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Title	Governance barriers to sustainable energy transitions – Assessing Ireland's capacity towards marine energy futures
Authors	Lange, Marcus;O'Hagan, Anne Marie;Devoy, Robert R. N.;Le Tissier, Martin;Cummins, Valerie
Publication date	2017
Original Citation	Lange, M., O'Hagan, A. M., Devoy, R. R. N., Le Tissier, M. and Cummins, V. (2018) 'Governance barriers to sustainable energy transitions – Assessing Ireland's capacity towards marine energy futures', Energy Policy, 113, pp. 623-632. doi: 10.1016/j.enpol.2017.11.020
Type of publication	Article (peer-reviewed)
Link to publisher's version	https://www.sciencedirect.com/science/article/pii/S0301421517307668 - 10.1016/j.enpol.2017.11.020
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Download date	2026-11-15 15:01:40
Item downloaded from	https://hdl.handle.net/10468/5408

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University College Cork, Ireland
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Energy Policy 113 (2018) 623–632

Contents lists available at ScienceDirect

Energy Policy

journal homepage: www.elsevier.com/locate/enpol

Governance barriers to sustainable energy transitions – Assessing Ireland's capacity towards marine energy futures

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ARTICLE INFO

Keywords:
Governance
Energy Transition
Marine Renewable Energy
Public Engagement

ABSTRACT

Marine energies (ME), including offshore hydcrocarbons along with marine renewable energies (MRE), such as offshore wind, wave and tidal energy, are increasingly important in the future energy mix of many nations. We observe that ME governance is complex, as development offshore involves engagement and may often result in conflict.

This paper examines the Irish case, where offshore gas and oil remain relatively undeveloped, and yet have provoked extensive controversy. Moreover, Ireland exhibits very ambitious plans for MRE developments. Against a background, where ME development seems to have stalled, the objective of the paper is to analyse the Irish governance setup and its capacity to deliver ME and whether the current system is equipped to enable transition to MREs. Current governance systems lack efficacy in terms of policy integration and enforcement, government oversight, and public trust due to past failures. Although, management approaches have been developed to address some of the barriers, domains such as policy/regulation, industry development and public engagement are disconnected.

Results presented may not simply be generalised, as each country context is different. An analysis of examples with similar issues must focus on studying the context of the governance setup and balances of power across domains.

1. Introduction

The world today is at a critical stage with regard to the management of its energy resources. Governments and societies around the world are facing the challenge to manage energy transitions and the decarbonisation of the energy sector (REN21, 2014). These challenges have become even more amplified since the adoption of the COP21 agreement, that aims to limit global warming to at least 2 °C by 2050 (UNFCCC, 2015). In this regard the importance of harnessing Marine Renewable Energies (MRE) has been recognized (IPCC, 2012; World Ocean Review, 2014). It is widely considered to be a promising means of economic development and job creation, whilst at the same time mitigating the impacts of climate change (IEA, 2014). However, due to the current pre-development stage of marine technologies, MRE is unlikely to make a significant contribution to climate and RE targets in some countries in the short-term, e.g. before 2020 (Berkhout et al., 2012; IPCC, 2012). For that reason and given the fact that in some countries indigenous offshore hydrocarbons provide the only resources for domestic energy supply both renewable and non-renewable resources have to be considered when discussing the short- and long-term priorities and targets for a future Marine Energy (ME) mix. In this context, ME includes offshore gas and oil along with MRE resources.

Abbreviations: DAFM, Department of Agriculture, Food and the Marine; DCCAE, Department of Communications, Climate Action and Environment; DCMNR, Department of Communications, Marine and Natural Resources; DHPCLG, Department of Housing, Planning, Community and Local Government; EEZ, Exclusive Economic Zone; FDI, Foreign Direct Investments; IMP, Integrated Marine Plan; IOSEA, Irish Offshore Strategic Environmental Assessments; LNG, Liquefied Natural Gas; MCG, Marine Coordination Group; ME, Marine Energy; MRE, Marine Renewable Energy; OREDP, Offshore Renewable Energy Development Plan; ORESG, Offshore Renewable Energy Steering Group; PAD, Petroleum Affairs Division; R&D, Research and Development

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https://doi.org/10.1016/j.enpol.2017.11.020
Received 22 July 2016; Received in revised form 25 September 2017; Accepted 10 November 2017
Available online 01 December 2017
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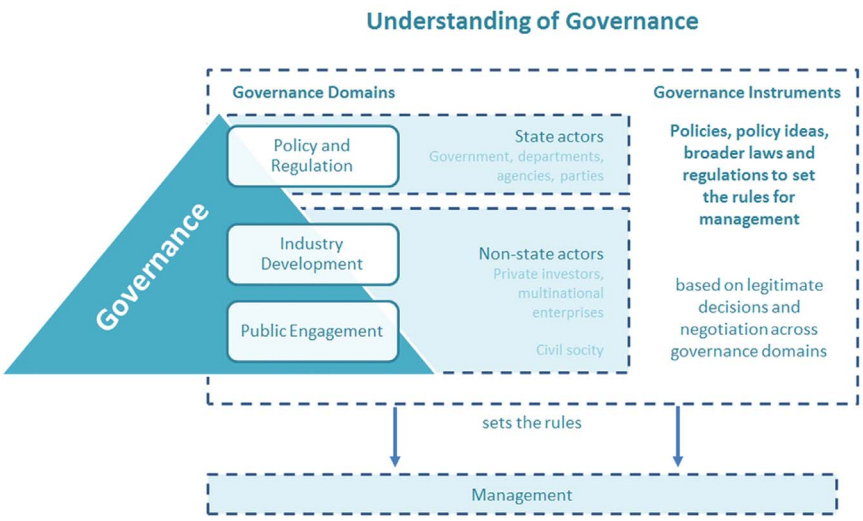


Fig. 1. Governance setup towards the setting up of rules for the management of human activities.

The idea is to use indigenous resources in a combined approach. This involves the exploration of indigenous gas and oil resources, while at the same time encouraging MRE resources before phasing out fossil fuel based resource extractions.

In terms of large-scale energy infrastructure and governance, there is a complex array of sectors and issues that need to be reconciled. This is basically due technological innovation that has triggered the exploitation of energy in more extreme environments and rural areas around the world often resulting in strong opposition. Prominent examples are the on-going opposition towards oil exploration in the Gulf of Mexico, to the extraction of tar oils sands in Alberta, Canada, and anticipated oil drilling in locations such as the Arctic, West Africa and Brazil. Large offshore wind projects also face widespread public and political objections, such as the large Cape Wind project off the U.S. East Coast (Williams and Whitcomb, 2007; Petrova, 2014) or wind farms in the North Sea (Lange et al., 2010). Opposition often occurred due to weak implementation of projects, reflected in persistent failures of the regulatory system and the way projects have been managed by developers not meeting local communities' expectations (Florini and Sovacool, 2009).

