Written evidence submitted by Nova Innovation Ltd (POW0084)

Introduction

Nova Innovation (Nova) is a world-leading tidal energy company – transforming the power of our seas into clean, predictable electricity. We design, manufacture, and operate tidal turbines that generate electricity from the natural ebb and flow of the tide. Our products have a very high UK and Scottish supply chain content and are exported to the world.

Nova successfully installed the world's first offshore tidal array in Shetland, Scotland in 2016 and our underwater turbines have been powering homes, businesses, and the Shetland grid for over seven years. We are actively developing projects across the UK, Europe, North America and Asia. Our aim is to be the world's number one tidal energy technology company.

1. Is the energy sector open enough to new generation technology?

The UK Government has the ambition to make UK the Silicon Valley of Green Energy. To do this, we need to make the UK **the best place in the world to develop and deploy new energy technologies**.

- Offer quick, cost-effective and firm **grid connections** to projects incorporating new energy technologies.
- Similarly, make **consenting** for new energy technologies quick and cost-effective.
- Offer suitable **financial support** for new energy technologies, to allow them to attract investment. We do not believe that the current CFD mechanism is suitable for purpose.

Tidal power

The UK is the recognised global leader in tidal energy. Both of the world's first offshore tidal arrays are deployed in UK waters – the Meygen project and Nova's Shetland Tidal Array – and UK companies like Nova Innovation and Orbital Marine Power are world leaders in tidal technology development.

To maintain this lead, the UK needs to continue to develop more tidal energy projects and deploy more UK-built technology. However, **there is currently no viable route to market under the CFD for new tidal energy projects in the UK**.

Key issues with the CFD

1. Project delivery under the CFD is painfully slow.
2. The CFD offers little certainty to investors, deterring investment.
3. The track record of the CFD in supporting emerging technologies is poor.

Project delivery under the CFD is painfully slow

It takes at least 7 years from conception to commissioning of a UK tidal energy site. In contrast, tidal projects in Canada can go from a greenfield site to first power in under 3 years. This puts the UK at a competitive disadvantage for project investment and risks the country losing its world lead in tidal energy.

A requirement for a CFD is a Section 36 consent, which takes at least 4 years in all nations of the UK (and in practice often much longer). Annual CFD auctions can mean up to a 1 year wait following project consent to the next CFD Allocation Round. There is no guarantee that there will be a budget for tidal power in that Allocation Round and, should a budget be awarded, the project might not be successful in the auction. This uncertainty magnifies project risk and deters investment in project development.

This means that investors are expected to shoulder millions of pounds of development costs in the hope that an appropriate CFD mechanism will be in place once consent has been awarded, many years in the future. The CFD minimum for tidal power was removed in Allocation Rounds 2 and 3, before being reinstated in AR4. This on-off history of UK support for tidal power distinguishes it from offshore wind, which has had consistent support, bolstered by ambitious targets. The chequered history of support for tidal power under the CFD deters investment in developing new tidal energy projects.

Once a project is successful in winning a CFD it takes a minimum of 3 years more before the CFD start date, and in practice potentially much longer before commissioning. This process is **far too slow** to encourage investment in an emerging technology sector like tidal power.

The CFD offers little certainty to investors, deterring investment
In addition to the uncertainties mentioned above relating to the future availability of the CFD, the price of the CFD is also uncertain. The LCCC does minimal technical or commercial due diligence on CFD bids – they only check that the appropriate consents and grid connection are in place. As a result, there is a risk that CFDs are awarded to projects that have no hope of successful delivery at the strike price secured.

This risk is mitigated for offshore wind, where tens of millions of pounds are required to secure consent and a grid connection, and the government can rely on those investors to do the required due diligence. In contrast, all tidal projects currently bidding for a CFD rely on existing grid connections and consents which do not require significant new investment. The technical and commercial feasibility of these projects will only be tested when they attempt to secure financial close.

The UK will not achieve its goals of developing a thriving tidal energy sector without attracting investment in new project development. The shortage of new tidal projects being developed in the UK is a clear warning sign that the CFD structure is not fit for purpose. Any developer considering investment in a new UK tidal energy project needs to consider not just consenting risk, and the risk that the CFD might no longer be available once consent has been secured, but also the additional risk that they will lose out in the CFD auction to a project that turns out (years later) to be technically or commercially unviable.

