May 18th[th], 2021

MRIA Response to Climate Action Plan Interim Actions Consultation

This submission by the Marine Renewables Industry Association (MRIA) www.mria.ie to the Consultation on the *Climate Action Plan Interim Actions* follows the format set out in the 'Expert Evidence' questionnaire i.e., it deals in order with the questions posed.... but only with those which the Association deemed relevant to MRIA's area of interest.

Carbon pricing and cross cutting issues

5. What specific additional measures might be required to promote sustainable growth in rural areas?

Ireland is making demonstrable progress in putting together the complex tapestry of legislation and policy measures necessary to enable exploitation of our vast Offshore Renewable Energy (ORE) resource. However, a national drive to win public acceptance of offshore renewables is critical to our climate actions, particularly those involving ORE.

A number of measures are necessary to win public support. The *policy and legal protections* for individuals and communities which will be provided by the forthcoming Maritime Area Planning Bill and associated procedures such as offshore 'planning permission' being dealt with directly by An Bord Pleanála etc. The *community benefit measures* related to ORE planned by Government and the local community out-reach efforts by project developers. Community-scale projects could provide a valuable bridging opportunity in this regard, decarbonising and enhancing the resilience of local electricity supply, engaging other marine users (fishing, recreation etc.) in a positive way, and potentially incorporating community ownership. Such initiatives could draw on the success of ESB Network's Dingle Project[1], which has been a fruitful collaboration in exploring how customers and communities interact with new energy systems.

Local, usually rural communities, are affected by ORE and will need to see tangible benefits from ORE in the form of *inward investment and employment opportunities*. There is a paucity of policy effort in the latter, critical area and this issue will be a thread running throughout our responses to this Consultation. In addition, industry and coastal stakeholders need a permanent, well-resourced *local structure* to engage on all aspect of offshore development outside of the formal planning processes e.g., at An Bord Pleanála. The UK experience of the Coastal Partnerships model has generally been positive and the Department of Housing, Local Government and Heritage's ambition to try out a similar

[1] www.esbnetworks.ie/who-we-are/innovation/esb-networks'-dingle-project

approach here with pilot exercises (reportedly in Wexford and Donegal) should be treated as a priority.

6. Are there further measures that the Government should take to channel private finance into low-carbon investments in Ireland?

This is an important aspect to the core investment and job creation challenge outlined in the response to *Carbon pricing and cross cutting issues 5*. above. There are three features that require attention:

a. Encouraging private and community investment in renewable energy projects:

- Reinvigoration of the investment in renewable energy companies provision for corporate investors (formally, section 486B Tax Consolidated Act 1997)
- Extension of participation exemption to early-stage renewable energy projects (s626B TCA 1997) which are not yet 'trading'.
- Technical amendment to the Employment and Investment Incentive Scheme ('EIIS') to provide for bone fide structuring requirements of Community Led Projects i.e., that a “qualifying company” for the purposes of EIIS includes a company controlled by a Renewable Energy Community.

b. Capital allowances on grid connection costs:

Strictly speaking, capital costs incurred by the developer in establishing a connection from the electricity producing assets (e.g., wind turbines, solar cells) to the national transmission grid are considered non qualifying for capital allowances purposes. Such costs can make up a significant element of the total capital expenditure for the project and are a fundamental aspect of developing and constructing it. The capital allowances rules in the UK provide relief for grid connection costs which is often noted by incoming investors to Ireland. A revision to this tax measure would have a substantial impact on the cost of building a renewable energy source and reduce the cost to the end user.

c. Grant aid scheme for port developments to support ORE

All of the indications are that our ports infrastructure will require upgrades, amendments and expansion to cope with the ORE developments planned or envisaged. A competitive grant fund is needed to spark this off and to reduce the risk for ports in making investments at such an early stage of development of the Irish ORE market.

7. Are any changes required in Ireland’s research policy to channel research funding into climate action-related topics?

The CAP Interim Actions document makes a significant and adverse change to the R&D supports available for Marine Renewables Emerging Technologies (MRETs): the historic, if somewhat dormant at present, support system for the MRETs, which was endorsed in the Climate Action Plan 2019 and the Programme for Government, appears to have been set aside and the only replacement proposed is a broad suggestion for a new (?) RD&D programme (Action 48) for ORE. An important distinction must be drawn between research

undertaken in an academic setting (as is implied by the new proposal) and research at an industry level. We support academic research e.g., the laudable MaREI programme led out of University College Cork. However, the programme proposed in the Interim Actions seems to focus on this latter area alone while there is a need for a major drive to support industry led R&D too: the appetite is there as evidenced by industrial involvement in the recent Marine Institute R&D competition and the recent SEAI RD&D call.

