



# INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE



## Special Report on Renewable Energy Sources and Climate Change Mitigation

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Government and Expert Review of the Second Order Draft  
Jun 21, 2010 – Aug 16, 2010

### Chapter 6

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<sup>1</sup> see <<<http://ipcc.ch/pdf/ipcc-principles/ipcc-principles-appendix-a.pdf>>>, Section 4.1 and clarification in decision 8 on procedures taken at the 33rd Session of the Panel <<[http://www.ipcc.ch/meetings/session33/ipcc\\_p33\\_decisions\\_taken\\_procedures.pdf](http://www.ipcc.ch/meetings/session33/ipcc_p33_decisions_taken_procedures.pdf)>>

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## Special Report on Renewable Energy Sources and Climate Change Mitigation, Second Order Draft

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Consideration by writing team
United States (U.S. Department of State)	6	0	-	-	-	-	-	-	<p>(introduction outline continued)</p> <p>Ocean Thermal Energy Conversion: In geographical areas with warm surface water and cold deep water (at 1000m), the temperature difference can be leveraged to drive a steam cycle that turns a turbine and produces power. Warm surface sea water passes through a heat exchanger, vaporizing a low boiling point working fluid (typically ammonia) to drive a turbine generator, producing electricity. This process can serve as a baseload power generation system that produces a significant amount of renewable, non-polluting power, available 24 hours a day, seven days a week.</p> <p>OTEC technology is not new. In 1881, Jacques Arsene d'Arsonval, a French physicist, proposed tapping the thermal energy of the ocean. But it was d'Arsonval's student, Georges Claude, who in 1930 actually built the first OTEC plant in Cuba. The system produced 22 kilowatts of electricity with a low-pressure turbine. In 1935, Claude constructed another plant aboard a 10,000-ton cargo vessel moored off the coast of Brazil. Weather and waves destroyed both plants before they became net power generators. (Net power is the amount of power generated after subtracting power needed to run the system.)</p> <p>In 1956, French scientists designed another 3-megawatt OTEC plant for Abidjan, Ivory Coast, West Africa. The plant was never completed, however, because it was too expensive.</p> <p>Many countries continue to pursue research and development efforts into this technology, including the United States, Japan, France Taiwan, and India. The significant cost of a scaled-prototype, considered a critical step to the further evolution of the technology, is a major hurdle to the near-term demonstration of OTEC.</p>	See above

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United States (U.S. Department of State)	6	0	-	-	-	-	-	-	(introduction outline continued)  Salinity Gradient Power: Salinity Gradient Power is a technology that takes advantage of the osmotic pressure differences between salt and fresh water or water of different salinity. Concepts proposing to make use of salinity gradient power were put forth more than twenty years ago. And while initial technical achievements were realized, they were not considered promising, mainly because they relied on expensive membranes. To date, membrane technologies have advanced, but they remain the principal technical barrier to economical energy production. Efforts are underway to address those issues and alternatively develop designs that eliminate the membrane.	See above
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United States (U.S. Department of State)	6	0	-	-	-	-	-	-	<p>An "introduction" should be included for this section. A proposed introduction follows:</p> <p>Introduction:</p> <p>Ocean energy offers significant potential for mid- and long-term carbon emissions reduction. This innovative suite of technologies could become a substantial renewable energy portfolio option in the US, US DOE predicts that up to 20% of electricity demand could be met by 2050, if ambitious efforts are made to reduce carbon emissions and to mitigate other barriers to increased ocean energy deployment.</p> <p>Oceans cover more than 70% of Earth's surface, making them the world's largest solar and wind energy collectors. Generating technologies for creating electrical power from the thermal or mechanical/kinetic energy available within the ocean include tidal power, wave power, ocean currents, ocean thermal energy conversion, and salinity gradients.</p> <p>Tidal Energy: Tides are caused by the gravitational pull of the moon (primary influence) and sun, and the rotation of the Earth. Small tidal mills were used in Southern England, France and in Orkney, which lies to the north of the Pentland Firth, in the Middle Ages. Tidal flows in bays and estuaries offered the potential to drive cereal-grinding apparatus in areas that were too low lying to allow the use of conventional water wheels. In the 20th century the tides were seriously re-examined as potential sources of energy to power industry and commerce. (World Energy Council, 2004 Survey of Energy Resources)</p> <p>Wave Energy: Waves are driven primarily by the winds, and Work on wave energy began in earnest during the 1970s as a response to the emerging oil crises. There were several government sponsored programs throughout the world, particularly in Japan, Norway and the UK. Since the mid-1990s, there has been a resurgence of interest in wave energy, led mainly by small companies. Their endeavors have progressed the technology so that there are now a number of different devices that have been built or that are under construction at this moment around the world. Hence, the next few years will be very interesting for wave energy, as these full-scale prototypes provide the in-service experience required to develop a more mature technology (World Energy Council, 2004 Survey of Energy Resources). PLEASE CHECK FOR UPDATED REFERENCES, as this comment is still highly applicable today.</p>	ES will be rewritten, taking into account the lengthy proposal here
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United States (U.S. Department of State)	6	0	-	-	-	-	-	-	<p>Chapter 6 does not address the two big barriers to deployment (at least in the US which is the basis for these comments)</p> <p>It can be argued that there are two big barriers to deployment of ocean energy in the U.S. namely 1) a lengthy and costly regulatory process that does not provide criteria to know whether or not any specific project will be successfully licensed for construction and operation and staffed by regulators that are not incentivized for action nor to help bring on line renewable energy generation and 2) Government policies that disincentivize ocean energy relative to other forms of renewable energy and fossil fuel generation with a playing field that is not level.</p> <p>To be fair, regulatory barriers are addressed in section 1 introduction but the regulatory barriers facing ocean energy are unique and substantially more severe than those facing any other form of electricity generation (this is because our oceans accommodate multiple users and are held in trust by a complicated set of laws administered by a plethora of different regulatory agencies) and should receive special coverage in section 6.</p> <p>If one of the purposes of this report is to advise policy makers on what barriers need to be overcome if ocean energy is to contribute to reduction of greenhouse gases emitted into the atmosphere, then it seems that barriers to deployment should receive attention in this report.</p>	Discuss barriers in 6.4
Australia (0)	6	0	-	-	-	-	-	-	Chapter 6 would benefit from the following contextual inclusions: -ocean energy appears to have a low level of global support; -focus is more on pilot demonstrations than R&D; and -doesn't appear to be seen broadly as an 'attractive' RE technology perhaps because it is largely country-specific.	Adequately covered; reference to country-specific distribution of interest
Norway (Climate and Pollution Agency)	6	0	-	-	-	-	-	-	It may be confusing when some places in the text the yearly energy production in TWh/year is used and other places the installed power in TW. Would it be better to use the yearly energy production whenever possible, assuming a capacity factor of e.g. 0.35??	Will try to replace all TW references with TWh/year; do not accept the 35% proposal
Christoph von Stechow (IPCC WGIII TSU)	6	0	-	-	-	-	-	-	Please elaborate on technology-specific barriers. According to the agreements reached during LA3 in Oxford, each technology chapter should list technology-specific barriers that exist on top of those that are referred to in Chapters 1 and 11.	Accept
Denis Aelbrecht (EDF)	6	4	3	4	5	-	-	-	"¿ are probably the least mature": precise "except perhaps for Tide Rise and Fall", as it is stated later in the text (e.g. page 4, lines 13 and 14)	Add phrase 'except for tidal range'
John Twidell (AMSET Centre)	6	4	20	-	-	-	-	-	Add sentence. 'Modern developmental tidal current generators of 100 kW to 1 MW capacity are operational in the UK' [ref SeaGen, Northern Ireland; Atlantis, Orkney, Scotland 1 MW]	This is unnecessary in the TS