The track record of the CFD in supporting emerging technologies is poor
The CFD has undoubtedly been successful in supporting offshore wind. However, offshore wind builds on the success of onshore wind, where hundreds of GW was deployed onshore worldwide before the first CFD round was launched in 2014. The record of the CFD in supporting less mature technology sectors is poor.

For example, ten Advanced Conversion Technology (biomass) projects were awarded a CFD under Allocation Rounds 1 to 3. Nine of these contracts have since been terminated – a 90% failure rate – and the one remaining project is long delayed.

This provides clear evidence that the CFD is not the right mechanism for all emerging energy technologies, and we strongly believe that the CFD in its current form is the wrong mechanism for tidal power in its current nascent state of development.

Summary
Faced with the long delays and uncertainties imposed by the CFD, investors will put their money elsewhere. This is evidenced by the lack of companies investing in new tidal project development in UK waters. Nova is one of the few companies involved in developing tidal energy projects in the UK. We do so not because of the CFD, but in the hope that the issues we have identified with the CFD will be recognised and addressed, because of the persistent and strong public and cross-party political support for tidal energy.

Interest in new project development should be a key metric to measure the success of UK and Scottish policy in encouraging investment in tidal energy. The current lack of interest in new UK tidal energy project development shows that a rethink is required.

Innovative technologies need to be deployed quickly to maintain a competitive lead through focused technology demonstration and learning by doing. They require a stable policy environment that offers security and confidence to investors. In contrast, the CFD structure leads to unnecessary delay and magnifies technology development risk and uncertainty. Proposed changes to the CFD to include non-price criteria will not address these fundamental issues.

Alternative mechanism such as Feed-in Tariffs (FITs) can offer the certainty and security to investors that is essential when kick-starting a new market. While they might now have outgrown this stage, the initial growth of solar and wind power across the world was supported by FITs. In the UK, the Renewables Obligation also offered much more security in terms of the price and availability of support than the CFD and allowed projects to be delivered much more quickly than under the CFD.

Nova Innovation strongly encourages the UK Government to reconsider the effectiveness of the CFD in supporting emerging energy technologies like tidal power, and to consider the merits of adapting or replacing the CFD as the mechanism for driving investment in new energy technologies.

2. Does the Government sufficiently support development of innovative energy infrastructure?

No response

3. Is the Governments plan for energy security sufficiently long term?

New energy technologies will always in the early years be more expensive than existing technologies – this is as true for tidal power as it was for wind and solar. Investment in new energy technologies therefor requires incentives; to be effective, these incentives need to meet the **3P rule: powerful, predictable, and persistent**.

- **Powerful**: sufficiently attractive to encourage investment.
- **Predictable**: the availability and level of support needs to be clear in advance.
- **Persistent**: incentives need to be long-term, to provide a pipeline of projects that can attract investment.

Adapting the CFD so it meets these criteria, or replacing it with an alternative mechanism focused on emerging technologies, will encourage investment into the vital and growing UK new energy technology sector.

4. What current technologies could usefully be deployed at scale to deliver better energy security in the UK?

Tidal energy has the potential to deliver over 11GW of predictable, low-carbon power to the UK grid, generating UK jobs and exports. The potential benefits of tidal energy to the UK economy are set out in the Marine Energy Council response to this consultation.

Today, tidal energy is an emerging technology and has enjoyed just a tiny fraction of the support that wind and solar energy have received. BEIS estimate that £175 million of UK funding has been invested in wave and tidal energy since 2003[1]. In contrast, the value of the UK Renewables Obligation in 2019-20 – **just a single year** – was **£6.3 billion**[2].

[1] https://hansard.parliament.uk/Lords/2019-06-05/debates/F111A6EE-535E-46C9-B3E2-4817ED0AA629/RenewableEnergy#contribution-CECAEA15-229F-4FB0-85C4-20856743CE52
[2] Ofgem RO Report 2010-11_WEB.pdf

In terms of megawatts deployed worldwide, the tidal stream energy sector is in a similar position to wind power in the 1980s. With the right support, the sector can develop much more rapidly than wind energy by taking advantage of transferable technology and learning gained by the wind energy and maritime engineering sectors, such as subsea oil and gas. We support RenewableUK's call for a target for marine energy and believe that the UK could deploy 1GW of marine energy technology by 2035.