The Marine Renewables Emerging Technologies (MRETs) today not only include wave and tidal energy but also floating solar energy and 'hybrids' which are single platforms which can extract power from two or more renewable energy sources, e.g., wave and wind. Indeed, floating wind technologies are just graduating from the MRET category and are vital to exploiting our Atlantic resource in particular while our wave resource remains an outstanding prospect for the future.

Ireland has, arguably, the world's most energy intensive waves with a resource estimated by the first Offshore Renewable Energy Development Plan OREDP 1 at up to 31GW, most of which is located off the Atlantic coast. Exploiting that resource has long been an ambition of the State. Minister Ryan, as far back as 2007, set a deployment target, which became policy, of 500MW of 'ocean energy'[2] (wave and tidal) in the water off Ireland by 2020.

The MRETs - specifically, wave and tidal energy - *were* a clear policy concern of the Government. The sector was singled out as a national priority for research and development support[3]. Supporting the emergence of this industry was set as one of a handful of strategic goals fixed for national energy policy to 2020[4].

This pioneering effort was backed up by substantial investment during the austerity period: the Beaufort Building and the LíR National Ocean Test Facility in University College Cork were built at that time to facilitate the development of MRETs; the 'SmartBay' and AMETS State test sites advanced; SEAI operated a crucial Prototype Development Fund; and the SFI MaREI Centre with a focus on marine and renewable energy was established which has since collaborated with in excess of 50 industry partners and, through peer review, has been recognised as a global leader in the offshore renewable energy research field. This investment has been translated into tangible impacts including:

- A number of technologies progressing through the Technology Readiness Levels to securing real-sea projects (e.g., Ocean Energy, GKinetic, Sea Power)
- Early-stage technology developers achieving success in international competitions and programmes such as the EU's Horizon 2020, Wave Energy Scotland and the US Department of Energy *Wave Energy Prize*.
- Publicly funded technologies finding commercial applications outside wave and tidal, including offshore wind, floating wind and aquaculture.

[2] wave + tidal energy = *ocean energy* + wind energy = *Marine Renewable Energy* or *Marine Energy*

[3] *Report of the Research Prioritisation Group*, Forfas

[4] *Strategy for Renewable Energy 2012-2020*, Department of Communications, Energy and Natural Resources

- Irish R&D funding was shown to have been the most cost-efficient in delivering installed ocean energy capacity in the period 2007-2016[5]

However, wave energy technology - the main component of ocean energy for Ireland[6] - has been slower to reach commercialisation than anticipated. This led, for example, to the ESB placing their WestWave project (5MW off the Clare coast) on hold, although the Saoirse project has since emerged in approximately the same area[7] which reflects recent advances in wave energy knowledge. All offshore energy technology takes time to 'hatch' and become competitive. It is instructive to recall that no commercial offshore wind farms existed anywhere pre-2000 and, indeed, that the existing Arklow wind farm is one of the oldest in the world. There is now over 22GW of European offshore wind capacity, including over 3.6GW commissioned in 2019 alone (the most recent date for which data is available), with a total of 5000+ turbines installed off 12 countries[8].

Wave energy technology - usually grouped with tidal energy (of which Ireland has almost no viable resource at scale) under the rubric of 'ocean energy') is now firmly located on the development pathway. It is being supported internationally - €3.84bn (€2.7bn from the private sector) was spent on R&D in the period 2007-2019 on wave and tidal energy. Wave and tidal energy have recently become a priority of the European Commission[9] which has just set a target of 100MW of ocean energy deployed by 2025; 1GW (c90% in Europe[10]) by 2030 and 50GW (5% of forecast European electricity demand) by 2050.

A major driver of this ambition is the fact that the world ocean energy (i.e., wave and tidal) sector is dominated by EU companies, patents etc and the Commission has high expectations of major new supply chain companies and a new EU industrial sector emerging. There are about 300 ocean energy technology companies globally - most of them are in the micro category; the EU accounts for the bulk of them and as much as 10% of the global total are located in Ireland[11]. The 2019 version of the Climate Action Plan supports emerging offshore renewables technologies (Action 26 *Support the ocean energy research, development and demonstration pathway for emerging marine technologies (wave, tidal, floating wind) and associated test infrastructure)* as does the Programme for Government (*Introducing a transformational programme of research and development, to ensure that Ireland is at the cutting edge of scientific and technological innovation in meeting our climate change targets, including..... in wave technology,* p33) and by the Irish National Energy and Climate Plan 2021-2030 under its 'with additional measures scenario.

