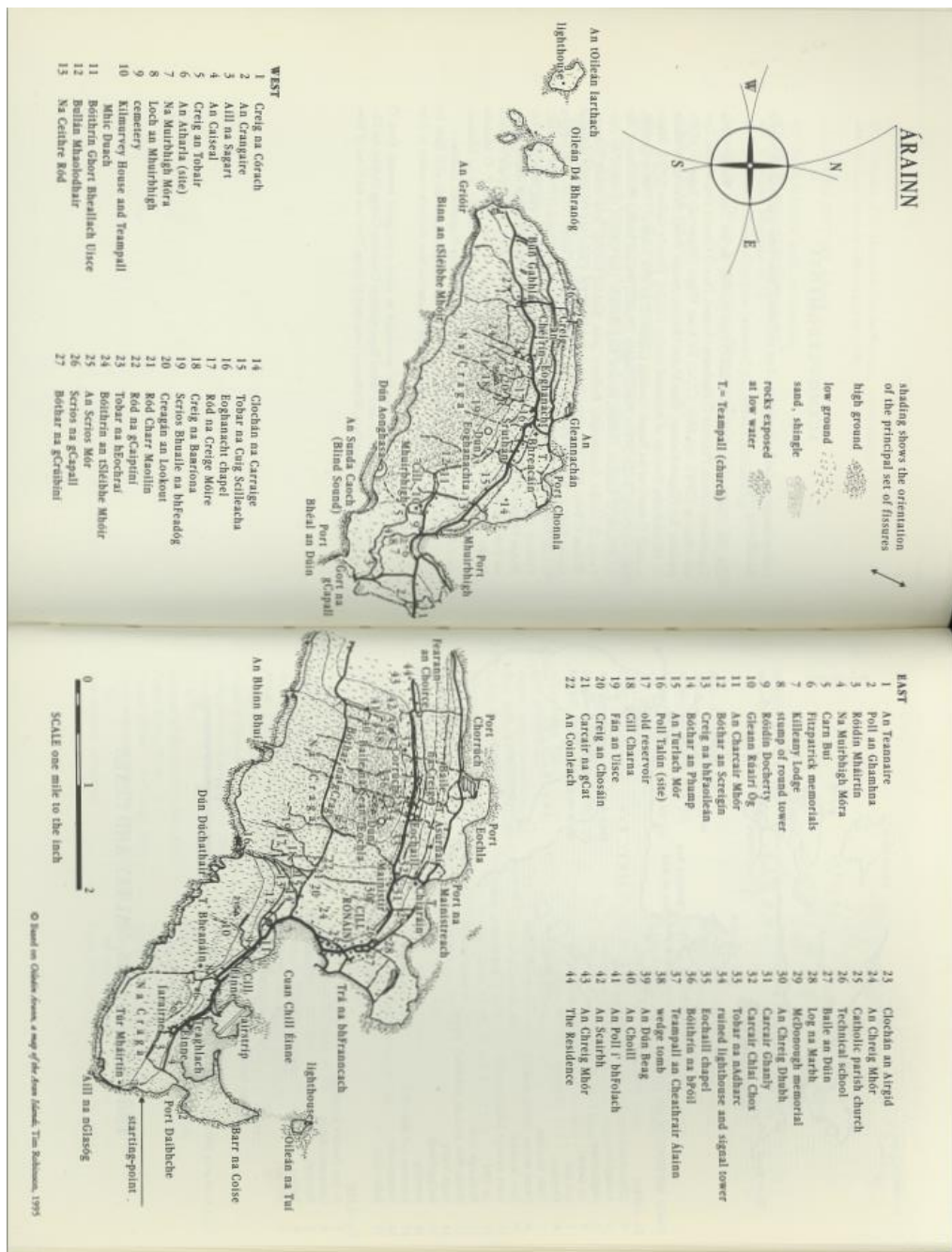
Map of Árainn

Figure 4 - Map of Árainn. Source: Robinson 1995, 474-475
Courtesy of the Lilliput Press.

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