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Fritz Vahrenholt (Prof. Dr.) (RWE Innogy GmbH)	6	4	4	-	-	-	-	-	Apart from tidal range.	As above
United States (U.S. Department of State)	6	4	8	-	-	-	-	-	Consider replacing 'globally distributed' by 'globally, but sparsely distributed'; good sites for current and osmotic resources are very specific.	Accept the comment but do not think that text implies good resources worldwide
Australia (0)	6	4	24	-	29	-	-	-	Could clarify the different expectations of funding providers in this paragraph. Governments provide funding for policy objectives (e.g. emissions reductions, industry development), private companies in the expectation of financial returns. Also suggest changing 'investors' in line 25 to 'funders'.	Will include in rewrite of ES
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	4	7	4	9	-	-	-	Firstly, tidal stream is not mentioned here. Secondly, I think it is also important to say that it is only "a roughly complementary distribution". The distribution for these two energy sources is not hard and fast. Later in 6.2.1 the wave climate close to the equator is described as "reasonable"	Revise as per SPM
United Kingdom (Department of Energy and Climate Change)	6	4	45	5	1	-	-	-	I think this point would benefit from a timeframe being associated with it. I.e. "There are encouraging signs that $\zeta$ towards the middle of the century."	Add reference to deployment section 6.8
United Kingdom (Department of Energy and Climate Change)	6	4	21	4	23	-	-	-	If it is considered that there is a single design for WTGs, then this reviewer thinks that the current multiplicity of concepts is typical of the early stage of technology development and that dominant designs will emerge as is also typical. You may want to cut the speculation.	Dominant designs
United Kingdom (Department of Energy and Climate Change)	6	4	-	-	-	-	-	-	In light of the comments above, the words in the executive summary regarding ocean power resources "easily exceeding human energy requirements" might need revision. The reader would be fooled if he/she went away thinking that was the case. Very few of these technologies exist in commercial installations and where they do, the rate of deployment is close to zero (certainly in the UK, which is described as the world leader). It would also be very unlikely that the all the resource would be realised given constraints etc. Words more along the lines of "wave and tidal stream devices might supply a reasonable fraction of the world's electricity requirements... Other technologies have the potential to make a significant impact but..."	Will remove reference to global potential
United States (U.S. Department of State)	6	4	31	-	-	-	-	-	'include' instead of 'range from'	Replace with include
David Clubb (European Environment Agency)	6	4	21	4	23	-	-	-	Incorrect implication: It is not true that there is only one design of wind turbine; the basic HAWT dominates, although there are many design variations even within this one sector; and it is also possible that VAWT may prove to be a niche design for different site conditions. Although this is not necessarily asserted here, it is implied	Text does not imply a single design but convergence; will soften text
David Clubb (European Environment Agency)	6	4	13	4	13	-	-	-	Incorrect terminology: 'tidal rise and fall' is correctly known as 'tidal range'	Will look for references on tidal range

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United States (U.S. Department of State)	6	4	37	4	38	-	-	-	<p>It is believed that environmental impacts will be low, but the actual impacts need to be ascertained and verified with pilot projects. Given appropriate construction, operation and decommissioning procedures, ocean power technologies potentially present fewer environmental risks and thus community acceptance may be more likely than for other renewable energy developments.</p> <p>It is recommended that this sentence is replaced with the following <math>\zeta</math> <math>\zeta</math>Some believe that, given, proper care in plant sizing, siting, design, deployment, operation, maintenance and decommissioning, ocean energy may be one of the more environmentally benign of the known electricity generation technologies.<math>\zeta</math></p>	Confusing comment, since it does not cite text directly; will address in rewrite
United States (U.S. Department of State)	6	4	30	-	-	-	-	-	<p>Line 30 National and regional governments are particularly supportive of ocean energy through a range of</p> <p>I recommend adding the word <math>\zeta</math>Some<math>\zeta</math> as the first word of this sentence. The reason is that not all, as the sentence implies, national and regional governments are supportive. And if you want to be specific, list those that are supportive, such as the UK, Ireland and Portugal (and maybe others depending on your criteria for supportive)</p>	As above
Australia (0)	6	4	40	-	-	-	-	-	<p>Link between ocean energy and rejuvenating shipping and fishing seems tenuous and shouldn't be made without supporting references.</p>	Shipping and fishing will be redeployed, not rejuvenated
John Twidell (AMSET Centre)	6	4	3	-	-	-	-	-	<p>Make second sentence 'The distinct forms of ocean energy derive from (1) waves, (2) tidal range (rise and fall), (3) tidal currents (flow), (4) vertical temperature gradients, and (5) salinity (osmotic). [A clear sentence is needed at the beginning, since the whole subject may seem complex and muddling].</p>	ES will be rewritten to include a similar sentence
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	4	30	-	-	-	-	-	<p>Needs clarification of which governments/countries are supportive and references to justify the strong word "particularly" or else omit this word</p>	Some national and regional governments
United States (U.S. Department of State)	6	4	40	-	-	-	-	-	<p>Recommend deleting line 40 due to its speculative nature.</p>	Will address in rewrite of ES
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	4	10	-	-	-	-	-	<p>See later comment on OTEC resource bands</p>	Agree - will modify text
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	4	40	4	42	-	-	-	<p>See later comments as these are unreferenced in the body of the Chapter.</p>	Will address in rewrite of ES