[5] Hannon & van Diemen (2016) *An international assessment of ocean energy innovation performance*
[6] Ireland has no significant tidal resource although it has been a pioneer in the field with companies such as GK Kinetic and ORPC. Northern Ireland has a notable tidal resource off the Antrim coast.
[7] Saoirse is promoted by Simply Blue Energy and also involves 5MW
[8] *Offshore Wind in Europe - key trends and statistics in 2019* www.europwind.org
[9] *An EU Strategy to harness the potential of offshore renewable energy for a climate neutral future,* European Commission, November 2020. The targets set by the Commission do not differentiate between tidal and wave energy

[10] *2030 Ocean Energy Vision* Ocean Energy Europe 2020
[11] Source: www.emec.org.uk

Regrettably, the actions and ambitions set out until now have been de facto suspended (at least!) in the Climate Action Plans Interim Actions.

Support for the MRETs is important as they represent a real opportunity for Ireland to become an 'early mover' in the ORE supply chain enterprise field with a potentially significant pay-off in terms of investment and jobs in coastal communities: the key groups whose 'social acceptance' of ORE is vital. To address the situation outlined, MRIA recommends that the recommendations of the Interim Review of OREDP 1 -see below - be accepted and implemented:

Initiative	**OREDP 1 *Interim Review* recommendation**	**Comments**
1. Restore Prototype Development Fund (PDF)	R.09	Assessment of PDF recommended in the *Interim Review* has been completed and made available by SEAI. Further studies by MRIA[12] and SEAI have presented alternative funding mechanisms suited to advancing MRET development, and a wealth of learning has been gained through Irish leadership in European initiatives such as OPIN[13] and MEA[14] to influence the refinement of the model. Also, The European Commission has committed to review and simplify State Aids procedures for such schemes.
2. Extend support tariffs for emerging technologies and demo projects	R.13	The extension proposed was to include floating wind and hybrid wind/wave technologies. Suggest that this be amended to *'marine renewables emerging technologies as determined from time to time by SEAI'* to enable inclusion of technologies as yet unknown and, also, in time to eliminate categories that reach maturity.
3. Review proposed tariff of €260/MWhr and of 30MW	R.13 Note: 'delivery date' set in OREDP Interim Review as 2018/19'!	OREDP 2 could *propose* a short consultation on these twin issues prior to determining revisions. Note that both the level of support and the quantum of MW involved are likely to benefit from the 'State Aids' review referred to above.
4. Multi-annual Test Site funding	Linked to R.05, R.22	Facilities to support the trial and validation of novel technologies are vital to allow developers to commercialise technology developments through deployment led innovation.

[12] *Funding the Development of the Ocean Energy Industry in Ireland* (2016), http://www.mria.ie/documents/a524d9555b5a39944adbd8d7c.pdf

[13] Ocean Power Innovation Network https://www.nweurope.eu/projects/project-search/opin-ocean-power-innovation-network/

[14] Marine Energy Alliance https://www.nweurope.eu/projects/project-search/nwe-mea-north-west-europe-marine-energy-alliance/

5. Give priority in the consenting system to demonstration projects and to State test facilities	Linked to R.05, R.22	New technologies need to be tested and demonstrated. Quick execution, in line with the MAP, is vital to maintain national competitiveness and to protect small companies' vulnerable cash positions which are always highly 'delay sensitive'. Facilities at the State test facilities e.g., 'SmartBay' need to be amended from time to time e.g., deployment of new cables and, as such, provisions should exist to facilitate this

Further initiatives that should be considered are:

- Reengagement with the Wave Europe project (which Ireland originally led and then refused to support financially!) which is a key to exploiting our west coast wave resource
- Provide additional support to access Horizon Europe projects
- Establish an ORE accelerator programme to help MRETs' inventors and micro firm promoters to make the transition to a commercial focus and self-sustaining enterprises. This is currently being trialled in the Netherlands under the EU Interreg Marine Energy Alliance programme, of which Ireland is a member
- Establish an equity fund to support MRETs enterprises
- Establish a Competitive Start-up Fund (CSF) for ORE manufacturing and traded service activities along the lines of CSFs established by Enterprise Ireland in the past for sectors and groups (e.g., women entrepreneurs).

