The Hendry Review - Overview

The case for a Tidal Lagoon Programme

Marine energy technologies offer an energy opportunity where the UK can reasonably aspire to be the global leader.

Tidal lagoons would help deliver security of supply; they would assist in delivering our decarbonisation commitments; and they would bring real and substantial opportunities for the UK supply chain.

I conclude that the potential impact on consumer bills of large scale tidal lagoons appears attractive, particularly when compared to nuclear projects over a long time period. I also conclude that, using a measure of CFD cost per MWh over project lifetimes, a tidal lagoon programme could play a competitive role as part of the UK's energy mix alongside low carbon energy from nuclear and offshore wind.

This is not therefore just about how we decarbonise the power sector in the most cost effective way now; it is also about very long-term, cheap indigenous power, the creation of an industry and the economic regeneration that it can bring in its wake.

After years of debating, the evidence is I believe clear that tidal lagoons can play a cost-effective part of the UK's energy mix. Large scale tidal lagoons, delivered with the advantages created by a pathfinder, are likely to be able to play a valuable and cost competitive role in the electricity system of the future.

The Case for a Pathfinder

There is a very strong case for a small scale pathfinder project (less than 500MW) as soon as is reasonably practicable and I urge the Government to capitalise on work already done rather than starting afresh. This clear commitment would deliver earlier benefits and accelerate a future programme.

The costs of a pathfinder project would be about 30p per household per year over the first 30 years.

To assure the taxpayer, the electricity consumer and the Government, it would be very beneficial for Tidal Lagoon Power to secure a delivery partner with a corporate track record in major energy or infrastructure projects.

I recommend that the Government now move to a timely 'final-stage negotiation' to explore robust and satisfactory terms that might be acceptable to both the developer and the Government.

The Government will require a period of time to assess these recommendations and to reflect them in their view of the proposals from Tidal Lagoon Power and their value for

money. This work should take account of my conclusion on the very strong case for a pathfinder project and conclusion that cost-competitive larger-lagoons will follow.

Any case to conclude a negotiation should reflect my assessment of the strategic value of a pathfinder project, the considerable value of a subsequent tidal lagoon programme, and the economic value created in the UK supply chain.

Moving ahead with a pathfinder lagoon is, I believe, a no-regrets policy. The Secretary of State for Business, Energy and Industrial Strategy, Greg Clark, has rightly spoken about the obligation on policy makers to plan for the longer-term. I don't believe there would be any debate in decades to come about whether this was the right thing to do.

Future Programme

The pathfinder should be commissioned and be operational for a reasonable period before financial close is reached on the first larger-scale project. The pause would allow in-depth monitoring to be carried out and research to be conducted to address issues as they arise.

The cost of a large scale project would be less than 50p per household per year over the first 60 years.

If the UK is to adopt tidal technologies, and tidal lagoons in particular, and to get the industrial benefits of such an approach, then I recommend that it needs a strategy similar to that for offshore wind, with a clear sense of purpose and mission. It needs to bring the industry together to address each challenge as it emerges and to set the industry itself the goal of making the step-changes which would determine whether this becomes a new industry or a small niche.

Government action is required if the benefits of a tidal lagoon programme are not to be lost, especially for the supply chain.

I have made over 30 recommendations that will help a tidal lagoon programme bring an important and exciting new industry to the UK, including that:

- The consenting process should be informed by a National Policy Statement similar to nuclear new-build, where specific sites are designated by the Government as being suitable for development;
- The current Swansea Bay project should be excluded from this National Policy Statement approach;
- A new body (Tidal Power Authority) should be established at arms-length from Government, with the goal to maximise UK advantage from a tidal lagoon; and
- contracts should be allocated by a competitive tender process for large scale tidal lagoons.