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Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	4	21	4	23	-	-	-	Suggest change 'may' to 'will' and preferably reword the sentence to sound more emphatic. This is only information to readers with almost no understanding of ocean energy so it should be clear. The resource types are inherently different and demand different methods of extracting the energy so it will not be possible to converge on a single technology.	Agree - will replace 'may' with 'will'
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	4	7	-	-	-	-	-	The ability to produce potable water only applies some of the technologies and should be caveated thusly	Accept the comment but the text does not imply that all technologies generate water
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	4	12	-	-	-	-	-	the claim of wave energy as a base load provider is unsupported by the body of the text and is, based on my experience, and unlikely to be true claim. Elsewhere in the report (eg the SPM) wave power is described as intermittent in conflict with this.	Will remove to avoid controversy
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	4	5	-	-	-	-	-	the phrase "easily exceeds" needs qualifying with some notes that this is the theoretical resource that is being discussed, not the geographically, technically, environmentally and (certainly not) economically constrained resource. Applying any of these checks would radically alter the resource numbers discussed in the body of the Chapter.	Will add in qualifier
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	4	11	-	-	-	-	-	the stated "40-60" directly conflicts the 30-60 stated in section 6.2.1	Agree - will modify text
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	4	25	4	29	-	-	-	These three sentences starting from "Principal investors" require references as they are unsupported by the body of the chapter. Moreover this is likely to be different between technologies, for wave and tidal stream power most recent investment is likely to be private in nature?	Will check and add references to text
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	4	45	5	4	-	-	-	This is not a very thorough summary of the cost information in the body of the chapter. It should summarise that there is only limited information from prototype deployments, give a rough indication of the scale of current costs (2 times more? 3 times?) and state that forecasts of these costs using assumptions about learning (as observed in other renewable industries) show that in the future costs could improve to a level that is broadly competitive with conventional sources of generation etc	Will address in the rewrite of the ES
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	4	37	-	-	-	-	-	This opening sentence needs a reference or deletion as it is not supported in the body of the Chapter. It is unlikely to be factually correct and the described lack of detailed knowledge regarding environmental impacts described later in the chapter suggests it should be removed or changed.	Replace 'forecast' with experience transfer
Fritz Vahrenholt (Prof. Dr.) (RWE Innogy GmbH)	6	4	14	-	-	-	-	-	Tidal range can also be exploited at other coastal locations.	Will include reference to lagoons; refer to coastal geomorphology
David Clubb (European Environment Agency)	6	4	45	5	4	-	-	-	Unsubstantiated assertion: What are the encouraging signs that ocean energy costs will become competitive with other renewables? Reference?	Add in a reference to Cost section; ensure that there is a supporting reference in 6.7

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United States (U.S. Department of State)	6	4	4	-	-	-	-	-	While the strength of these marine hydrokinetic are variable and intermittent, they are predictable and reliable, and can be forecast days and months into the future. As such, they can be readily be accommodated into a utility's power generation and transmission planning efforts, and are ideal for baseload power applications. Power from ocean thermal and salinity gradient resources are also designated as baseload power options. Thus collectively, ocean energy is one of the few baseload renewable energy technologies. Furthermore, As about 2.2 billion people, representing 40% of the world's population, live within 100 kilometers of the world's coasts (World Resources Institute), ocean energy offers a unique opportunity to provide renewable energy to these growing population centers. The close proximity of the resource to the electrical load greatly reduces transmission costs, enhancing the economic position of ocean energy technologies.	Will incorporate into rewrite of ES and add into Markets section
United Kingdom (Department of Energy and Climate Change)	6	4	45	5	4	-	-	-	Without a reference, this is also speculation and it is hard to see what these signs are.	See comment 52
United States (U.S. Department of State)	6	5	7	-	-	-	-	-	'likely applications' instead of 'likely for applications'	Typo - will correct
United States (U.S. Department of State)	6	5	6	5	9	-	-	-	Ocean thermal and salinity gradients will be predominately a utility-scale application. While there maybe be small-scale, off-grid wave and tidal applications, there is also the potential for large-scale, on-grid wave and tidal applications in locations with very good resources, such as the wave energy off the coast of Ireland and the Pacific Northwest of North America and the tidal resources in UK and the Bay of Fundy in North America.	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	5	5	5	6	-	-	-	This discussion of utility scale vs domestic scale is unsupported in the body of the chapter. Moreover the mention of OTEC and salinity as specifically utility scale neglects tidal barrages and seems to marginalise wave and tidal stream to the following prescribed use of remote/island communities. This could be reworded.	Will add in tidal rise and fall
United Kingdom (Department of Energy and Climate Change)	6	5	5	5	5	-	-	-	This paragraph needs to explain what back-up power supply these communities will use, given the certainty of highs and lows of wave and tidal generation.	This comment is relevant to Chapter 8 Integration, rather than here
Steffen Schlömer (IPCC WGIII)	6	6	18	-	-	-	-	-	"MANY ESTIMTATES of the potential energy exeeding world electricity demands", but only ONE SOURCE. I suppose the source OES-IA (2008) is a meta-study of studies estimating the global ocean energy potential. If so, please state reference as "(for an overview of potential estimates see: OES-IA, 2008)" or refer to section on resource potential. Otherwise, replace "many" by appropriate wording.	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	6	29	6	30	-	-	-	"the size of the resulting waves" is an ambiguous term and only describes the potential energy. Wave energy is a function of the wave height and also the period.	Will address