Electricity

1. What options are available to increase the penetration of renewable electricity beyond the 70% committed to in Climate Action Plan 2019?

While an increase in renewable energy targets is to be welcomed, this won't be sufficient on its own to ensure penetration in excess of 70%. Similarly, while the development of new grid infrastructure will help reduce constraint, it does nothing to reduce curtailment. Unfortunately, as renewable energy penetration increases towards 70% and beyond, there is a risk that the degree of curtailment on variable generation will be such that naturally limits further investment in renewable energy projects. As such, solutions will be required which (a) support electricity system stability with even higher levels of renewable energy penetration e.g., further support for system services and (b) provide outlets for the "extra" renewable energy generated e.g., hydrogen, export, electrification of heat and transport, etc. See also *Electricity 6.* below.

In order to enable more penetration, more generating capacity is required and the principal option open to policy makers is to increase the target for ORE. This requires that, first, the necessary policy and legislative arrangements (MAP, MARA etc) are put in place urgently and that the pace at which, currently, Foreshore Investigative Licenses and, later, MACs etc are processed is stepped up significantly. Although MACs won't be relevant until the

Maritime Area Planning Bill is enacted (towards the end of 2022?), an early briefing on the likely requirements for MAC applications would be valuable as it would enable developers to start preparatory work now. Second, a substantial investment and effort would have to be made in support of grid reinforcement over and above those under consideration at present by EirGrid. Briefings by EirGrid about their current consultation, 'Shaping our Electricity Future', indicates that the ORE 'heavy' option posed - 'Generation Led' - would require €0.5bn in grid reinforcement, the second lowest investment cost associated with the four options posed. It is an indicator (and no more) that reinforcement to enable a higher level of renewable energy beyond the '70% by 2030' target which focuses on extra ORE capacity would make economic sense and be affordable, particularly in the light of the forthcoming, revised National Development Plan which will allocate funding for major projects to advance sustainably Ireland's economy and society to 2040.

In addition, the Programme for Government indicates that offshore renewable energy developments off the east and south coasts will be addressed in the 2020s. As an Association, we have recognised the importance of this given the concentration of potential projects off those coasts and their technological readiness including in Floating Offshore Wind. Projects must be able to demonstrate a realistic route (e.g., access to grid, planning consent) to participation in a RESS auction (or suitable alternative for the project offtake) by 2025 and deliver by 2030. Where this can be demonstrated for projects off the west coast, consideration should be given to including them as part of Phase 2 projects. Projects should have a pathway to development, regardless of their location, if they can contribute to Ireland's 2030 targets. We are satisfied that there are sufficient credible projects in the pipeline to match an increase in the '5GW by 2030' target. A developer-led approach will be crucial to this so that Government and developer resources can be harnessed in an effective fashion

2. WHAT CAN BE DONE TO INCREASE THE UPTAKE OF OFFSHORE WIND AND SOLAR PV IN PARTICULAR, IN THE CONTEXT OF THE PROGRAMME FOR GOVERNMENT AMBITION?

The points made in *Electricity 1*. above apply here too. In short, put the policy and legislative infrastructure in place; step up the investment in grid and open up the Celtic Sea and the SW Atlantic coast (Co Clare coast) to early development - these initiatives will enable the 2O30 5GW offshore target to be exceeded. Further development requires, first, undertaking the planning required to provide at least 30GW of floating wind off the west coast (as called for in the Programme for Government). This must be accompanied by early plans for a 'route to market' for the extra capacity. Second, we must reinvigorate our efforts to support wave energy development (see *Carbon Pricing and Cross Cutting Issues 7*. above) so that we both exploit our leading R&D in this field and participate in developing the technology for the exploitation of our west coast wave resource, regarded as the most energy intensive in the world.

Allocation of seabed

In relation to phase 2 projects and beyond, we would also highlight the importance of developing a robust system for the allocation of Maritime Area Consents or seabed. A robust, transparent and efficient allocation of seabed is required to avoid future challenges

for the projects that come after the Relevant Projects. The characteristics of the ORE industry in Ireland will need to be taken account of in developing such a seabed allocation process. There are a significant number of projects already at various stages development. An application driven approach may work for other forms of development, but we do not believe this to be the case for offshore wind.