Summary of conclusions and recommendations

Report heading	Conclusions and recommendations	Section	Page No
Introduction	*Recommendation* I recommend that the Department for Business, Energy and Industrial Strategy considers publishing as much of the material received as possible, as a valuable resource for a range of interested parties.	1	Page 5
Security of supply	*Conclusion* I am persuaded that power from tidal lagoons could make a strong contribution to UK energy security, as an indigenous and completely predictable form of supply. Even though it offers limited dispatchability, National Grid expressed no particular concern that this would pose problems they could not readily manage.	3.2	Page 24
	Conclusion A programme of tidal lagoons that could deliver the goal of providing constant, or as near as possible to constant, power would be an absolutely huge undertaking, requiring tidal lagoons around much of the country. It is my belief that this is too ambitious a goal to be set at this time, before even one has been built, and could only be considered properly when more progress has been made on building a number of tidal lagoons.	3.2	Page 25
	Recommendation I would strongly caution against ruling out tidal lagoons because of the hopes of other cheaper alternatives being available in the future. There may be technological innovations forthcoming which could eventually make tidal lagoons redundant, but policy has to be made with the information we have now on the benefits and drawbacks they have, not in hindsight.	3.2	Pages 25-26

Report heading	Conclusions and recommendations	Section	Page No
Decarbonisation targets	*Conclusion* If lagoons can be constructed and operated with such low levels of lifetime emissions [i.e. c.14gCO2e/kWh], then it is clear that they would contribute positively to progress towards the UK's decarbonisation goals.	3.3	Page 28
Impacts on the environment and other uses of the waters	*Recommendation* Should lagoons be built, the Government should require a high level of on-going monitoring of environmental impacts to ensure that mitigation can be put in place where impacts are judged to require it.	3.4	Page 30
	Conclusion I do not consider it acceptable that the business interests of established commercial organisations should be unreasonably impacted by the creation of lagoons in the Severn Estuary.	3.4	Page 32
	Recommendation I recommend that developers should be required to demonstrate, as part of the planning and consenting process, that they have taken full account of potential deposition rates.	3.4	Page 32
Hybrid Infrastructure	*Recommendation* Where a tidal lagoon is being used to help contain or prevent flooding, it would inevitably mean that it would not be deriving income from generating power at those times and the developers of the tidal lagoon would reasonably expect to be compensated for this loss of income. Government should carefully consider whether this compensation should come from energy bills.	3.5.1	Page 35
	Conclusion The weight of the expert evidence I have received supports the scale of seawall being proposed for TLSB, and I have not seen engineering-based evidence to persuade me it could be significantly reduced.	3.5.2	Page 36

Report heading	Conclusions and recommendations	Section	Page No
	Conclusion I think it is beyond question that, in the case of Swansea Bay, local economic regeneration would follow a tidal lagoon.	3.5.2	Page 36
	Recommendation My recommendation is therefore that the Tidal Lagoon Swansea Bay should be considered as an electricity project to all intents and purposes, but one which would incidentally bring very real and substantial economic and recreational benefits to the Swansea Bay area. This distinction is important as it relates to how the project should be paid for. My recommendation is therefore that Tidal Lagoon Swansea Bay should be considered an electricity project rather than a hybrid project with multiple sources of funding support.	3.5.2	Page 37
	Conclusion My conclusion therefore is that lagoons would certainly bring wider benefits beyond those of power generation, but these are very site specific, are hard to quantify and are unlikely to make a significant contribution to capex. I consider in the Chapter on competition how some of these benefits might be taken into account.	3.5.2	Page 37
Benefits to supply chain companies and other sectors	*Conclusion* Many companies have described the potential tidal lagoon programme as a 'lifeline'. Given the challenges facing the UK steel industry, this is probably no understatement, so this is not just about the 'jobs created' but about the 'jobs saved for the long-term' as well.	4.4	Page 47
Other benefits	*Recommendation* I recommend that much more detailed work should be done to assess possible tourism impacts, in conjunction with local FE colleges, to plan ahead with the necessary skills training that significant visitor numbers could require, and to ensure that the design of the visitor attractions reflect the potential of this economic uplift.	4.5	Page 52

Report heading	Conclusions and recommendations	Section	Page No
Innovation and Cost Reduction in Tidal Range technologies	*Conclusion* I am in no doubt that there are promising innovations and technological advancements that could be made as part of a tidal lagoon programme, and that could help drive down costs. The new public body UK Research and Innovation and the Energy Innovation Board could play useful roles in this regard.	4.6	Page 53
Caissons	*Conclusion* Should a programme of tidal lagoons go ahead, I see very significant benefits in principle in the development of a caissons capability in the UK. This would give UK manufacturing a very significant advantage over foreign competition. Potential locations would be in Wales, the North-West of England and the West Coast of Scotland, spreading the economic benefits to many different parts of the country.	4.7	Page 54
Supply chain conclusions	*Conclusion* I have been encouraged that the current financial backers strongly sign up to TLP's ambition of developing a supply chain in the UK. This should reduce those pressures to go for potentially cheaper products from abroad, but it does remain a risk. More significantly, the full opportunities for a UK supply chain will only be realised if there is long-term clarity about the number, scale and timing of lagoons to be built in the UK.	4.8	Page 55
	Conclusion Overall, a tidal lagoon programme offers a significant economic opportunity for Wales and the UK more generally. There are few other energy sectors where the UK can realistically aspire to have such a significant supply chain, where the skills already exist for a 'pathfinder' project or where there is such commitment to large scale manufacturing in the UK from the world's largest firms in this sector.	4.8	Page 56