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United States (U.S. Department of State)	6	6	22	-	-	-	-	-	'a number are operational ...' instead of 'a number of plants are operational ...'	Deleted text
Australia (0)	6	6	22	-	-	-	-	-	Change "a number" to "a few".	Deleted text
United States (U.S. Department of State)	6	6	8	-	-	-	-	-	Change to "wind driven "and" thermo-haline ocean circulation"	Rejected; does not give correct sense
United States (U.S. Department of State)	6	6	6	-	-	-	-	-	delete "and swells"	Will clarify in text but remove in ES
Norway (Climate and Pollution Agency)	6	6	32	6	33	-	-	-	Dubious definition of swell versus wind-waves. Swells results from wind waves that have travelled a long distance since they were generated. The period of swells are normally more than 10 seconds, corresponding to wave length of more than 150 meters.	See above
Finn Gunnar Nielsen (Statoil)	6	6	32	6	33	-	-	-	Dubious definition of swell versus wind-waves. Swells results from wind waves that have travelled a long distance since they were generated. The period of swells are normally more than 10 seconds, corresponding to wave length of more than 150 meters.	Will address
United Kingdom (Department of Energy and Climate Change)	6	6	17	-	23	-	-	-	In the UK technologies are only becoming economically attractive with the help of large scottish government incentives (~£150/MWh).	Accepted
Steffen Schlömer (IPCC WGIII)	6	6	37	-	-	-	-	-	Include footnote explaining the term "doldrums"	Will address in rewrite
Steffen Schlömer (IPCC WGIII)	6	6	27	-	-	-	-	-	Include footnote explaining the term "friction"	Fricitional dissipation
Steffen Schlömer (IPCC WGIII)	6	6	15	-	23	-	-	-	Include references to the sections. Briefly introduce content of each section.	Not necessary
David Clubb (European Environment Agency)	6	6	7	6	8	-	-	-	Inconsistency: You cannot use the phrase 'tidal energy' without defining it in the context of previous phrases ('tidal range, gravitational energy etc)	Accepted
David Clubb (European Environment Agency)	6	6	20	6	21	-	-	-	Incorrect assertion: Ocean energy is not now becoming 'economically attractive'; the most positive you could say is that it is improving its economic profile; it is still extremely unattractive compared with almost every other renewable energy investment	See above
David Clubb (European Environment Agency)	6	6	7	6	7	-	-	-	Incorrect terminology: 'tidal rise and fall' is correctly known as 'tidal range'	See previous comments
Rafiuddin Ahmed (The University of the South Pacific)	6	6	6	-	-	-	-	-	It will be better to write ""derived from the transfer of the kinetic energy of the wind to the upper surface of the ocean.""	Waves also transfer potential energy

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Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	6	35	6	37	-	-	-	Last two paragraphs of this sentence are ambiguous. It is stated as "attractive" with "less variability" but in the Exec Summary is says that distribution is complementary with OTEC and also the following map doesn't really support the idea that it is attractive. I think a reference is required and also a statement that concludes that the vast majority of viable wave sites are away from the equator. Also if the desire to describe the equatorial wave climate remains then the statement on doldrums needs qualifying, where, how often, what impact?	Will address in rewrite
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	6	34	-	-	-	-	-	opening sentence needs a reference to support these numbers	Will supply references
United States (U.S. Department of State)	6	6	10	6	11	-	-	-	OTEC needs both solar energy stored in the ocean surface layer AND deep cold seawater. The latter is just as necessary. As a parenthesis, seawater air-conditioning (SWAC) technologies, the description of which is missing from this report, only require deep cold seawater.	Will add reference to SWAC
Steffen Schlömer (IPCC WGIII)	6	6	21	-	-	-	-	-	replace "economically attractive" by "economically more attractive"	Not true
Steffen Schlömer (IPCC WGIII)	6	6	18	-	19	-	-	-	replace "potential energy" by "theoretical resource potential" or "theoretical resource potential" as appropriate.	Rejected - cannot change a sub-heading
Australia (0)	6	6	2	-	5	-	-	-	Suggest clarifying the language: there are a number of ocean energy resources which can be exploited, but only a few 'sources' of energy: solar energy which drives winds, waves and currents and creates temperature differences between surface and deep water; tidal; and salinity differences.	Not valuable comment
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	6	27	-	-	-	-	-	the moon and sun should be grouped together as it is their gravitational field that induces the tides. I think it is also important to measure the rotation of the earth.	Accepted
United States (U.S. Department of State)	6	6	35	6	37	-	-	-	The Trade wind belt does not extend to the Equator. Tropical and Equatorial zones should be distinguished (or the latitude band better specified).	Will address in rewrite
United Kingdom (Department of Energy and Climate Change)	6	6	1	6	23	-	-	-	These are the normally accepted ocean energy sources. This is inconsistent with the definition used in Chapter 0.	Ch 1 does not contradict Ch 6 definitions; need to modify glossary definitions
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	6	21	6	23	-	-	-	this statement feels misleading, there is only 1 large barrage which dominates this MW figure, the other few are very small. Also there is never any cost justification given anywhere in the chapter to support the claim that tidal rise/fall is commercially viable. No costs are given in section 6.7.	Deleted text
Gian-Kasper Plattner (IPCC WGI TSU, University of Bern)	6	6	26	6	33	-	-	-	this text on fundamental of wave generation and wave energy seems ok with regard to content, but reads more like a textbook than part of an assessment. If it's needed to define/explain wave energy, suggest to at least provide a reference to a textbook or a similar publication.	Will address

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United States (U.S. Department of State)	6	6	6	-	-	-	-	-	'wind kinetic energy' instead of 'wind energy kinetic energy'	See above
China (China Meteorological Administration)	6	6	11	-	-	6,1	-	-	Change 'surface layers' into 'upper layers'.	Agree
Gian-Kasper Plattner (IPCC WGI TSU, University of Bern)	6	6	26	6	37	6.2.1	-	-	Comment by Simon Allen, Science Officer WGI TSU, University of Bern: scientific references are needed to support the basic wave physics described here.	Will address
Simon Allen (IPCC WGI TSU, University of Bern)	6	6	26	6	37	6.2.1	-	-	scientific references are needed to support the basic wave physics described here.	Will address
United States (U.S. Department of State)	6	7	7	-	-	-	-	-	add to the end of the sentence 'and the inertial and centrifugal forces of the Earth-Moon system.'	Already addressed
Australia (0)	6	7	1	-	12	-	-	-	Clarify the difference between 'theoretical' wave energy resource vs the resource calculated in lines 9-12.	Will address in rewrite
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	7	1	-	-	-	-	-	i think it needs to be clear about what is being stated as theoretical. Need to state that that it is not geographically, technically, environmentally nor economically constrained	Text revised.
Norway (Climate and Pollution Agency)	6	7	1	-	-	-	-	-	Is this the wave energy impacting the coastline?	Yes
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	7	14	-	-	-	-	-	it is more appropriate to say "thousands of kilometres" and omit the "tens". There is not more than ~10,000km between any of the continents so there are not many instances where one could expect swell from more than 20,000km away.	Will be addressed in the rewrite