An enduring Conditional MAC allocation process is critical and a suitable arrangement should be put in place. It is vital that this is developed as part of a public consultation process. A structured procedure or application window will need to be put in place to deal with applications and assess them in a robust and fair way (whether they are overlapping or not).

Ireland should avoid the 'highest bidder wins' format favoured in the Crown Estate Round 4 auctions as it is a blunt assessment. Such an approach risks putting upward pressure on RESS auction bids. Evidence in the US and more recently in the UK shows the potential for very high prices. While auctions in Ireland are unlikely to reach these highs, option fees should be capped to minimise costs to the consumer. Sustainable competition is needed to deliver an industry, that does not adversely impact consumers, and provides confidence to the supply chain and investors.

The matters just outlined above need to be identified as a priority in Ireland's revised Climate Action Plan.

In additions, centralised collection and publication of key environmental, resource and geophysical data, building on the success of the DECC-funded INFOMAR programme would be a valuable cross-cutting support for all forms of offshore renewable energy, removing barriers for technology demonstrations, facilitating the identification of the most commercial attractive projects, and accelerating their timelines for development.

5. WHAT OTHER OPPORTUNITIES EXIST TO SUPPORT THE DECARBONISATION OF THE ELECTRICITY SECTOR?

Decarbonisation of electricity will be about removing fossil fuels from the generation mix. There are a number of strategies which can be used to ensure this happens including smoothing the demand to avoid the need for peak generation, providing storage and other system solutions to better match renewable energy generation and demand and supporting additional fuels such as hydrogen and ammonia to displace the remaining fossil fuels used to generate dispatchable generation.

In addition, there is an opportunity to establish an *industrial policy* to match the unique opportunity represented by Ireland's bountiful ORE resource; to create investment and jobs, particularly in coastal communities (thus, contributing to social acceptance of ORE); and to ensure that the infrastructure - ports, manufacturing skills and services etc - are available to enable ORE. If policy is not developed in this space, the opportunity could be lost to other jurisdictions. See below *Just Transition 3* and *7.*

6. What measures might be taken to improve the resilience of the electricity system to the impacts of climate change?

The core challenge facing the resilience of the electricity system is the potential instability posed by the dependence of the future system on a high level of System Non-Synchronous Penetration (SNSP). A key part of the solution will be to extend widely the geographical coverage of ORE e.g., wind speeds off the west coast won't necessarily match those in the Irish Sea at any one point in time and, also, to introduce wave energy which operates to a different pattern to wind i.e., can complement wind energy in terms of availability.

The pioneering work of Professor John Ringwood of Maynooth University and others indicates that wave and wind energy combined 'smooths out' the discontinuity inherent in each source: *'...it is shown how the West and South coasts experience, most of the time, wave systems where the predominant (from an energy point of view) part is composed of large swell systems, generated by remote wind systems, which have little correlation with the local wind conditions. This means that the two resources can appear at different times and their integration in combined farms allows a more reliable, less variable and more predictable electrical power production. The reliability is improved thanks to a significant reduction of the periods of null or very low power production (which is a problem with wind farms). The variability and predictability improvements derive from the smoothing effect due to the integration of poorly correlated and diversified sources*.' From Variability reduction through optimal combination of wind/wave resources – An Irish case study by Francesco Fuscoa, Gary Nolan, John V. Ringwood in Energy, 2010

The scale, geographical spread and diverse technology sources of renewable energy, each with different forecast time frames, including wind on-and-offshore, biomass, solar, wave, perhaps tidal (from Northern Ireland) and 'hybrids' of wind and wave should enable Ireland to depend on domestic renewable sources for electricity generation and provide significant export earnings.

While Ireland's tidal energy resources is not as abundant as wind and wave, it is highly predictable and consistent, and is well suited to improving the resilience of local scale grids, particularly when integrated with short term storage. Projects and research elsewhere have demonstrated the potential for using these systems to reduce the dependence of communities on fossil fuel generators[15] and support the decarbonisation of commercial energy users such as distilleries[16].