Report heading	Conclusions and recommendations	Section	Page No
	Conclusion Marine energy technologies offer an energy opportunity where the UK can reasonably aspire to be the global leader, with some substantial supply chain opportunities to match it. If the UK is to commit to a new source of power generation, then I consider it absolutely essential that it should also bring wider and long-term economic benefits to the country, rather than imposing charges on consumers' bills where the economic benefits go to businesses overseas. To help achieve maximum UK advantage, the Government should make it clear that its support for tidal lagoons is, in part, based on the supply chain opportunities and the wider industrial and economic benefits such a programme would bring. If the UK is to adopt tidal technologies, and tidal lagoons in particular, and to get the industrial benefits of such an approach, then I recommend that it needs a strategy similar to that for offshore wind, with a clear sense of purpose and mission. It needs to bring the industry together to address each challenge as it emerges and to set the industry itself the goal of making the step-changes which would determine whether this becomes a new industry or a small niche. I would urge the Government to look at these opportunities not just in tidal lagoons but for marine renewable energy more generally. Whilst wave technologies are further behind tidal technologies, the UK should be promoted as a centre of global excellence and opportunity for the development of all marine energy technologies, where appropriate giving a central focus to the work of organisations like Marine Energy Wales and Wave Energy Scotland.	4.8	Pages 56-57
Export Opportunities	*Conclusion* I am satisfied, through the academic and commercial input I have received, and given the clear evidence of suitable locations, that there is some overseas potential for tidal lagoons. It does, however, require an additional leap of faith to believe that the UK would be the main industrial beneficiary of such a global programme.	5.6	Page 62

Report heading	Conclusions and recommendations	Section	Page No
	Conclusion I conclude that there are international opportunities for tidal lagoons which could provide supply chain opportunities for the UK, but these are far from certain. There is not currently firm evidence of a commitment to develop such resources in many of the identified countries and even if they would be developed, they would probably look more locally for the supply chain elements and skills they would need.	5.6	Page 63
	Recommendation The UK tidal lagoon potential should be looked at for its own merits. The international opportunities would be 'good to have' but they are not sufficiently concrete that they can be relied upon.	5.6	Page 63
	Recommendation To capitalise most effectively on the supply chain opportunities for the UK, I would recommend that the Department for International Trade hosts a summit in the UK bringing together countries from around the world with tidal lagoon opportunities to showcase the skills and expertise the UK has to offer.	5.6	Page 63
Generation Costs and the potential for cost reduction	*Conclusion* I conclude that high-level modelling indicates that large scale tidal lagoons would decrease generation costs relative to a pathfinder project due to high tidal ranges and favourable designs. Moreover, this reduction would still apply even in a scenario where cumulative impacts on energy yields are significant. This trend would be further accentuated when reductions in project costs and financing costs are taken into account.	6.1	Pages 68-68

Report heading	Conclusions and recommendations	Section	Page No
	Conclusion I have concluded that there is scope for project costs to reduce following a pathfinder project, probably at least by 8-10% of capex and potentially by significantly more. The extent of these reductions will in part depend on Government's willingness to create the right framework for securing the greatest cost reductions, as proposed in Part Two of the Review. In particular, effective competition between developers to progress projects will put downwards pressure on project costs and help to ensure that consumers will benefit from cost reductions as a result of a pathfinder, innovation, a strong supply chain and efficient financing.	6.2	Pages 69
	Conclusion There is potential for large scale tidal lagoons to significantly decrease generation costs relative to a pathfinder project, due to site location and design, including in a scenario where cumulative impacts on energy yields are significant. There is a moderate potential for project cost reductions as the industry establishes itself following a pathfinder. And there is a high potential for cost of capital reductions (due to the role of a pathfinder). Whilst it is inevitably very difficult to quantify this potential precisely at this stage, it should be noted that generation costs (and therefore subsidy costs) are very sensitive to improvements in these areas. However, all the methods used show the same trends of reducing costs for projects built at scale. Effective competition is essential to efficiently drive cost reductions.	6.4	Page 73