To date, some research has been undertaken on governance dimensions related to offshore gas and oil in the marine environment of the Artic and the Gulf of Mexico from either a law, policy, environmental, civil society or property right perspective (Gulas et al., 2017; Liu, 2015; Quist and Nygren, 2015; Johnson et al., 2013; Simas et al., 2015). Studies in this field have been focused on sectoral issues related to social assessments, technological, economic or environmental aspects. However, only limited research has been undertaken on governance dimensions covering a broad range of issues associated with specific developments in the marine environment (Kerr et al., 2014). As the pace and scale of global environmental challenges grow and social problems become more apparent there is a need to develop governance responses that are approached from a science perspective and other knowledge systems, such as indigenous, traditional or local communities (Feliciano and Berkhout, 2013).

There is also a need to address people's perceptions, and expectations and concerns of communities that are hosting energy infrastructure while at the same time considering the needs of policy, regulation and industry development and path-dependencies between those (Armitage and Plummer, 2010; Berkhout, 2002). In the context of research on global change, governance challenges call for new modes of knowledge production. The notion of co-production of knowledge in social science has been emphasized by international research initiatives, such as Future Earth (van der Hel, 2016).

For energy research this means that it is challenged to carry out research on governance environments that can facilitate the successful transition from ME to MRE. It is also challenged to carry out research in a multidisciplinary setting of various stakeholders to support co-production of knowledge. In the context of our research, this was a starting point to draw from lessons learned for the future by analysing the enabling conditions from the perspective of concrete large-scale ME projects. This article sets out to support an understanding of this knowledge transfer and learning.

1.1. Governance understanding and theory

Governance of natural resources describes how societies make decisions, share power, ensure accountability and take actions in response to diverse dynamics and complex challenges today (Folke et al., 2005; Kooiman, 2003). It addresses multiple possible modes of decision-making and involves multiple possible actors from government, industry, research and civil society (Biermann et al., 2009). It encompasses broader laws, regulations, policies and actions with which natural resources are managed (UNESCO, 2017). Governance from a policy perspective is the assemblage of institutions, instruments and individuals within civil society in order to enhance the legitimacy of the public realm (Kjaer, 2004). Central to this are formal and informal institutions, policies and policy ideas that are in use to set the rules for collective decision-making. Management distinct from governance is concerned with the application of these rules and operationalisation of policy visions (Folke et al., 2005). Thus, governance sets the stage within which management occurs (Olsen et al., 2011). van Tatenhove (2013) focusses on governance of marine use activities and dynamics within a framework of coalitions of governmental and non-governmental actors. Both groups are working together to engage in a way that enables a process of negotiation of the rules for activities at sea. In this regard, negotiation aims at reaching agreement between actors and nested institutions based on access to resources and different abilities to mobilize resources.

Fig. 1 highlights the theoretical governance understanding based on the authors referenced above. It also reflects the governance domains and the instruments setting the rules for the management of human activities.

1.2. Objective and justification of case study selection

Given the ambitions to develop its marine resources, including ME, we used Ireland as a case study for analysis. Against a background where ME development seems to have stalled, the objective of the paper is to analyse the Irish governance setup and its capacity to deliver ME,

whether this is offshore gas and oil, or MRE. This includes an analysis of whether the current system is equipped to enable stronger contributions of MREs and to manage large MRE projects. We used the three governance domains grounded in governance theory (Fig. 1). We evaluated Ireland's setup in the context of experiences with large-scale ME projects against all three by exploring the factors that could hamper developments, such as failures in policy and planning or bad experience with large-scale projects.

Ireland stands out as a feeder case study in three respects: *Firstly*, the Irish government has a stated aim to maximize the benefits to the country from indigenous oil and particularly gas resources and is ambitious to drive developments in the marine environment forward (DCENR (Department of Communications, Energy and Natural Resources), 2014b). However, to date only very little activity is underway. *Secondly*, in terms of MRE, the country has seen investments in MRE research and developments (R&D) and policy support is significant. The country has become a test-bed for energy devices and smart grid electricity solutions (EirGrid, 2012). It has also seen large investments in world class facilities around MRE R&D and the set-up of the Prototype Development Fund (administered by the Sustainable Energy Authority of Ireland), a principle funding mechanism for the sector (SEAI, 2014). The declared goal of the government is to use abundantly available indigenous MRE resources on a commercial scale, alongside other sources of renewables such as onshore wind and solar, and thereby transitioning the energy system from imported fuel dependency (DCENR (Department of Communications, Energy and Natural Resources), 2014a). However, the only offshore wind farm in the Irish Sea is operational since 2004 and no new MREs have been added or similar. Irish ambitions to become a global leader in MRE appear to have stalled. The *third* reason arises from Ireland's recent history and the opportunity to learn from conflicts, such as the development of the Corrib Gas project (Cox, 2014; Murphy, 2013). Because of poor project implementation and local opposition, at the time of commissioning, the project was 12 years behind schedule and €2.8bn over budget (see Section 3.3). Other examples are the ongoing opposition towards overland pylons and large onshore wind developments in the Midlands.

The first two reasons above make the case for a phased-strategy by exploring indigenous gas and oil resources, while at the same time harnessing MRE resources before phasing out fossil fuel. This is supported by the analysis (Chiodi et al., 2015), that even by following a low-carbon scenario of an 80% CO_2 reduction to 2050, hydrocarbons will likely be part of the energy mix as the transport sector in Ireland is very dependent on oil, whilst heating systems within residential homes and industry are reliant on gas. In the long-term, this phased approach will pave the way for larger use of renewables to unfold.

Below we draw on policy analysis of Ireland's governance framework to reflect on whether the system is equipped to enable a transition to MREs, enabled by improved management of large ME projects (Section 5).

2. Methods and approach

In order to analyse Ireland's governance framework towards marine energy futures, we address the specific policy context for ME and MRE. Central to this context is the government's visions, investors' ambitions and the history of examples of good and bad project implementation. The study was based on a qualitative approach involving desktop-based document analysis, followed by a collaborative approach involving a national "Marine Energy Governance Workshop" (referred to as the governance workshop in the following) and interviews. An in-depth case analysis of the Corrib Gas project formed part of the approach.