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United States (U.S. Department of State)	6	7	19	7	23	-	-	-	Line 19: Even though the potential resources have been recognized for a long time, technologies for harnessing these potentials are only now becoming feasible and economically attractive, with the exception of tidal barrage systems - effectively estuarine hydro dams - of which a number of plants are operational worldwide (c. 265 23 MW worldwide).  It is recommended that the second half of this paragraph (beginning with $\zeta$ with the exception of tidal barrage systems $\zeta$ .) be deleted. The number of commercial scale plants operational worldwide is ONE $\zeta$ the 240 MW plant at La Rance France and is very old. There are a few smaller scale pilot plants operation (i.e., Annapolis Nova Scotia, China and Russia) and they are all over 30 years old. I think that this sentence implies that there could be many more tidal barrage plants in the world, and, that may not be the case. It may be the case but that is certainly unknown today. The reason why none of these plants have been built in the last 30+ years is the environmental effects of such barrage plants.	Will address
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	7	16	-	-	-	-	-	no need to define 'h' as it is not used anywhere else in the report	Will be addressed in the rewrite
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	7	1	-	-	-	-	-	One reference for such a number seems inadequate. Also see the REN21 report "GLOBAL POTENTIAL OF RENEWABLE ENERGY SOURCES: A LITERATURE ASSESSMENT" for at least one more estimate.	Accepted
United States (U.S. Department of State)	6	7	8	7	9	-	-	-	Recommend moving Tidal currents above to "Tidal Rise and Fall", making the entry Tidal Currents and Tidal Rise and Fall". Leave "Ocean Currents" as a single entry, with the definition: "derived from wind driven and/or thermohaline circulation. Add "The term thermohaline circulation refers to the part of the large-scale ocean circulation that is driven by global density gradients created by surface heat and freshwater fluxes.	Already addressed
Steffen Schlömer (IPCC WGIII)	6	7	15	-	-	-	-	-	replace "dissipation" by "losses" or explain in footnote	Will be addressed in the rewrite
Steffen Schlömer (IPCC WGIII)	6	7	1	-	9	-	-	-	Several terms need (better) explanation, e.g. shoaling, refraction, bathymetry.	Will address in rewrite
United States (U.S. Department of State)	6	7	15	-	-	-	-	-	'Swell generated' instead of 'Swell that generated'	Will be addressed in the rewrite
Australia (0)	6	7	14	8	9	-	-	-	Technical discussion of wave properties should be matched with an explanation of the implications for energy conversion.	Will be addressed in rewrite
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	7	15	-	-	-	-	-	The swells are not generated "in" a country, they are generated over the neighbouring ocean.	Will be addressed in the rewrite

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Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	7	14	-	-	-	-	-	The term 'swell waves' needs to be defined and it should be explained that these are caused by storms far away over a large 'fetch' and that they carry the majority of the energy given in the table above	Will be addressed in rewrite
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	7	9	7	12	-	-	-	This needs to be introduced just one of a number of estimates and as the work of Mork et al. It also needs some explanation i) that waves are typically measured in power per unit wavelength, ie kW/m ii) why is 5kW/m chosen? this is much less than is typically considered economical iii) why pick +- 66.5 degrees when it was stated before that most is far from the equator? Overall there is no justification given for this seemingly arbitrary set of constraints. The statement that it is 8% less is self evident and not required.	Already addressed
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	7	16	-	-	-	-	-	This reference is not in the bibliography	Will be addressed in the rewrite
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	7	16	8	1	-	-	-	This statement about waves changing when depth is less than half the wavelength is ambiguous. 1) it occurs for all waves not just swell waves, 2) what is the specific change that is being discussed? 3) I think it is useful to introduce the term shoaling here as it is used later without introduction. Waves change anytime the depth changes, the claim needs to be made specific. Finally, I'm not sure that Lighthill 1978 is the seminal text on wave mechanics. This has been more famously described and characterised but others such as Airy and Stokes in the 1800's.	Will be addressed in the rewrite
United States (U.S. Department of State)	6	7	1	7	2	-	-	-	TWh per year, not just TWh	Already addressed
United Kingdom (Department of Energy and Climate Change)	6	7	-	-	-	-	-	-	Your reference for the global wave potential is newer than mine. Mollison 1986 "Wave Climate and the wave power resource". In here, Mollison cites Arthur from Pond and Pickard (1978), who estimates the mean power incident on the world's coasts at 2000GW ~ 17,500TWh/year. This is substantially less than the 32,000TWh/year figure from Mork et al. in the report but the same order of magnitude. Of that wave power, the maximum Mollison could ever imagine extracting (i.e. turning into electricity) is 1000GW using something like Stephen Salter's Duck.  In the same paper, Mollison assesses the European wave resource in detail. He comes to a conclusion of 50GW (450TWh/year) average wave power incident on the whole of Europe. This is for a 50% efficient theoretical device-Salter's Duck. Allowing for the efficiency of the technology the estimate is still a lot smaller than the 2,800 + 1,300 TWh/year estimate for Europe in the report. A separate issue: the total in table 6.1 is inconsistent with the text.	Will be addressed in rewrite

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China (China Meteorological Administration)	6	7	1	-	-	6.2.1	-	-	Change $\zeta$ 32000TWh/yr $\zeta$ into $\zeta$ 32000TWh $\zeta$ .	Comment considered
Finn Gunnar Nielsen (Statoil)	6	7	1	-	-	6.2.1	-	-	Is this the wave energy impacting the coastline?	Will clarify the text
Norway (Climate and Pollution Agency)	6	7	-	-	-	-	6.1	-	Explain that this is the flux of wave energy per meter wave front. Some maps depict wave energy per square meter ocean surface, which is not the relevant quantity when considering wave power.	Already addressed
Finn Gunnar Nielsen (Statoil)	6	7	-	-	-	-	6.1	-	Explain that this is the flux of wave energy per meter wave front. Some maps depict wave energy per square meter ocean surface, which is not the relevant quantity when considering wave power.	Will address
Peter Johnston (Environmental & Energy Consultants, Ltd)	6	7	-	-	-	-	-	6.1	"Australia, New Zealand and Polynesia" is not correct (even if it is so shown in the paper cited). It should presumably be "Australia, New Zealand and Pacific Islands", i.e. Australia, New Zealand, Polynesia, Melanesia & Micronesia	Accepted
Norway (Climate and Pollution Agency)	6	7	-	-	-	-	-	6.1	Assume the unit should be TWh/year.	Already accepted
Finn Gunnar Nielsen (Statoil)	6	7	-	-	-	-	-	6.1	Assume the unit should be TWh/year.	Changed
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	8	16	8	18	-	-	-	1) felt to be too much detail 2) what does either of these limitations mean in terms of resource estimates? 3) no need to define the acronym as it is never used again	Will address in rewrite
United States (U.S. Department of State)	6	8	35	-	-	-	-	-	After the sentence ending with " $\zeta$ .atmospheric pressure." Add "The global distribution of the main constituent of the full tidal cycle (called M2) is shown in Figure 6.2. "	Will address
Australia (0)	6	8	46	-	-	-	-	-	Define M2 constituent	Will be a footnote to Figure 6.2
Australia (0)	6	8	14	-	25	-	-	-	Discussion of wave measurement seems unnecessary - the main point is the resource potential.	Will address in rewrite
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	8	18	8	20	-	-	-	Does not seem necessary to discuss SAR if it isn't useful for wave resource measurement.	Will address in rewrite
Steffen Schlömer (IPCC WGIII)	6	8	35	-	-	-	-	-	explain "Coriolis"	Most readers will know what Coriolis forces are
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	8	5	-	-	-	-	-	I think delete "similar to the optical phenomenon" as this isn't any help to the casual reader.	Will address in rewrite
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	8	35	8	40	-	-	-	I think these sentences from "within a tidal system $\zeta$ " onwards can be omitted. They don't add much value to the reader in terms of understanding resource.	Already addressed