Report heading	Conclusions and recommendations	Section	Page No
Subsidy costs and other considerations	*Conclusion* Based on current project assumptions and the financing structure proposed for Swansea Bay, I have concluded that a "CFD Equivalent" measure of subsidy costs indicates that large scale tidal lagoons have potential to be competitive with low carbon projects commissioning in the mid to late 2020s. Potential subsidy costs should be considered by Government in the round with estimates of other direct and indirect public costs and the wider social and economic benefits of projects. I conclude that the potential impact on consumer bills of large scale tidal lagoons appears attractive, particularly when compared to nuclear projects over a long time period; and that a measure of CFD cost per MWh over project lifetimes indicates that a tidal lagoon programme has potential to be very valuable and competitive. Large scale tidal lagoons, delivered with the advantages created by a pathfinder, are likely to be able to play a valuable and cost competitive role in the electricity system of the future.	7.4	Page 85
	Conclusion I do not consider that the shortfall between estimated capex levels for large scale tidal lagoons and ETI's targets illustrate that tidal lagoons cannot be cost effective. Rather, the variance indicates the importance of the role of a financing structure in driving down subsidy requirements, which are the key criteria for projects to be cost effective.	7.5	Page 86
	Recommendation I encourage Government to engage with stakeholders to further its understanding of potential system impacts for tidal lagoons in a range of deployment scenarios and time periods.	7.5	Page 87

Report heading	Conclusions and recommendations	Section	Page No
Conclusion: The Strategic Case for a Tidal Lagoon Programme	*Conclusion* My conclusion is that tidal lagoons would help deliver security of supply; they would assist in delivering our decarbonisation commitments; and they would bring real and substantial opportunities for the UK supply chain. I have also concluded that they could play a competitive role as part of the UK's energy mix alongside low carbon energy from nuclear and offshore wind. Nevertheless it must be recognised that an analysis purely on economic aspects inevitably overlooks wider benefits of a lagoon programme and that it is why it is ultimately a strategic decision, every bit as much as an economic decision.	8	Page 89
	Conclusion Moving ahead with a pathfinder lagoon is, I believe, a no-regrets policy. The Secretary of State for Business, Energy and Industrial Strategy, Greg Clark, has rightly spoken about the obligation on policy makers to plan for the longer-term. I don't believe there would be any debate in decades to come about whether this was the right thing to do, even if it ended up as the only lagoon constructed – but I would expect it is much more likely to be seen as the decision which started a new industry, and all done at the cost of a small number of pence to consumers each year. This is not therefore just about how we decarbonise the power sector in the most cost effective way now; it is also about very long-term, cheap indigenous power, the creation of an industry and the economic regeneration that it can bring in its wake. If this is the conclusion, it also follows that we should start that process as swiftly as we can. After years of debating, the evidence is I believe clear that tidal lagoons can play a cost-effective part of the UK's energy mix.	8	Page 89

Report heading	Conclusions and recommendations	Section	Page No
First of a Kind Project	*Conclusion* The challenges of securing investment for a very large project as the first tidal lagoon would be very considerable, if not insurmountable. A smaller project would help develop the supply chain and allow the skills base in the UK to grow to support a larger industry. In most respects as much can be learned from the experience of building a small project as could be learned from a very large lagoon. I therefore have concluded that a first lagoon should be relatively small in scale (i.e. less than 500 MW), as I consider this to be much more deliverable and would not significantly reduce the learning opportunities. I consider that the term "pathfinder project," rather than a "first of a kind" better reflects the value that a smaller first lagoon could bring: it will establish the technology and prepare the supply chain to reap later benefits; yet follow-on projects will be different – in particular bigger – and therefore will face challenges of a different nature.	9	Page 92
	Conclusions and recommendations During the Review I saw material relating to TLP's position as part of the 'first-stage negotiation' underway with Government for a CFD for Swansea Bay. I have not seen a formal response from Government, nor received an assessment of final terms that might be acceptable to Government negotiators. It is therefore not possible for a full Value for Money case to be made for this particular project; and regardless such a case would clearly be beyond the scope of my independent Review. I do conclude that there is a very strong case for a smaller pathfinder project as soon as is reasonably practicable and I urge the Government to capitalise on work already done rather than starting afresh. This clear commitment would deliver earlier benefits and accelerate a future programme. I recommend that the Government now move to a timely 'final-stage negotiation' to explore robust and satisfactory terms that might be acceptable to both the developer and the Government.	9	Pages 92-93