[15] https://www.thetimes.co.uk/article/irish-river-turbines-to-power-entire-alaskan-community-ch0w00r2d

[16] https://www.novainnovation.com/news/news_/i/creating-water-of-life-from-the-power-of-the-sea/

Enterprise

7. What measures should be taken to address the risks that climate change poses for enterprise?

The enterprise support agencies, IDA Ireland and Enterprise Ireland, are to set up 'green' Departments under the CAP Interim Actions. Undoubtedly, the two agencies will devise schemes to help *existing* industry to transition to climate-friendly products and practices. Nonetheless, there is a need to develop an overarching national industrial policy for climate friendly industry. This should, on a pan-agency basis, identify opportunities, detect domestic 'roadblocks' (e.g., ports capacity) to them and set out a pathway (new support schemes, targets to be achieved etc) to realising them. While, obviously, this would go beyond ORE, industrial development associated with ORE should form a centre piece of the policy: Irish offshore renewable energy developments, particularly when the ambitions for the 2030s are taken into account, represents a significant investment and jobs opportunity and one that is eminently realisable, particularly if we put in place now policies to support the MRETs. See *Just transition 3.* below for fuller brief on the Association's approach to industrial policy and ORE.

Just transition

3. What specific further measures should Government undertake in order to realise the benefits of the low carbon transition, including in relation to supporting the development of low carbon sectors of the economy, including employment in these sectors?

The Irish offshore renewables opportunity is twofold: the GENERATION OF ELECTRICITY and the development of an IRISH SUPPLY CHAIN (which will help drive social acceptance of ORE) to service both the indigenous and international markets. As illustrated in the table below, the electricity opportunity (i.e., the generation and sale in domestic and export markets of electricity generated offshore) is being addressed by actions to achieve the 5GW target, the proposed plan for 30GW of floating offshore wind off the Atlantic coast referenced in the Programme for Government etc. The early supply chain opportunity is married to some extent to its electricity counterpart: individual, project-related (perhaps temporary) final assembly facilities, O&M support etc will occur naturally although 'choke points' in terms of port facilities, for example, may yet arise at an early stage.

However, the core of the supply chain opportunity lies in generating significant onshore investment and the creation of sustainable employment in coastal communities through the MRETs - particularly floating wind and wave energy. Ireland has a natural and major advantage in terms of its wind and wave resource and its micro companies, its facilities and its expertise (including in tidal energy) are to the forefront globally. These new technologies are on a typical technology development journey[17]and, at this stage, no dominant country

[17] Captured particularly well in Measuring the duration of formative phases for energy technologies Bento and Wilson published in Environmental Innovation and Societal Transitions Journal 2016

or companies have appeared. In contrast, fixed offshore wind has seen a convergence in suppliers of high-value components such as turbines (the top two suppliers account for 90% of all connected capacity) and cables (three suppliers account for all projects in Europe)[18] There is, therefore, an opportunity to 'shape' a new Irish energy technology sector to cater for both domestic and export needs in an industry that has yet to see such consolidation.

Status of offshore renewables technologies and potential opportunity for Ireland. *Source*: MRIA

ORE technology	Irish resource	Electricity opportunity	Supply chain opportunity	Comment
Bottom fixed wind	Excellent wind resource - speeds, availability etc, notable in the Irish Sea and parts of the Celtic Sea	Key to achieving 2030 target of 5GW of ORE	Focus will be on final assembly, installation and on-going Operations and Maintenance (O&M). Limited export opportunity?	A mature technology. Scale of possible local market is limited
Floating wind (FLOW)	As above	As above, and key to exploiting west coast - *Programme for Government:* 30GW FLOW 2030s ambition	Ireland's resource represents a significant global FLOW opportunity. Opportunity for Irish companies/ opportunity to attract FDI across the supply chain spectrum	FLOW is maturing fast. Consensus that it is at an early commercial stage
Wave	Excellent off west & south coast, one of the most energy intensive wave regimes world wide	Substantial opportunity in 2030s with focus on exports	Important Irish presence already in global emerging sector. Again, scope to develop new Irish companies/attract FDI across the supply chain spectrum for both domestic and global markets	Wave is now part of EU energy policy with significant ambitions in 2030s
Tidal	Focused on several specific locations of high current speeds with technology as currently envisaged;	Limited at utility scale based on current technologies, but potential for demonstration and community scale projects,	Given Irish expertise (companies; R&D), opportunity to develop local companies and attract FDI (ORPC, Verdant already here)	Opportunity is confined to developing supply chain for global markets. Also, tidal is an EU priority
Other	'Hybrids' - wave/FLOW/ solar/tidal etc at early stage but significant resource	Could contribute significantly as technology develops e.g., to electricity exports in 2030s	Again, opportunity to develop supply chain to cater for upper-end opportunities based on Irish facilities, expertise and reputation	Opportunities are medium term

[18] WindEurope, Offshore Wind Energy: 2020 mid-year statistics

A new Irish ORE technology sector, uniquely, would largely be focused on and directly benefit coastal communities, notably those in traditionally deprived west of Ireland areas.