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Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	8	2	8	4	-	-	-	I think this statement needs to be characterised as this is a condition that occurs in many places, to pick only scotland and give such explicit details seems unfounded. It would be better to say that "the level of energy dissipation from far to nearshore varies with characteristics such as bottom roughness and width of the continental shelf. Studies have shown that at some locations more than 50% of the energy can be lost." It needs to be clear that this is just one example as the energy dissipation varies enormously from site to site.	Will address in rewrite
David Clubb (European Environment Agency)	6	8	26	8	27	-	-	-	Incorrect terminology: 'tidal rise and fall' is correctly known as 'tidal range'	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	8	43	-	-	-	-	-	it is generally accepted that high tidal ranges suitable for barrages only occur in the north of Australia, I think the wording should be more specific here. See <a href="http://www.bom.gov.au/oceanography/tides/index_range.shtml">http://www.bom.gov.au/oceanography/tides/index_range.shtml</a>	Rejected; section has been deleted
United States (U.S. Department of State)	6	8	27	8	28	-	-	-	Line 27: Tidal rise and fall is the result of gravitational attraction of the Earth / Moon and the Sun on the ocean.  No, as this is an incomplete definition. If that were true, we would have only one tidal cycle per day and most places in the world have two cycles per day. It is recommended that this is replaced with "Tidal in stream energy occurs due to the moving mass of water caused by the gravitational forces of the sun and the moon, and centrifugal and inertial forces on the earth's waters."	Already addressed
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	8	41	-	-	-	-	-	Need an introduction that states that high tidal ranges are desirable and why. Kiho et al. 1996 "Study on the Power Generation from Tidal Currents by Darrieus Turbine" mentions a 5m minimum limitation and I've seen a similar figure elsewhere but can't recall where. Would be useful to give an indicative average tidal range requirement for readers.	Confusing and not relevant
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	8	46	9	2	-	-	-	Not relevant	Accepted; text has been removed
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	8	43	-	-	-	-	-	Reference required for this list of places.	Rejected; section has been deleted

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John Twidell (AMSET Centre)	6	8	41	-	-	-	-	-	Start with new sentence. 'Tidal periodicities can resonate with the natural oscillatory frequencies of estuaries, so giving greatly increased tidal range. Consequently, the locations with the largest tidal ranges are at resonant estuaries in $\zeta$ [this physical property of resonant enhancement is vital to appreciate and is not explained now. The condition is that the length of the estuary L and the water depth h are such that $L=36,000 \text{ m}(1/2) \times \text{square root } h$ . Refer to Twidell and Weir, 'Renewable Energy Resources' 2nd ed 2006, Taylor & Francis (pages 439-441). ]	Will add
George Gogolev (Geography of the Russian Academy of Sciences)	6	8	42	8	42	-	-	-	Suggest changing the order of listed seas with high tide to Russia (Sea of Okhotsk, Barents Sea, White Sea), even though white sea has the only functioning experimental tidal plant at Kislaya Guba, the potential of tidal power and tides are much higher in the Sea of Okhotsk. Huge (11-100 GW) hydropower projects were planned in both Sea of Okhotsk and Barents Sea in the Soviet era, some of those are now being reanimated.	Rejected; section has been removed
Australia (0)	6	8	34	-	40	-	-	-	Suggest deleting paragraph or explaining how this discussion is relevant to resource potential.	Remove first sentence
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	8	6	8	8	-	-	-	The nearshore effects are explicitly described but no conclusions are drawn. What should the reader learn from these statements? Perhaps something like "the lower energy levels and sheltering effects are likely to be one of the reasons why the majority of wave energy device technologies to date have been developed for deeper waters"	Will address in rewrite
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	8	8	8	9	-	-	-	This highly technical statement on wave breaking has little relevance to any intended reader and this is also not the seminal literature on wave breaking phenomenon nor the standard equation. I'd suggest deletion.	Will address in rewrite
China (China Meteorological Administration)	6	8	42	-	-	6.2.2	-	-	Change $\zeta$ 'Yellow Sea' into 'East China Sea'.	Rejected; section has been removed
China (China Meteorological Administration)	6	8	35	-	-	6.2.2	-	-	Delete $\zeta$ and atmospheric pressure $\zeta$ .	Agreed
Steffen Schlömer (IPCC WGIII)	6	8	41	-	43	6.2.2	-	-	This information is most interesting from my point of view. I think it would make a lot of sense to complement it with information about the extent to which the resource potential in each of the respective areas has been tapped and/or been considered for exploitation.	Will move to deployment section
Steffen Schlömer (IPCC WGIII)	6	8	41	-	43	6.2.3	6.2	-	What about the red areas off the coast of New Zealand, East Africa, and in the Pacific coast of Central America?	Section has been removed
stephen Wyatt (Carbon Trust)	6	9	28	-	-	-	-	0	Note high variation in Tidal resource estimates. The complexity of predicting tidal resource should be mentioned.	Will add sentence
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	9	24	-	-	-	-	-	"1.0 - 1.5 m/s" see comment 55	Accepted