Report heading	Conclusions and recommendations	Section	Page No
	Recommendation To assure the taxpayer, the electricity consumer and the Government, it would be very beneficial for TLP to secure such a delivery partner with a corporate track record in major energy or infrastructure projects. Such a partner should be in-place for the conclusion of a final phase negotiation with the Government. Any case to conclude a negotiation should reflect my assessment of the strategic value of a pathfinder project, the considerable value of a subsequent tidal lagoon programme, and the economic value created in the UK supply chain.	9	Page 93
The relationship between the pathfinder project and a programme	*Conclusion* Even in a policy area where so much vision is required to move forward, I have concluded that we have to exercise sensible caution in moving to a programme of lagoons too quickly, in order to understand their full impact and learn the full lessons of how the programme can be improved going forward. I have concluded that it is therefore inevitable that the pathfinder project should be separated from the wider lagoon programme, and that the pathfinder should be commissioned and be operational for a reasonable period before financial close is reached on the first larger-scale project.	10	Page 95
	Recommendation To maximise the learning from this period of monitoring and research, I recommend that smaller scale lagoons (and potentially small scale barrages) continue to be developed and constructed during this pause.	10	Page 95

Report heading	Conclusions and recommendations	Section	Page No
	Recommendation It has also been proposed that data and learning from the pathfinder project should be open-sourced, to allow a whole industry to grow to the benefit of the UK. I see considerable attractions in such an approach, especially given the public funding involved, and whilst I recognise that there may be difficulties in doing this in a way the respects the intellectual property interests of the operator of the pathfinder project, I recommend that the Government investigates whether these difficulties can be overcome.	10	Page 96
Future Programme	*Conclusion* I believe it is best for Government to take a view on which configuration of lagoons offers the best outcome for the UK. But whichever configuration is selected, it is my opinion that the most will be achieved for the country if the Government allocates a specialist resource to foster the whole industry, increasing competitiveness through innovation, efficiency, and organisational stability.	11	Page 98
Competition	*Conclusion* I have identified nothing unique about tidal lagoons that precludes them from competitive CFD allocation and I recommend that there must be a move to competition as soon as this can be effective to deliver the most substantial cost reductions.	11.1	Page 98
When to move to a competitive structure	*Conclusion* On balance I have concluded that the risks involved in a competition to select the pathfinder are too significant: the Government has a realistic option of a pathfinder project and this option should be taken.	11.1.1	Page 99
	Conclusion I do not consider that these issues sufficiently outweigh the benefits to the UK consumer of delivering a real competition for the first large project. It is a genuine challenge but the issues are fixable with a clear policy and competition framework and the prize is worthwhile.	11.1.1	Page 99

Report heading	Conclusions and recommendations	Section	Page No
Approach to delivering competition	*Conclusion* I recommend that competition should … be phased with one contract agreed per competition.	11.1.2	Page 100
	Recommendation I … recommend that a 'use-it or lose-it' approach is adopted, so that prospective developers could not simply lock out other developments by winning a competition and not progressing the project. If they cannot show real progress to develop a facility within an established timescale, then the offer of support should be withdrawn. Indeed I recommend that the Government should go further, and consider securing a bid-bond from a winning developer to be paid if the project is not pursued efficiently and in good faith.	11.1.2	Page 100
	Conclusion Competition should be a driver for efficient project design, engineering, procurement, risk allocation and financing package. All of this feeds into the price required for electricity produced. I therefore conclude that competition should be for the government package of support (CFD and associated contracts).	11.1.2	Page 100
	Recommendation On balance, I recommend allocation by competitive tender. These are such large and complex projects to develop and finance that the greater flexibility offered by tenders is highly desirable. An element of bespoke risk arrangements and contract terms could deliver material advantages to the consumer. A 'tender' model will also allow greater flexibility to reflect other desirable aspects of a project such as flood protection, regeneration and tourism.	11.1.2	Page 101
	Conclusion When delivering a competition by tenders, competing the same site allows for a clearer comparison of proposals. Moreover a site specific tender process would avoid investors becoming frustrated by preparing costly bids which make no progress and would enable a more structured approach to be taken, with a balance between projects in different parts of the country.	11.1.2	Page 101