Why should this be of direct importance to energy policy makers, given that the Department of Enterprise Trade and Employment (DETE) and its agencies (IDA Ireland and Enterprise Ireland as well as, where relevant, Údarás na Gaeltachta) have primary responsibility for industrial development issues? There are three valid responses.

While acknowledging the work of Enterprise Ireland in developing an offshore industry network, the DETE family focuses, and always has done so, on relatively short-term targets (e.g., exports, jobs approved). They do not deal at all with the micro companies, early R&D support, test facilities etc that are a feature of the MRETs sector at this stage of its development. Thus, second, the agencies will 'take over' the supply chain challenge some years hence once the MRETs sector begins to mature e.g., Irish companies of the scale necessary to qualify for Enterprise Ireland support start to emerge and an FDI 'market' (in e.g., wave technology firms) grows to the point where it makes sense for IDA Ireland to compete. However, there won't be any sector of note to mature unless a support regime is put in place again, one which should be driven via the Sustainable Energy Authority of Ireland. Finally, there may be public support challenges for offshore renewables-now evident in Scotland[19] for example - if the perception of local interests is that Ireland has failed to reach out for opportunities which are currently open to us. The principal scope, as the Table above illustrates, is to advance quickly and to make visible a proactive effort to extend beyond the electricity opportunity (and its related O&M etc) to a strong and sustainable supply chain opportunity by providing support to the emerging technologies.

There is a popular assumption that the bulk of the supply chain opportunity in ORE lies in the fabrication of the wind or wave conversion devices' 'hulls', i.e. heavy engineering in which Ireland has only a limited tradition. In fact, there is a notable and sophisticated engineering sector (e.g., to support the large pharmaceutical cluster in Cork) in the Republic of Ireland ….and, of course Northern Ireland has excellent heavy engineering capabilities highlighted by Harland and Wolff Heavy Industries. With the right Government policy and support, companies may be in the position to diversify and expand into these areas.

In any event*, hull manufacture represents a relatively small proportion of overall device costs* as illustrated by Alcorn[20] in a study which broke down the cost of an *actual* full scale prototype wave energy device (name supplied to MRIA): hull manufacture accounted for under 12% of the total project cost. The elements of the project in question are shown in the tables below. This example highlights the point that device development and manufacture is not solely, or even mainly, involved in heavy engineering and that there are many different activities along the value chain where Ireland has capability also.

[19] See e.g., the Financial Times 'Vision of industrial rebirth from wind runs out of puff', 8/01/2021, for a report of issues in Scotland arising from concerns about the industrial benefits, or more accurately, a perceived lack of benefits, from offshore wind development

[20] *Supply Chain Opportunities* Dr Ray Alcorn, MaREI Research Centre, UCC 2014. Dr Alcorn was employed at one time by the project in question.

Major Components	*Major Services*	*Major Services (cont'd)*
▪ Hull structure ▪ Foundation/moorings ▪ Primary power take off → Hydraulics → Turbo machine → Turbine ▪ Electrical Generator + Drives + protection ▪ Power cabling ▪ Onshore works	▪ Fabrication ▪ Precision engineering ▪ Heavy lifting ▪ Towage ▪ Piling ▪ Anchor handling ▪ Diving ▪ Rigging ▪ Elec/Mech ▪ Cable installation	▪ Design ▪ Naval Architecture ▪ Certification ▪ Insurance ▪ Risk Analysis ▪ Deployment planning ▪ O&M ▪ health & Safety ▪ Berthing ▪ Training

Breakdown of elements in actual project

Hull	12%
Transport	6%
Site Works	8%
Foundations/Moorings	12%
Electrical	8%
Turbomachine (PTO)	8%
Engineering Design	24%
Integration	8%
Installation	16%

Breakdown of costs in actual project

4. What specific investments should be considered to support a just transition in Ireland?

The capacity of our ports infrastructure to support ORE will be seriously challenged by the '5GW target by 2030' target and is inadequate to handle the scale of ORE development off the south and west coasts given Government ambitions for the 2030s, the scope for offshore hydrogen production, the possibility of electricity exports at scale etc. Ireland's offshore renewable energy farms will be built from bases outside the country, losing billions of this potential investment, unless strategic investment decisions are made now.