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Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	9	24	-	-	-	-	-	"1.5m/s" i recommend to remove this unreferenced claim on required speed. This is highly dependent on the technology used.	Accepted
Gian-Kasper Plattner (IPCC WGI TSU, University of Bern)	6	9	7	9	9	-	-	-	"The effect of climate change on tidal rise and fall is uncertain but, in the worst case, sea level rise should only result in translation of the mean ocean level, with possible impacts linked to shoreline changes, rather than to tidal range." -- what is this based on? Need to provide a reference supporting this statement.	Delete ' is uncertain'
United Kingdom (Department of Energy and Climate Change)	6	9	16	-	27	-	-	-	"The potential power of the tidal current is proportional to the cube of the current velocity". In some cases. However, the Chief Scientific Advisor at DECC has discussed at length how this is inappropriate in many situations in chapter G of Sustainable energy without the hot air <a href="http://www.inference.phy.cam.ac.uk/withouthotair/cG/page_311.shtml">http://www.inference.phy.cam.ac.uk/withouthotair/cG/page_311.shtml</a> .  No one really knows the answer about tidal stream resource but people have suggested methods for estimating it. For example, Taylor (in a 1920 paper to the royal society) describes a method that assesses the tidal stream power by calculating the power being dissipated along the sea bed (bottom friction). Stephen Salter has also written a paper using this method in an IMechE journal paper. People in Washington are currently using this method to estimate tidal stream resource.  David MacKay suggestes modelling the tide as a shallow wave, which is a different method.	Change Figure 2 to Egbert and Ray,
Australia (0)	6	9	4	-	-	-	-	-	Change "hydrological risk" to "resource risk".	Simplify sentence
Steffen Schlömer (IPCC WGIII)	6	9	7	9	9	-	-	-	Consider cross-reference to section 6.5 "Social and Environmental Impacts".	Accepted; reference will be added
United States (U.S. Department of State)	6	9	4	9	5	-	-	-	Delete the sentence beginning with "although the resultant power.." beginning on line 4. It is not known what "hydrological risk" is.	Simplify sentence
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	9	4	9	5	-	-	-	Does not make sense. Hydrological risk typically relates to flooding. The other technologies of course do not have a risk of flooding. Should this sentence be referring to environmental risk then this would also not be a true statement as the risks associated with tidal barrages are perceived by many as high and there is much literature to support this.	Simplify sentence
Steffen Schlömer (IPCC WGIII)	6	9	18	-	-	-	-	-	explain "sinusoidal variation"	Text revised.

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Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	9	25	9	26	-	-	-	How can a tidal flow be non-oscillating? Suggest remove this sentence	Removed
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	9	28	-	-	-	-	-	I think a number of methodologies have been proposed, more could be listed? For example EMEC, UK DTI, Equimar and Supergen consortium in the UK have been looking at this I believe.	Will add references
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	9	30	-	-	-	-	-	I think instead of 'atlases' you mean 'resource estimates'? The references provided are not atlases.	Will check that these are atlases
Steffen Schlömer (IPCC WGIII)	6	9	23	-	24	-	-	-	include "potentially commercially attractive sites" in list or make otherwise more explicit, where those are.	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	9	18	9	20	-	-	-	Irrelevant?	Text revised.
David Clubb (European Environment Agency)	6	9	20	9	20	-	-	-	Loose definition: the energy of a tidal current is proportional to the cube of its velocity (the potential power is a derived output)	Point of comment is not clear and text is correct
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	9	7	9	9	-	-	-	Needs a reference. Surely the worst case would be changes in flow patterns? Also why mention climate change in this section but not for the other resources?	Text revised.
stephen Wyatt (Carbon Trust)	6	9	28	-	-	-	-	-	Note high variation in Tidal resource estimates. The complexity of predicting tidal resource should be mentioned.	Will add sentence
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	9	6	9	7	-	-	-	Only one reference is given in a book which is unreferenced there, see REN21 2008 "GLOBAL POTENTIAL OF RENEWABLE ENERGY SOURCES: A LITERATURE ASSESSMENT" and Blunden & Bahaj 2008 "Tidal energy resource assessment for tidal stream generators" for more recent estimates	Comment considered
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	9	22	-	-	-	-	-	please qualify the term sinusoidal. Tidal flows are only very approximately sinusoidal, they are comprised of 100's of astronomical harmonics.	Will change to 'approximate sinusoid'
Steffen Schlömer (IPCC WGIII)	6	9	16	-	27	-	-	-	replace "current velocity" by "speed of the current" or include in parenthesis	Accepted
United States (U.S. Department of State)	6	9	28	9	29	-	-	-	Replace "the assessment of tidal energy resource" to "a tidal energy resource at a single cross section or transect for a specific tidal passage."	Unnecessary embellishment

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Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	9	23	-	-	-	-	-	see comment 53	This section does not cover costs
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	9	6	9	7	-	-	-	Should be clear this is all tidal energy, not some split of tidal range and tidal stream. They effectively the same.	Text revised.
Norway (Climate and Pollution Agency)	6	9	23	9	26	-	-	-	State that these ranges are based upon state of art technology. May one foresee technology developments that significantly alter these velocity limits?	Accepted
Norway (Climate and Pollution Agency)	6	9	20	-	-	-	-	-	The cube law is valid for wind as well.	As above
Canada (Environment Canada)	6	9	6	9	7	-	-	-	The sentence "The world's theoretical power potential is in the range of 3 TW with 1 TW located in relatively shallow water" is not clear. The global energetics of tides is as follows: Work is done by astronomical forces on the ocean at a rate of 3.7 TW. This occurs almost entirely over the deep ocean. Of this 3.7 TW, about 1 TW is dissipated in the deep ocean (mainly via transfers to internal waves). The rest, about 2.7 TW, fluxes from the deep ocean into shallow coastal regions where it is dissipated by frictional processes. See: Egbert, G.D and R.D. Ray (2000) Significant dissipation of tidal energy in the deep ocean inferred from satellite altimeter data. Nature, vol. 405, 775-778. (note: any changes would also be required in TS, pg 57, lines 9-11)	Need to clarify that this includes both tidal rise and fall and tidal currents
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	9	29	-	-	-	-	-	There is also an atlas for Canada that should be mentioned. CHC 2006, INVENTORY OF CANADA'S MARINE RENEWABLE ENERGY RESOURCES"	Will add Canada reference
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	9	20	-	-	-	-	-	This is true of all fluids and not very relevant unless one discusses the higher density and relate this to air, eg: water at 1m/s is the same power as wind at 9m/s (Kerr, 2007 "Marine Energy" Philosophical Transactions of the Royal Society.)	Will retain as it explains to a lay audience
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	9	5	-	-	-	-	-	This reference Ray, 2009 refers to a completely different topic and not risk. It is the reference for the picture below in fact.	Need to check reference
United Kingdom (Department of Energy and Climate Change)	6	9	4	-	6	-	-	-	Variable might be a better word than intermittent (on/off)?? Would power be better quoted in TWh/year rather than TW average?? Seeing as it's variable?	Simplify sentence
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	9	11	9	14	-	-	-	what is the relevance for tidal resource?	Map demonstrates tidal range distribution; need a sentence to describe the Figure 6.2