Policy analysis draws out the policy dynamics in terms of the implementation of ME developments (Section 3.1). For the case study presented, the institutional framework and policies for energy, offshore renewable energy developments and the maritime economy in Ireland were analysed. These include the Energy Policy (DCENR (Department of Communications, Energy and Natural Resources), 2014a) (published as White Paper on 16 December 2015), the Offshore Renewable Energy Development Plan (OREDP) (DCENR (Department of Communications, Energy and Natural Resources), 2014b) and Our Ocean Wealth - an Integrated Marine Plan (IMP) for Ireland (DAFM, 2012).

The governance workshop brought together twenty (N = 20) experienced leaders from across industry (chief executive officers from both the offshore gas and oil and MRE sectors) and government (semi-state, department, government, civil service) with governance, coastal and ocean experts. It was held in May 2015 in Newbridge, County Kildare, Ireland. Individuals from both groups were committed to the workshop, its format and they supported the event. International peers working in the ocean and coastal governance research field facilitated the discussion. Attendance of the event was by invitation only and it was held under Chatham House Rule. It was the first time actors with the power to influence decisions from both the renewable and the non-renewable energy sectors had come together to discuss Irish ME futures. Participants were selected as part of a *stakeholder analysis,* which was facilitated by advisors with extensive networks in ME. Ultimately we selected stakeholders given their expertise, their stake in marine economic developments, their broad perspective and their power to influence the energy transition in Ireland.

A *desktop analysis* brought together insights in technological considerations of ME developments, government visions and ambitions, and emerging issues (e.g. lack of integration and inefficiency). Section 3.2 sets the context for governance from a future energy perspective. How is Ireland envisaging energy transitions towards an enlarged share of marine energy resources? What can a vision look like and what are emerging issues and challenges?

As part of a *case study* of the Corrib Gas conflict that both informed, and was informed by the workshop, scoping visits to County Mayo and 30 semi-structured interviews with local citizens of the 'Erris community' at the West Coast of Ireland and the developer were conducted between February and December 2015. In order to analyse what caused the relationships to breakdown, interviewees were asked i) how decisions were made and ii) who took lead responsibility in the communication and implementation iii) at what point in the process did trust erode? The objective of the analysis was to understand major root-causes of breakdowns but also measures of good governance practice. In the following, we provide results of case study analysis along three governance domains in order to highlight common weaknesses in a current governance system and to explore governance responses to overcome those weaknesses towards energy transitions.

3. Results

3.1. Policy and regulation: institutional framework and policy analysis

There has been a number of policies relevant to marine and energy developments. Importantly for the ME sector, these include the Energy Policy (DCENR (Department of Communications, Energy and Natural Resources), 2014a), representing the most overarching framework for the entire energy sector, the OREDP (DCENR (Department of Communications, Energy and Natural Resources), 2014b) and *Our Ocean Wealth* (DAFM, 2012). Responsibility for strategic Energy Policy and the OREDP sits with the Department of Communications, Climate Action and Environment (DCCAE), which has the remit for both renewable and non-renewable energy policy. Whilst there is no plan for the hydrocarbon sector in Ireland, there have been five licensing rounds and accompanying Strategic Environmental Assessments, so called Irish Offshore SEA (IOSEA). Generally marine developments fall under the remit of the Department of Housing, Planning, Community and Local Government (DHPCLG), which has responsibility for foreshore licensing and leasing and general marine legislative functions (e.g. Marine Strategy Framework Directive, Water Framework Directive and is the

designated competent authority for Maritime Spatial Planning). Management of aquaculture and fisheries rest with the Department of Agriculture, Food and the Marine (DAFM). Given that the government shares responsibility for marine activities between a number of central Government departments and State agencies, an Inter-Departmental Marine Coordination Group (MCG) was established in 2009 with representatives from each department (and relevant State agencies) with a marine remit. The MCG is responsible for the oversight, delivery and implementation of the Government's *Our Ocean Wealth*, an Integrated Marine Plan.The complicated governance setup turned out to be a major reason for stalling ambitions. Another reason was a lack of the decision-making power of the MCG, which hindered decisions towards greater certainty for investors. Workshop participants mentioned existing structures that seek to address integration but those often only exist on paper. Decisions are rather influenced by political decisions, which are enforced through non-standardized practices relating to timelines and rules to make decisions. Decisions are shifted from one State agency or Government department to the other, which offers political bodies to escape responsibility. In this regard, respondents advocated a model like in Scotland, where the government tried to blend complex agencies and interests that have to deal with getting an application for developments at sea approved under one heading to make implementation easier.

Fig. 2 shows the different levels of integration across responsible Government departments and State agencies foreseen to implement applicable plans.

In spring 2016, the recent elections resulted in government changes. A minority government, based on a coalition led by one of the two major parties, Fine Gael, with the support of nine independent politicians (with a formal agreement that the other major party Fianna Fáil would abstain on matters of confidence and supply), was formed. Most importantly for the ME sector, some ministries were split, including the one responsible for marine affairs, for political reasons, which makes it even more complicated to integrate across various responsibilities. Planning issues in the marine environment were separated from the energy and natural resources department and are with the DHPCLG since. This caused policy fragmentation, which made the system more ineffective. The example shows that decisions that had impact on the governance setup towards ME were strongly politicized. This means that they were made based on political deliberations and not due to what is needed to support energy developments. Therefore, decisions followed political calculus rather than following a clearly defined strategy with formal guidelines of what is needed to support greater integration.

A minority of interview partners believed that a minority government might pose an opportunity for greater efficiency, because they expect intense negotiation on critical issues to bring about decisions. Workshop participants and interview partners agreed that intense negotiation and integration were called for in order to unlock economic potentials in the marine environment and to make governance of ME resources more straight-lined. Participants emphasized that particularly the MCG needs to fill an existing gap between policymaking and industry development by connecting the complex array of responsibilities involved in the management of energy transitions. This would apply to decisions needed in support of ME developments, such as financial support of private investment. It was further stated that the MCG needs to connect more effectively with industry concerns in the energy sector to create greater certainty for developers and investors. They emphasized that as long as integration could not be established, e.g. by the MCG and due to its lack of power, an existing or newly established industry association was needed to make sure that interests and needs across sectors, such as energy, renewables, fishing and aquaculture and environmental concerns are represented.