Report heading	Conclusions and recommendations	Section	Page No
National Policy Statement	*Conclusion* It strikes me as unarguable that a fledgling industry would benefit from the clarity and stability represented by an explicit statement of Government policy that welcomes the development of tidal lagoons within defined parameters. Moreover, given that there are only a limited number of sites around the country which would be suitable for tidal lagoons (as they need both a significant build-up of a head of water and also to be of a sufficiently shallow depth where the wall can physically be constructed), there is a limit to how many installations would be possible.	11.2	Pages 103-104
	Recommendation I therefore recommend that the consenting process should be informed by a National Policy Statement similar to nuclear new-build, where specific sites are designated by the Government as being suitable for development.	11.2	Page 104
	Conclusion A series of lagoons in a particular area is likely to have an impact on the energy yield of individual sites and therefore careful consideration of the hydrodynamic interactions between sites will need to inform the NPS. In the same way, the NPS needs to ensure that the activities of other users of the waters are not affected unreasonably by the development of multiple lagoons.	11.2	Page 105
	Recommendation I would not want the work on Tidal Lagoon Swansea Bay to be lost because of an administrative exercise primarily intended to manage the development of very large lagoons. There seems broad agreement that the scale and location envisaged for the tidal lagoon proposed for Swansea Bay would have negligible impact further up the Severn, so I recommend that the current Swansea Bay project should be excluded from this NPS approach.	11.2	Page 106

Report heading	Conclusions and recommendations	Section	Page No
	Recommendation The consenting process also needs to give due weight to the local community interests. I recommend that the process should encourage local authorities to have a significant role in deciding what is the right cumulative capacity of tidal lagoons in their vicinity.	11.2	Page 106
	Recommendation I recommend that the National Policy Statement process should also include an assessment of the sustainability of the main construction elements for a longer term lagoon programme.	11.2	Page 107
Tidal Power Authority	*Conclusion* Significant Government action is required if the benefits of a programme are not to be lost, especially for the supply chain. I consider this can be done; and actually be done in a way that will give greater long-term clarity and confidence to investors and industry. *Recommendation* I propose that, at the same time as the pathfinder project is moving forward, the Government should set out a programme to bring forward additional tidal projects, so that the supply chain in particular has a clear understanding of the opportunities and contracts.	11.3	Page 107
	Recommendation I recommend that the Government should establish a Tidal Power Authority.	11.3	Page 107
	Recommendation The Authority would be established at arms-length from Government with a clear purpose and the resources necessary to deliver results. I recommend that the goal of the Authority should be to maximise UK advantage from this programme.	11.3	Pages 107

Report heading	Conclusions and recommendations	Section	Page No
	Conclusion I am not proposing that the new Authority should have planning or consenting powers, nor should it take powers away from local authorities. A positive, symbiotic relationship with local authorities is essential.	11.3	Page 109
	Recommendation The Authority should be responsible for deciding (after appropriate consultation) which locations should be offered for tender at which time, ensuring that this tendering process is managed so that any negative cumulative impacts (either environmental or commercial) from a series of lagoons can be avoided.	11.3	Page 109
	Recommendation I recommend that the Authority should undertake some of the environmental assessment work for the lagoon locations, or incentivise the Crown Estate to do this on a commercial basis, and seek to recover these costs at financial close within the strike price. The results of these environmental assessments should be made available to those bidding in the tender process, rather than requiring each developer to do this work themselves and individually.	11.3	Page 110