There are good reasons for thinking that tidal energy could one day be cheaper than wind power due to the high density of the resource. The amount of power a turbine can generate per square meter of swept area is referred to as its specific power. Today's onshore wind turbines – following decades of development and hundreds of GW deployed worldwide – achieve a specific power of 221 W/m^2, or 340 W/m^2 for offshore turbines[3]. In contrast, Nova's M100D turbine generates 1,726 W/m^2 – **5 times greater than offshore wind and 8 times greater than onshore wind**. This means that we can generate the same amount of power as wind energy with a far smaller device, highlighting tidal power's tremendous competitive potential.

5. Are there technologies that have not been able to develop their potential and should be abandoned?

Fossil fuels need to abandoned, and quickly if the UK and the world are to achieve their net zero ambitions. Net zero can't be achieved with wind and solar power alone. Tidal power offers a uniquely predictable source of zero carbon energy that can diversify the UK's energy supply. With the right incentives, the UK can build on its global lead to become the world leader in tidal power, following the example of Danish wind, and generating UK jobs and exports.

6. What energy generation mix will get us to net zero the quickest in the most affordable way?

No-one knows how energy supply and demand technologies will evolve over the next decades. The fall in cost for wind and PV was completely, unexpected, even for experts in the sector. Given such uncertainties, the best approach is to avoid concentrating risk and to invest a significant share of resources in technologies with the potential to deliver future benefits. If previous generations had lacked this foresight then we wouldn't be enjoying the benefits of today's technologies– including of wind and solar power.

Tidal power has already proven that it has the potential to contribute to UK energy security, with UK projects to date delivering over 74GWh of power to the grid. Appropriately designed incentives will continue to attract investment and drive down costs, just as they did for wind and solar power, allowing tidal power to earn its place in the UK and global energy mix.

This isn't just a matter of achieving the UK's goals – in investing in new technologies the UK will develop products that will help other countries decarbonise, and thereby attracting investment and generating UK green jobs and exports. An assessment of "affordability" should also consider the enormous potential economic benefits that the green economy can generate.

Denmark, with a similar population to Scotland but significantly less renewable resource, shows what can be achieved with the right policy environment:

- In 2019 the Danish wind energy sector employed 33,159 people (direct jobs) with 6,128 MW of wind deployed in Denmark – **5.5 jobs per MW**[4].
- In contrast, in 2019 the Scottish wind energy sector directly employed 4,200 people[5] with 8,423 MW deployed – **0.5 jobs per MW**.

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[3] Experts' Predictions for Future Wind Energy Costs Drop Significantly | Electricity Markets and Policy Group (lbl.gov)
[4] Statistics | Wind Denmark International
[5] Low carbon and renewable energy economy estimates - Office for National Statistics (ons.gov.uk)

The difference is **exports**:

- Denmark is a massive net exporter of wind technology – €8.9 billion of exports in 2019. The UK is one of its biggest markets. 90% of Danish exports are linked to turbine manufacturing and its supply chain[6].
- In contrast, despite Scotland's abundant resources and impressive capacity figures, there are no major turbine manufacturing plants in Scotland. This is a huge missed opportunity which, with the right incentives, can be avoided with tidal energy.

In addition to future export potential, the current, real-world impact of tidal energy on UK jobs and regional economic growth is evidenced by Nova Innovation's experience delivering the Shetland Tidal Array:

- **Construction** of the Shetland Tidal Array had **over 80% UK content**, including 25% supply chain spend in Shetland.
- **Operation** of the array has seen **98% UK supply chain content**, with over 50% of project expenditure going to companies in Shetland and Orkney.
- Nova works with **over 40 local suppliers** in Shetland including Shetland Composites, who have built blades for all of Nova's turbines, and are now one of the top tidal blade manufacturers in Europe.
- Nova expects this high local content to be replicated at our other sites across the UK.

7. Are the energy solutions universal across the UK or are there regional and local approaches on fuel and energy?

No response

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[6] Study of the macroeconomic impact of Wind Energy in Denmark, Deloitte, 2012