The existence of various applicable policies reveals that the policy implementation process for ME developments does not happen in isolation. Rather it crosses various policy domains that need to be coordinated in an integrated framework. The policy reviews revealed that all policies catered for horizontal integration providing close coordination across responsible departments. Responsibility for the coordination and implementation of related energy policies was envisaged by the creation of the MCG and an Offshore Renewable Energy Steering Group (ORESG). However, a need for stronger integration remains with other policies relevant to developments in the marine environment that are central to the objectives of ME implementation. For example, the OREDP implementation is influenced by a complex setup of other policies, for example by the National Renewable Energy Action Plan, which aims to deliver EU obligations under the Renewable Energy Directive, the Strategy for Renewable Energy 2012–2020, *Our Ocean Wealth*, EirGrid's Grid25 plan, which is a long-term strategy for developing the transmission system, and the National Ports Policy. The situation shows that a complex set of policies that are not tailored to the objectives of each other or to an overarching policy vision as well as a lack of coordination between these policies are obstacles to implementation.

The previous findings are supported by a point that was repeatedly highlighted by government officials and experts within interviews and

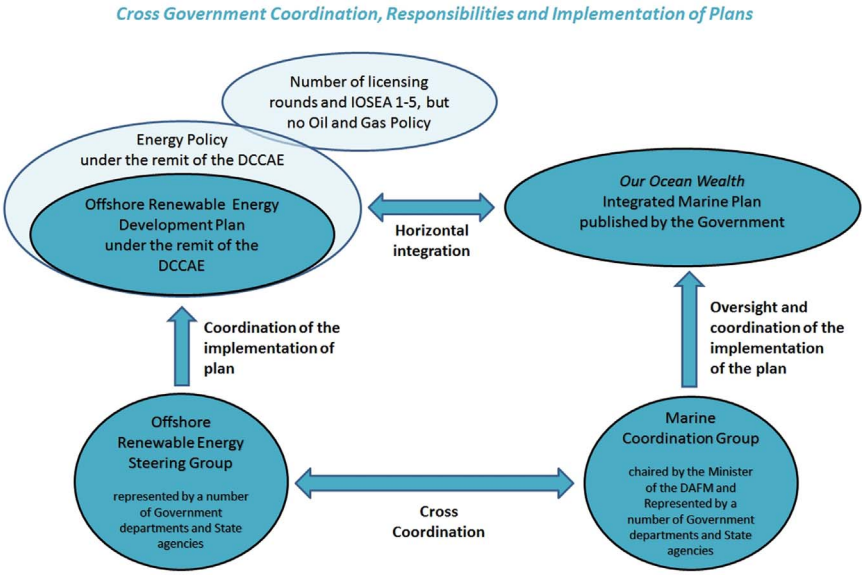


Fig. 2. Interrelationships across responsible Government departments and State agencies implementing the plans for the marine economy and energy-related developments. Abbreviations: DAFM = Department of Agriculture, Food and the Marine; DCCAE = Department of Communications, Climate Action and Environment; IOSEA = Irish Offshore Strategic Environmental Assessments.

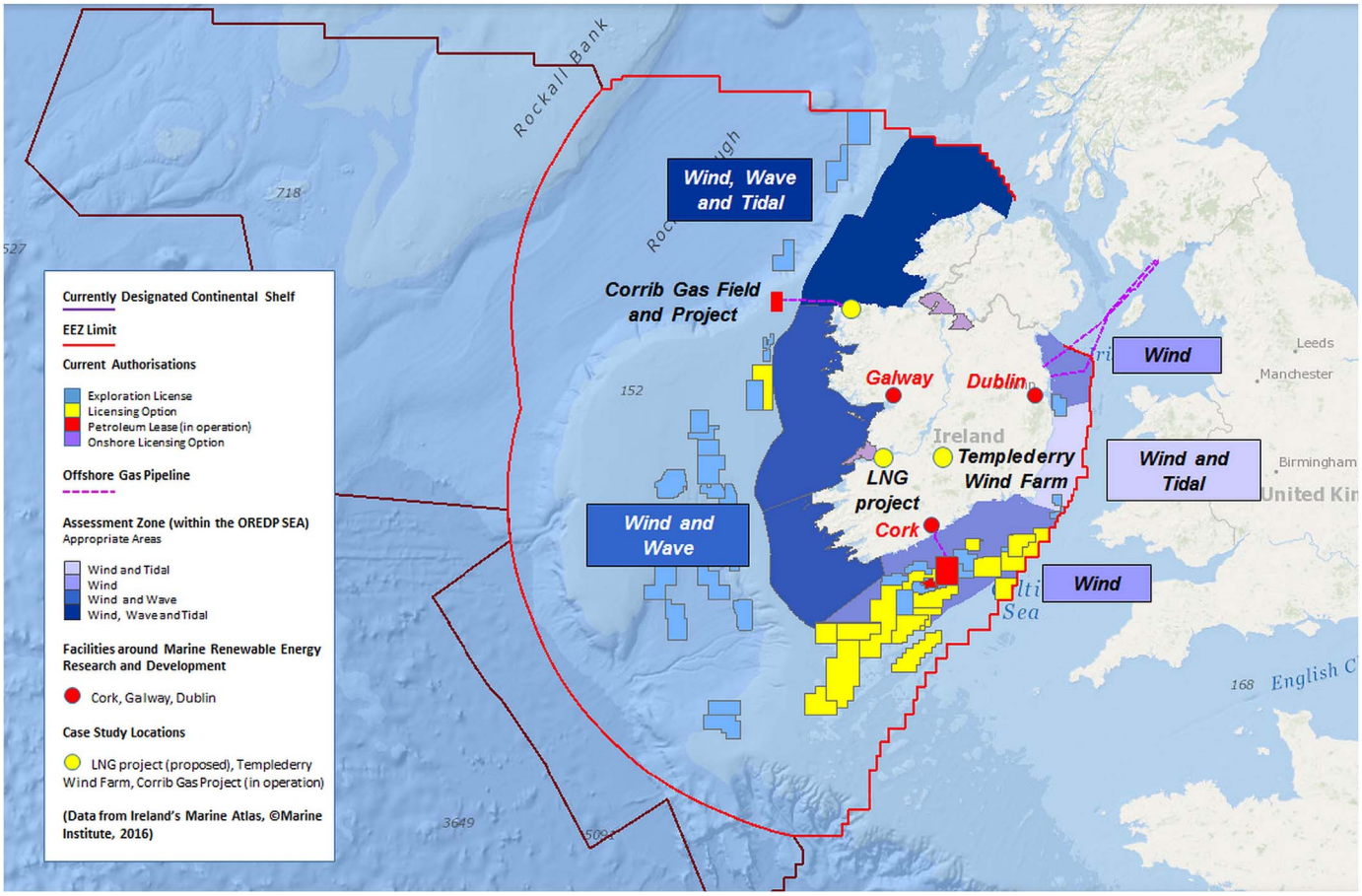


Fig. 3. Extent of Ireland's offshore territory including areas identified for harnessing MRE resources, current authorisations for offshore hydrocarbon explorations, cases study locations (yellow dots) and research and development facilities (red dots) (Data from the marine renewable and offshore gas and oil theme accessed through Ireland's Marine Atlas at http://atlas.marine.ie/, 11 January 2016) (Abbreviations: Exclusive Economic Zone = EEZ; Liquefied Natural Gas = LNG; Offshore Renewable Energy Development Plan = OREDP; Strategic Environmental Assessment = SEA).