Report heading	Conclusions and recommendations	Section	Page No
	Recommendation The Tidal Power Authority should also drive the process for securing cost reductions from tidal technology. This should follow the example of the Offshore Wind Cost Reduction Taskforce, led by industry, and providing the forum which brings together developers and policy makers. In recent years, these fora (for nuclear, offshore wind and CCS) have been Minister-led and run by Government departments, but I consider that the Authority could achieve more progress, more quickly if run at arms-length from Government, albeit with the closest ties. This is not to say that it could not be done within Government, but I see merits in a dedicated body to perform these tasks. The Authority should set up a Centre of Excellence to give tangible support for innovation in tidal lagoon technology, perhaps in partnership with the Offshore Renewable Energy Catapult , with the aim of developing skills in this sector that can be used in other tidal lagoon developments overseas. The Authority should be responsible for deciding where common criteria are necessary, for example in considering whether it should specify a common turbine design for tidal lagoons, bringing together the expertise and experience of major turbine manufacturers such as Andritz Hydro, GE Renewable Energy, Voith and Toshiba. The limited nature of the supply chain in this field means that it could be an area where industry cooperation is every bit as important as industry competition, as being the best way to move technology forward and achieve cost reductions.	11.3	Pages 110-111
	Recommendation The Authority should also work to foster the UK supply chain. I would urge Government to publicly set out its ambition for the level of UK content that the TPA will seek to deliver. I would recommend that, as with offshore wind, this should certainly be more than 50%.	11.3	Page 111
	Recommendation If projects in early rounds of the programme do not deliver sufficient UK content, the Government may wish not to continue with further rounds.	11.3	Page 111

Report heading	Conclusions and recommendations	Section	Page No
	Recommendation The Government may, following consultation, take steps to wind up the Authority if it has reason to believe the objective has been achieved, as far as possible, or if it cannot be achieved.	11.3	Page 111
	Recommendation I invite government to consider including tidal stream and small scale tidal barrage projects within the Authority's remit.	11.3	Page 111
Government Structures	*Recommendation* The Government will require a period of time to assess these recommendations and to reflect them in their view of the proposals from TLP and their value for money. This work should take account of my conclusion on the very strong case for a pathfinder project and conclusion that cost-competitive larger-lagoons will follow. A Negotiating Strategy will be necessary alongside this, and will form the foundation of any counter-proposal Government might make. This work will need to be undertaken by a lead official with an explicit mandate to deliver on a cross-departmental basis, supported by an enhanced transaction team.	11.4	Pages 111-112
	Recommendation Such is the significance and complexity of the strategic and fiscal considerations in implementing this policy beyond the pathfinder project that I recommend the appointment of a single senior official with sole responsibility for developing the financing structures that will form the basis of the Authority's first competition exercise.	11.4	Page 112
	Recommendation I recommend that the Authority seconds staff into the team led by the single senior official. I further recommend that the Government seconds policy staff into the Authority for the duration of the competition.	11.4	Page 112

Report heading	Conclusions and recommendations	Section	Page No
Financing structures	*Conclusion* Whilst I have seen attractions in a regulatory model, I am persuaded that a CFD model is the most appropriate form of support for a pathfinder project. Transitioning to an alternative financing structure at this stage would have the added disadvantage of introducing delays and uncertainty, at a time when I believe we should move forward quickly. I have not seen sufficient advantages of an alternative funding approach which would justify such delays and uncertainty.	12.8	Page 124
	Conclusion My proposal to provide a period of separation between a pathfinder and subsequent projects and to then approve future lagoons through a competitive tendering process, provides time and opportunity for Government to assess this option [viz. a Regulatory model] in more depth. Such a change of approach would in any case require Government to undertake a formal consultation process and I recommend that time is taken to consider these very important issues in greater detail. However, as stated above for the financing of a pathfinder project, there would need to be a more compelling rationale than I have so far seen to justify moving from the CFD approach to a regulatory model for the wider programme.	12.8	Pages 124-125
Financing structures	*Recommendation* I recommend that the Government should use any grant funding available to this sector to support investment in these new and improved manufacturing facilities, for example in steel and turbine manufacturing technologies and facilities.	12.9	Page 125
Decommissioning	*Recommendation* I recommend that the Government should accept that once built, the seawall of a tidal lagoon should be considered to be permanent for the purposes of decommissioning plans.	13	Page 128

Report heading	Conclusions and recommendations	Section	Page No
	Recommendation The TPA should have a role in advising Government on decommissioning plans. But I recommend that, towards the end of the operating lives of the first lagoons, a decommissioning body should be established to ensure there is ongoing maintenance and repair for lagoons after the end of their operational lives.	13	Pages 128-129
	Recommendation I … recommend that the operators of lagoons should be required by law to contribute to a decommissioning fund over the operating life of the lagoon, starting modestly at an appropriate time after the lagoon begins operating. This fund will provide the necessary resources for long-term maintenance once the operational life of a lagoon is over.	13	Page 129
	Recommendation Once the fund has reached a level agreed by Government (national and local), there should be no need to contribute to it further, although there should be periodic reviews (every five years) to ensure that the fund is adequate for future needs.	13	Page 129