It is imperative that the proposed review of ports policy takes a fresh and imaginative view of the relationship of ports capacity to ORE plans, given factors such as the long timeframe involved in ports investments; the limited land availability at key ports (thus, without any investment in new facilities, ORE would have to compete with existing commercial port activities which would cause obvious difficulties); the cost of 'steaming time' to ORE sites means that a single investment in ports in one location will not suffice with ORE development likely in all three of our adjoining oceans over the next two decades; the likely (Offshore Support Vessels in oil and gas industry -scale) vessels required to support floating offshore wind and wave developments in the Celtic Sea and the Atlantic. The indications are that, since Brexit, the main ports are near to full berth utilisation with no sign of this easing anytime soon.

5. How should the State finance just transition initiatives and investments?

The first initiative sought by MRIA is the restoration and enhancement of the support regime for MRETs. In line with the Interim Review of OREDP 1, this should include restoration of the Prototype Development Fund, extension of the special revenue support scheme beyond wave and tidal energy to include other new technologies such as new concepts in floating offshore wind, floating solar energy etc as well as an increase in the quantum of the special revenue support scheme (as recommended in the Interim Review). Second, a finance mechanism to support new ORE technologies at the TRL c4-6 levels is required and the way forward for such a Pre Commercial Technology Fund was set out in a Paper by MRIA[21] Third, for reasons set out at *Just Transition 3.* above, an industrial policy initiative is required to ensure Ireland has the policy framework and means to maximise the local employment and investment benefits of our ORE ambitions and to win export opportunities. Finally, as outlined at *Carbon pricing and cross cutting issues 6.* above, initiatives to incentivise investment in ORE would contribute to social acceptance of the sector. Community-scale projects could provide a valuable bridging opportunity in this regard, decarbonising and enhancing the resilience of local electricity supply, engaging other marine users (fishing, recreation etc.) in a positive way, and potentially incorporating community ownership. Such initiatives would build on the success of ESB Network's Dingle Project[22], which has been a fruitful collaboration in exploring how customers and communities interact with new energy systems. This could be a particular opportunity for tidal energy technologies, which are scalable to site-specific locations provide base-load power output that can complement other forms of renewable energy.

In terms of investments, the first need is for a support scheme to ready our ports for ORE and to enable the National Maritime College of Ireland (NMCI) to do likewise - see *Just Transition 7.* below. Second, the ports policy review -see *Just Transition 4* above - should provide for a funding mechanism with a substantial allocation of funding to support ports development with awards being made on the basis of criteria which have been the subject of consultation with industry.

[21]

[22] https://www.esbnetworks.ie/who-we-are/innovation/esb-networks'-dingle-project

7. Are there specific issues for consideration in Ireland's further education, training and skills system?

All the indications and views available to MRIA suggest that there is a need for a significant ramp up in education & training facilities and operations. In September, the *Expert Group on Future Skills Needs* (Department of Enterprise, Trade and Employment) is expected to issue a report on skills needs for the low carbon economy. It will cover ORE, electric vehicles and building retrofitting. There are informed suggestions that the Expert Group will indicate that Ireland will need to *double the output of qualified seafarers by 2030* which has major implications in terms of infrastructure investment, staff levels etc at the National Maritime College of Ireland (NMCI). In any event, given the significant scale-up in offshore activity now underway and planned, there will be a challenge to deliver the *basic* maritime safety and competency training alone, needed by those likely to be working offshore on installation, maintenance etc.

In addition, there will be a need for three types of new programmes:

- Bridging programmes for existing professionals to transition from other sectors into ORE – this is regarded as a priority by industry
- Undergraduate and postgraduate courses specifically focusing on aspects of ORE e.g., engineering, supply chain and so on
- New apprenticeships to cover the range of the engineering trade skills needed by ORE including mechanical, electrical, general operative etc.

There is a need for a national ORE education and training policy with 'joined up' thinking, otherwise the necessary capacity won't be achieved and a fragmented approach - a possibility at present as various "solo runs" by individual institutions are emerging - will be both expensive and ineffective. In the first instance, a national audit of existing national ORE (maritime, engineering, electrical, supply chain etc.) education and training infrastructure should be undertaken.