the governance workshop. By looking at historical and current governance arrangements, they concluded that the policy framework in Ireland does not allow for successful implementation of large-scale ME projects for two reasons:

Firstly, policy development is fragmented. The policy analysis showed that indeed policies exist. However, neither the necessary integration across the specific goals driving these policies nor coordination to achieve them exist. In addition, the lack of power of central responsible bodies was mentioned as 'stumbling block'. Together with the findings above the analyses emphasize that one of the major governance barriers of Ireland's transition to sustainable energy transitions is a political issue and government policy yet fails to achieve greater coordination towards implementation.

Secondly, implementation in the context of the licensing of projects lacks efficiency. Some workshop participants stated that this was due to delayed licensing for foreshore developments caused by the overarching foreshore legislation. The General Scheme of a new Maritime Area and Foreshore (Amendment) Bill was published in 2013 but has not yet been enacted thought it is on the Government Legislative Programme for this session (Spring/Summer 2017) (Department of the Taoiseach, 2017). The bill was designed to streamline the development consent process for the foreshore. However, Flynn (2015) has identified common failures in the evolution of the bill. Several participants suggested that much could be learned from the Scottish permitting process related to energy generation at sea. Marine Scotland's Licensing Operations Team is a "one-stop shop" for the entire licensing process from screening and scoping consultation, the delivery of a marine license and the final decision by the minister (The Scottish Government, 2011). The Marine (Scotland) Act (The Scottish Government, 2010) gave this body a statutory power to make determinations on navigational and electricity grid connection matters, subject to input from the relevant stakeholders on those matters.

The comparative example above highlights, that Ireland has no robust institutional process such that the regulatory issues vested in one competent body as in the case of Scotland (Marine Scotland). In contrast, Ireland's marine portfolio has moved around and responsibilities are split according to sector, e.g. fishing, energy, environment etc. Ireland has a very complex and unwieldy inter-agency framework of multiple and parallel permitting and consenting processes. The only State agency with extensive scientific knowledge of marine environmental impacts, the Marine Institute, has only limited power, relating to consultation, in the planning and consenting process for offshore renewables in Ireland. Workshop participants emphasized that this created a power vacuum and the government yet fails to address it. In summary, the analyses show that the power struggle is also a major barrier in the context of the licensing process.

3.2. Industry Development: Marine energy challenges and Ireland's marine energy mix

Ireland's energy system and its strong dependence on fossil fuel imports have been highlighted in Section 1. At the same time, the country has potential to harness indigenous renewable resources in the future. Ireland's energy target is to achieve 16% of total energy demand from RE sources by 2020. The Energy Policy Framework 2007 – 2020 published by the [then] Department of Communications, Marine and

Natural Resources (DCMNR) initially set out a national target for a 40% contribution from renewables for electricity generation by 2020 (DCMNR, 2007). This is envisaged to be achieved by harnessing the vast abundance of marine resources in terms of both space and ideal physical conditions. In this regard, the government identified the development of MRE, such as offshore wind, wave and tidal energies as an important future opportunity. It also suggested that offshore wind resources may contribute an even bigger proportion of total energy supply than initially targeted and unlock potential to create an export market for energy to EU member states (DCENR (Department of Communications, Energy and Natural Resources), 2014a, 2014b).

Fig. 3 shows the extent of the Republic of Ireland's offshore territory (880,000 km^2) and its exclusive economic zone (EEZ). The offshore territory is more than 10 times the size of the land mass. As part of a Strategic Environmental Assessment, Irish waters from the mean High Water Mark out to the 200 m isobaths off the coast and parts of the EEZ were identified as suitable areas for harnessing resources from wave, tidal and offshore wind energy (DCENR (Department of Communications, Energy and Natural Resources), 2014b). These zones as well as the current authorisations for offshore hydrocarbon explorations and the Corrib Gas field 83 km off the West Coast are shown. Locations with facilities around MRE research and development (red dots) are shown, as well as the locations of the case study examples (see Section 3.3). In addition to these large infrastructure developments, Ireland's first offshore wind farm, the Arklow Bank Wind Farm off the East Coast (25 MW) is operating and two tidal energy developments (100 MW each) off the coast of the Counties Antrim and Down in Northern Ireland. These developments are part of the Single Electricity Market for the Republic of Ireland and Northern Ireland and in pre-development stage.

Workshop participants mentioned that the vision to harness indigenous energy resources on the one hand and characteristics of the energy system on the other hand support the vision for a phased-strategy for the energy transition. This could include *first,* an incremental expansion of energy supply that is based on indigenous resources both renewable and non-renewable, e.g. up to 2050, and *second,* on a progressive phase-out of fossil fuels afterwards. However, the government has not clearly spelled out priorities and targets to progress in this way yet, neither in the Energy Policy nor in the OREDP (DCENR (Department of Communications, Energy and Natural Resources), 2014a, 2014b).

While government ambitions appear strong and research, development and small enterprises are working towards driving progress in the sector, progress towards the implementation of large MRE projects is still lacking. The government favours onshore wind even if developers of onshore wind have already experienced extreme public opposition due to visual intrusion. Whilst other European countries consider offshore wind technology as mature and large wind farms went operational in countries like Denmark, the UK and Germany, no large-scale project is in planning to date. A large joint offshore wind farm planned by the Irish and UK government failed in 2016, together with the development of an export agreement between both countries. Major reasons for the slow pace of MRE developments in Ireland are mainly due to the lack of government support in terms of start-up funding of concrete projects or at least funding programs, which stimulate sector investments. The Renewable Energy Feed-in Tariff (REFIT) scheme (established by the DCCAE) (SEAI, 2014), relevant for the wind sector (REFIT 2), was opened in March 2012. The REFIT is only directed towards support for onshore wind while excluding offshore wind developments. Workshop participants emphasized the need for infrastructure development rewards as a central ingredient of the energy transition. The conditions above suggest that government ambitions only exist on paper and government yet failed to implement towards wide-ranging support.

New questions arise at the time of writing, concerning Brexit, however, addressing these emerging issues from a ME perspective, are beyond the scope of the paper. Technological barriers are existent around MRE developments. Wave energy technology is yet commercially viable and need additional R&D. Devices are at the demonstration and pilot level. Tidal energy technology is increasingly proven viable, can be considered mature and is more advanced than ocean current technologies. Offshore wind is the most established type of energy generated in the marine (IPCC, 2012; SEAI, 2014). In Ireland, one small wave energy project at pilot level is pending due to issues around the development of different devices.

In terms of offshore hydrocarbons, to date only three commercial discoveries since 1970 are producing natural gas, two almost depleted and one with a lifetime of 15–20 years' maximum. Most recently,enterprise partners commissioned the Corrib Gas field off the West Coast in December 2015. At peak production over the next 5 − 10 years, the project is capable of meeting up to 60% of the Ireland's gas needs. No commercial oil well has entered into operation at date of submission of this publication. Some expect that Ireland's offshore territory contains more potential reservoirs for hydrocarbons. In recent years, several enterprises have discovered significant reserves offshore, most notably in the Corrib field in the Atlantic margin. However, the scale of Ireland's recoverable gas and oil resources remains unknown. As there are no further reserves at development stage to date, future large-scale developments remain uncertain (Wood Mackenzie, 2014). Amongst others, gas and oil explorations suffer from economic barriers, which are high prizes of extractions in Ireland and are facing competition from cheap shale gas and cheap oil in Russia and Africa.

In this regard, technology remains a major uncertainty, particularly when sufficient incentives are needed for resource development. Participants of the governance workshop agreed that future developments would depend on the governments' ability to provide incentives for private investors, R&D and to continue attracting Foreign Direct Investments (FDI). This is critical as Ireland's economy after its downturn and the recession in 2009 is recovering and interest in Ireland as a country for FDIs is continuously high (DJEI, 2014; Helena and Bradley, 2015). Thus, there is potential for future developments in the sector.

Interviewees repeatedly mentioned the Irish planning system as a factor for the slow pace of developments. A forward planning system needs a robust method of coping with technology and economic uncertainty. Industry is looking for this certainty in order to invest in the emerging market. Again, the example of MRE developments in Scotland shows that government created the enabling conditions by establishing an adaptive management approach ("Survey, Deploy and Monitor").

3.3. Public Engagement: Case studies of poor and good practice engagement

Extreme conflict with stakeholders and strong opposition has characterised the *Corrib Gas project* resulting in the involvement of international human rights NGOs. Responses from a polled cohort of 30 local citizens indicated a close interplay between government and industry creating a feeling that, in particular, the government failed to safeguard the interest of the local community. It also missed to clearly communicate challenges and the strategic national interest around offshore gas extraction. Particularly opponents stated that developers failed to engage the community in the pre-planning phase of the project and showed only limited willingness to make concessions to local interests. For example, concerns over safety and environmental risks with regard to the location of the gas-processing refinery or the route of a raw gas pipeline, were only taken into account after massive opposition and legal interventions. This created a feeling that the developer followed a *decide-announce-and-defend approach*particularly in terms of siting of the different components of the energy infrastructure. Opponents voiced the impression that the developer did not fully consider all possible alternatives carefully and that it did not shared information appropriately. This resulted in a gradually eroding trustand the relations to break down. Continued project support was challenged not only at the local level but also nationally.

To date in terms of strategic importance, the Corrib project represents Ireland's largest ever energy investment. During construction, more than 6,000 people have worked on the project and up to 175 full time job equivalents will continue during operation (Shell EandP Ireland, 2014). Proponents from local communities, such as business leaders and citizens very much acknowledged the positive regional economic developments the project brought to the area. Some also voiced that an opportunity to bring existent benefits to the attention of citizens had been missed. Interviewees raised general concerns on the role of media and one-sided reporting in this regard. In contrast to these experiences, the following sections highlight examples in the context of energy developments in which developers sensed local expectations by involving the public from the offset.

Examples of good practice presented here draw from land-based and terrestrial project experiences in Ireland since there are currently only limited examples of operational projects in the marine environment. Workshop participants discussed the example of the *proposed Liquefied Natural Gas (LNG)* project in County Limerick, Ireland, in the context of strong, early engagement in the pre-application stage. The project can be viewed in light of the government commitment to enable the transition to a low-carbon economy through the exploration of Ireland's indigenous natural gas resources. In this instance, participants highlighted a top down, industry-led proposal for major infrastructure as a potential model of best practice in how to involve stakeholders particularly in the early stages of the planning process. The project is part of a bigger plan for the development of the Shannon Foynes area, providing additional investments and employment (SFPC, 2013). Participants of the governance workshop highlighted good local relationships as well as sufficient advice and guidance within the pre-application stage as major achievements of the process. Key statutory bodies and authorities, responsible County Councils and a port company showed commitment and interest. They selected the best site following a meaningful discussion on economic feasibility and consideration of appropriate alternatives. All of the conditions together were identified as necessary for successful delivery of projects. However, stakeholders also agreed that there is no such thing as a panacea for citizen involvement and they pointed out that the LNG project approach was not without its problems. Issues arose with regard to market and tariffs and mixed messages related to the current project state. A time delay of up to ten years also became an issue.

The second example, *Templederry community wind farm* project in Coounty Tipperary, was discussed in the context of market and government incentives to provide community energy benefits in practice. Workshop participants highlighted the project as the first successful delivery of a co-ownership project in a rural Irish community. Workshop participants, who brought up the example, emphasized that the project was based on a well-planned process, steered by an economically experienced energy agency that is based and trusted in the area and that is collaborating closely with members of the community. The local context was of particular importance here. Issues of population decline and limited local economic opportunities is impacting this rural area and led the community to explore how to harness the benefits of renewable energy through a locally owned wind farm. Workshop participants agreed that an academic energy institute served as a central enabler for the process. It provided an important role in assessing feasibility and building capacity, by empowering local social entrepreneurs with awareness of the sector. Site selection followed in conjunction with an independent energy agency. The outcome of the process is a shared ownership wind farm with two 2.3 MW turbines feeding electricity into the national grid. It provides energy sufficient to power 3,500 homes. Energy experts expect income to be in the order of €25 m over the life of the project. After costs of €9 m (about €6 m has/will be spent outside the County) the local project benefit will be around €19 m. Income will be distributed to local government, local contractors, a local community fund and the 27 local families behind the project (Ryan et al., 2014). Over the course of the process, developers repeatedly sought input from the local community. The case example highlighted patience and strong commitment of developers and members of the cooperative, particularly concerning the six-year planning process. The workshop participants agreed that developers gained credibility through the way they handled affairs, which finally led to the commissioning of the project. To date developers from the private sector sometimes in tandem with the government still fail to draw experiences from these good practices examples and tend to make the same mistakes from bad experiences again. Projects often failed due to strong opposition. Interview partners from government stated that this was due to a lack of understanding of the local context.

Participants often made the connection to successful examples from other countries such as Denmark, Scotland and Germany that addressed “community ownership” as a central ingredient of the national renewable energy portfolio. Studies from these countries reveal promising ways to increase public acceptance for energy projects (see Haney and Pollitt, 2013; Walker et al., 2010). Studies on wind farm developments in Scotland and the Middelgrunden wind farm off the Danish coast show that strong support can lead to greater public awareness and can positively affect support for renewable energy projects (Sørensen et al., 2002; Warren and McFadyen, 2010). Participants agreed that trust around people living close to projects could be built around a co-ownership approach. They mentioned the *Fuinneamh Oileáin Árann Comharchumann Teoranta* or Aran Islands Energy Cooperative as another promising initiative in this regard. Participants also agreed that the projects reviewed in the workshop were of a relatively small scale, which needs to be considered. Planners need to assess, plan and discuss options for larger scale projects, and the scaling up to other types of ME projects carefully. Currently, feasibility studies are carried out in Denmark.

4. Discussion

In this study, we explored challenges and the enabling conditions for stronger contributions of MREs, to manage large MRE projects and looked into processes and structures for its implementation in Ireland. We identified three barriers: The *first* barrier is a lack of policy integration and enforcement, the *second* is a lack of government oversight to unlock potentials of yet untapped commercial resources, and the *third* barrier is a lack of trust on the part of local communities due to past failures.

These barriers are discussed as follows:

- *Policy integration and enforcement*

  In terms of *policy*, we found that the government has not formulate future considerations of a phased-strategy in the energy transition yet. Together with the stated aim to use indigenous hydrocarbon and renewable resources this would make an important point towards a concise strategy and the development of the ME sector. Rather Ireland's IMP and the OREDP fall short in supporting a comprehensive strategy that provides integration of the three domains of governance addressed in this article. There is no policy that envisages clearly defined incentives to stimulate investments in the overall ME sector to deliver a balanced hydrocarbons portfolio against MRE over time. The IMP and OREDP mark significant declarations of intent to support economic development, but actually miss real opportunities for integration and tangible measures for enforcement.

  To overcome this major barrier, *first* an overarching strategy and clearly communicated priorities for a future ME mix, and *second* concrete actions for enforcement are needed. An overarching strategy must align to a vision, which can be distilled down from the various plans for use activities in the marine environment (see Section 3.2). As follows, government must commit ideally entirely to this strategy by intensively negotiating on the issues. Creating the enabling conditions by establishing this strategy and implementing

concrete actions through clearly defined energy targets could help deliver greater certainty for investors in the short-term, and push the ME sector away from fossil fuels and energy import dependency to a low-carbon future, in the long-term.

Even if institutions and processes for policy and planning associated with Ireland's ME sector have been described as not fit for purpose by a range of business leaders and private investors, the MCG and the ORESG are good mechanisms to manage towards concrete actions and greater horizontal integration across applicable departments. The MCG could play a greater role in setting the agenda for institutional collaboration, for example linking the ORESG and the Petroleum Affairs Division (PAD) to take a strategic look at the question of marine energy transitions. There is also a need for a closer link to industry and to civil society using energy and hosting energy infrastructure in their community.

In terms of *energy regulation,* Ireland misses a joined up and robust permitting process. Such a process is required to manage the planning challenges for MRE developments and to cope with policy, technology and economic uncertainties. Here a “one-stop-shop”, such as the one run in Scotland by a competent authority, can overcome some of the barriers that led to uncertainties in Irish planning history. At the European level, legislation aims at harmonizing obligations, for example with regard to Maritime Spatial Planning or climate change to address some of the issues. Here governments need to develop greater integration. This can provide the critical enabling conditions for smoother licencing and the management of marine activities and the ME sector.

- *Government commitment to unlock economic potentials*

  At the level of enterprise and *industry development,* the previous section emphasized the establishment of a ME strategy. The first concrete action of choice of such strategy could be a Renewable Energy Feed-in Tariff (REFIT) scheme that includes offshore wind developments, as offshore wind is the most feasible and mature MRE technology. Government needs to lead the change. Experts interviewed in this study expected that industry and technology would follow government incentives. As a relatively small nation and as one that has suffered strongly from the recession, Ireland is dependent on FDIs. After the recession, the interest for FDIs continued to increase and there are R&D facilities around the country geared up to work on technological barriers to device development and smart energy solutions. Industry and technology will create some of the enabling conditions, but the sector developers will only feel the impact after the public sector has paved the way.

  Addressing all issues includes aligning foreshore consenting with the onshore planning systems and providing a coherent mechanism to facilitate and manage the multi-faceted aspects of marine developments. This must include small-scale developments as well as large-scale strategic infrastructure. Mechanisms must also address critical issues, such as requirements for the export of energy.

- *Trust on the part of local communities due to past failures*

  At the level of *public engagement,* the example shows that developers from both industry and government need to support greater vertical integration and find new ways of engagement. Stronger engagement by developers will become even more important in the marine environment as new forms of uses evolve and legitimate action is needed to build trust in ever changing complex situations (Devine-Wright, 2011).

This means that developers and project managers must link closer to local communities that are hosting energy infrastructure and are affected by these developments. The examples presented in this article show that involving people as part of a well-planned process, steered by an independent agency and within pre-development can serve as prerequisites to deliver successful projects. Developers in these examples became managers of intense collaboration rather than managers of a conflict. Whilst this is clear energy projects can be contentious as discussed and developers often find themselves in opposition to the public (Section 3.3). The example presented in this article shows that expectations on benefits and perceptions of a development process differ at various scales. For developers this means that they need to develop skills to assess and consider these in order to meet local expectations. One of the major lessons is that once trust is lost, it is difficult to get people back behind a project. Government has a responsibility in numerous respects. It has a role to play in steering developers towards an understanding of the local context and the expectations of the public to maintain people's trust. In addition, government is challenged to set the necessary rules for developers not to develop components against greatest resistance of local communities. Finally, yet importantly, it has to communicate expected benefits of significant energy infrastructure more clearly.

5. Conclusions and policy implications

Based on an integrated analysis and a multiple stakeholder approach we found that sectoral pillars to address some of the challenges in ME transitions exist. However, different domains such as policy and regulation, industry development and public engagement are disconnected. Ambitions and aspiration formulated within policies do not necessary lead to implementation. This is because to date, ambitions only exist on paper and are not supported by sufficient government support that steers towards implementation.

Weaknesses, such as missing integration, of common governance frameworks have been emphasized. Integration is called for in order to develop and enforce policy actions and facilitate transition from fossil fuels to MRE. Whilst the need to integrate within certain domains has been recognized by the government and addressed in some areas (e.g. through improved coordination in the policy domain), there is a lack of integration across domains. Any future transition must facilitate an ability for all actors in the energy policy domain, and those essential to it, to integrate in a meaningful way with all those responsible for policy implementation.

Referring back to the governance model in this paper (Fig. 1, Section 1), we emphasize that major changes to existing frameworks are needed in order to improve governance and increase the capacity towards marine energy futures. Fig. 4 focuses on the governance of this transition and highlights the three governance domains. It highlights that integration across the domains is called for to deliver on the implementation. This can be ensured by means of negotiation and the application of a range of governance instruments established to enable concise strategy actions.

Based on the experiences drawn out in this study, we propose pillars of a new governance model and summarize the following key elements:

First, a marine energy strategy that addresses policy integration across applicable policies in the marine domain and that enforces concrete actions to implementation, beyond policy statements that only exist on paper. Central to the implementation of concrete actions are the amendment of foreshore consenting to counteract delays of large infrastructure developments.

Second, strategic oversight as a prerequisite to set and communicate clear and unambiguous priorities for the future energy mix. This coordination needs to be based in one department. For the formation of Government departments, this means that one single Ministry, ideally a Ministry for the Marine, should be established. This can provide oversight of marine affairs, including energy developments at sea. The aim must be to set clear priorities, which are the prerequisite to support greater certainty for investors. Clear priorities have to be informed by the energy user, those that are affected by energy developments at the local and the national level, and by developers, science and research.

Third, integrative approaches with early collaboration and engagement. Traditional approaches to consultation need to be replaced by truly integrative approaches with early collaboration and engagement with the public in a pre-development stage. Industry and government

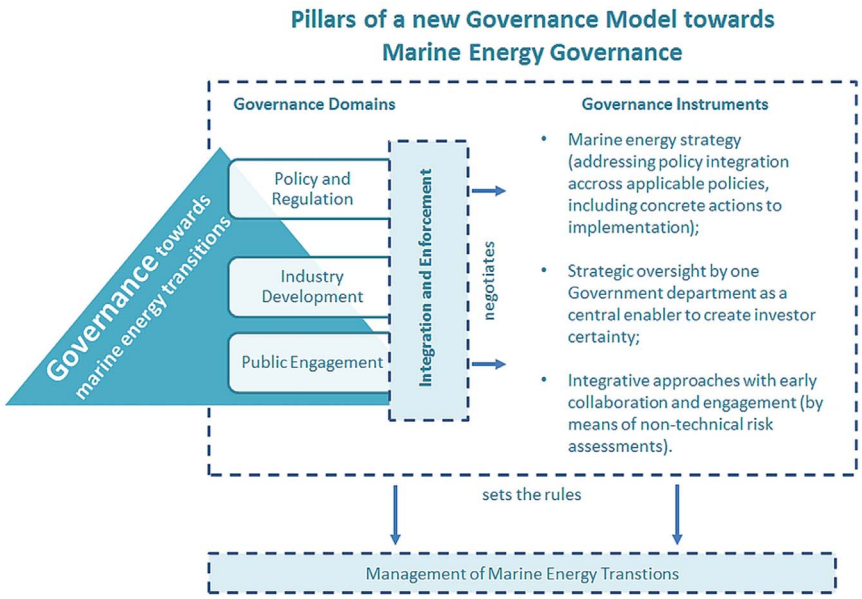


Fig. 4. Pillars of a new governance model in transitioning towards MRE in Ireland.

are called to take this up and to commit themselves to intense public engagement. Awareness of the energy challenge and trust in a project can be built around a fair share of benefits and co-ownership initiatives. A means to an end may be the formulation of a "community engagement policy".

In order to go beyond the case study presented in this article, we generalise the following conclusions: By establishing the changes to current frameworks, governance will enable countries to increase their capacity to deliver ME, whether this is hydrocarbons or MRE. Addressing the failures requires a thorough understanding of the governance dynamics based on multidisciplinary and participative forms of communication and engagement as those tested in this study. Every case will have to be analysed separately. The specific governance context of a country matters. Therefore, the enabling capacity of the governance system to deliver a transition to sustainable energy futures needs to be thoroughly analysed. In this regard, the three pillars established above are proposed as a valuable point of departure for analysis.

Science and research can tie into powerful governance solutions by providing basic knowledge on both socio- and technological energy transitions along the pillars proposed, including dynamics in energy and environmental systems as well dynamics in governance systems. This may help to support society and decision-makers with an understanding of how to manage the challenge. However, the role of science cannot be limited to create knowledge in isolation. Following our experiences gained in this study, the role of science should be to facilitate institutional engagement by exchanging with diverse stakeholders from all governance domains to support co-production of knowledge.

Using findings from case study analysis with its focus on Ireland can help to inform broader system perspectives and to scale up other systems with similar issues. However, the findings presented in this article did not aim to provide comparative insights from case studies from other countries. It did also not address the spatial dimensions of governance systems and dynamics within stakeholder relations. Results presented in this article may not simply be generalised. Each country context is different, and context matters. In the case of country examples with similar issues this means, that analyses need to focus on studying the context of the governance setup. This must include the power balances between the three different domains established in this article. As an example, many of the barriers in the Irish context are to do with shortcomings in government decisions, whereas balances of power in governance systems of other countries may differ strongly. These balances are important as they strongly determine countries' capacity towards programme implementation.

According to this further analysis of governance dynamics and the balance of power within governance setups of other countries are needed. The on-going research will address shortcomings as drawn out in this study by exploring innovative approaches for collaboration, integration and learning to support and facilitate change to enable ME towards more sustainable futures.

Acknowledgements

This material is based upon works enabled by the Science Foundation Ireland (SFI) MaREI Grant 12/RC/2302. MaREI is the SFI Centre for Marine Renewable Energy Ireland. We thank the reviewers of this paper for their invaluable useful comments, interview partners, workshop participants and collaborators for giving time to support the on-going research. Thanks are due to Glenn Page, Stephen Olsen and Paul Anderson who facilitated international scientific exchange. The study is embedded in the work of MaREI and Future Earth Coasts (formerly LOICZ) under the international Future Earth initiative *Research for Global Sustainability*.

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