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Canada (Environment Canada)	6	9	20	9	21	-	-	-	<p>With respect to the sentence "The power potential of a tidal current is proportional to the cube of the current velocity" : This is a commonly made assumption and it underpins all of the regional resource assessments cited in this section, as well as the methodology presented in the Hagerman et al. (2006) report (referred to in text). For an isolated turbine in an unbounded stream, then it is the case that the power potential is proportional to the cube of the flow speed, as demonstrated by Betz (1926). However, application of the Betz model to estimate the power potential of current in a tidal channel is problematic and, in fact, without theoretical support. Theory and methodologies for estimation of the power potential of tidal channels have been developed in recent years and a number of publications have appeared (e.g., Garrett &amp; Cummins, 2005, 2008; Sutherland et al., 2008, Karsten et al., 2008 [see references below]). These works have shown that it is generally not the case that the power potential is proportional to the cube of the flow speed. Results from these studies call into question virtually all of the resource assessments for tidal currents conducted to date, including those cited in the SRREN. Suggest also that this literature should call into question the figures given in paragraph TS, pg 57, lines 15-22.</p> <p>References:</p> <p>Garrett, C. &amp; P. Cummins.. (2005) The power potential of tidal currents in channels. Proceedings of the Royal Society A, vol. 461, 2563-2572.</p> <p>Garrett, C. &amp; P. Cummins (2008) Limits to tidal current power. Renewable Energy, vol. 33, 2485-2490.</p> <p>Karsten, R.H., J.M. McMillan, M.J. Lickley &amp; R.D. Haynes (2008) Assessment of tidal current energy in the Minas Passage, Bay of Fundy. Proc. IMechE Part A: J. Power and Energy, vol. 222, 493-507.</p> <p>Sutherland, G., M. Foreman &amp; C. Garrett (2008) Tidal current energy assessment for Johnstone Strait, Vancouver Island. Proc. IMechE Part A: J. Power and Energy, vol. 221, 147-157.</p>	Accept the argument but reject its addition as this is too much detail for the report
Finn Gunnar Nielsen (Statoil)	6	9	6	-	-	6	-	-	It may be confusing when some places in the text the yearly energy production in TWh/year is used and other places the installed power in TW. Would it be better to use the yearly energy production whenever possible, assuming a capacity factor of e.g 0.35??	See below
Australia (0)	6	9	-	-	-	6.2.3	-	-	Define 'sinusoidal' or include in glossary	Already rejected
Finn Gunnar Nielsen (Statoil)	6	9	23	9	26	6.2.3	-	-	State that these ranges are based upon state of art technology. May one foresee technology developments that significantly alter these velocity limits?	Accepted
Finn Gunnar Nielsen (Statoil)	6	9	20	-	-	6.2.3	-	-	The cube law is valid for wind as well.	Text revised.
Australia (0)	6	9	-	-	-	-	6,2	-	Define M2	Already rejected

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United Kingdom (Department of Energy and Climate Change)	6	10	5	-	-	-	-	-	48TWh/year. This seems about right. We have previously used estimates of this order for the UK. If it is the case that the UK has the majority of this resource, the chapter might benefit from saying so. Where is the tidal stream resource in Italy?	Accepted; will add text
Rafiuddin Ahmed (The University of the South Pacific)	6	10	6	-	-	-	-	-	are"" to be replaced by ""is"".	Accepted
Canada (Environment Canada)	6	10	3	10	8	-	-	-	As indicated in Chapter 6, page 8, line 41: "One of the locations with the highest tidal ranges is in Canada (Bay of Fundy)". This tidal range is also being pursued for the tidal current potential, and could be indicated in this section. Canada has the Fundy Ocean Research Centre for Energy (FORCE) located in the Bay of Fundy for the testing of tidal current extraction devices.	Text has been removed
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	10	10	10	11	-	-	-	Direct contradiction with the 30-60 stated in the previous sentence! I would suggest delete this sentence. Furthermore I would suggest delete the discussion of "non-oscillatory" tidal flows which do not occur as far as I'm aware. All practical tides increase and decrease in speed even if they reverse direction to different degrees.	Accepted; text has been removed
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	10	7	-	-	-	-	-	I don't think this is a correct list. Australia does not have much tidal stream and nor does *all* of northern africa or south america. Perhaps just list countries rather than continents. Also Canada is omitted but has excellent resource as does New Zealand.	Will seek reference
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	10	1	-	-	-	-	-	I think the "carbon trust" reference is in fact authored by black and veatch.	Will check and correct, if necessary
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	10	4	-	-	-	-	-	I think the reference for this statement is CEC 1996?	Accepted
Norway (Climate and Pollution Agency)	6	10	9	10	11	-	-	-	Is the definition of load factor and capacity factor obvious?	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	10	17	10	19	-	-	-	Language feels misleading, implies that all these currents flow at 2m/s	Text Specifies specific currents
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	10	26	10	27	-	-	-	Language feels opinionated "languished". Perhaps suggest why it has not been used to date (cost, practicality, technology restrictions, need, etc)	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	10	2	-	-	-	-	-	language: "far-eastern countries". Based on the reference I think you mean China?	Rejected; report covers more than China

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United States (U.S. Department of State)	6	10	24	10	27	-	-	-	Line 24: The power generation potential of the Florida Current of the Gulf Stream system was recognized decades ago (MacArthur Workshop; Stewart, 1974). The workshop concluded that the Florida Current had ~25 GW potential but its recommendations have languished, despite various oceanographic measurement programs confirming the potential (see Raye, 2001). It may have languished before 2005, but, there is now a vigorous program in the United States at the Florida Atlantic University. It is recommended that this report be brought up to date and include a reference to the work at FAU. It is also recommended to use the FAU estimate of the resource $\zeta$ which is ignored in this report. The FAU estimate is stated in the comments below.	Accepted
United States (U.S. Department of State)	6	10	9	10	11	-	-	-	Retain "The predictability of tidal currents is an important positive factor for their utilization." Delete remainder of paragraph.	Text revised.
United Kingdom (Department of Energy and Climate Change)	6	10	9	10	12	-	-	-	The terms "load factor" and "capacity factor" appear to be used interchangeably and without explanation of what they mean. In order for the reader to understand this section, some discussion of power curves would be required.	Accepted
Norway (Climate and Pollution Agency)	6	10	5	-	-	-	-	-	This mix of energy production and installed power may be confusing. Would it be better to use the yearly energy production whenever possible, assuming a capacity factor of e.g 0.35??	Accepted but do not propose to adopt a ballpark cap factor
Steffen Schlömer (IPCC WGIII)	6	10	24	-	27	-	-	-	use term technical potential, instead of just potential	Does not add substance
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	10	5	-	-	-	-	-	When stating tidal stream potential it is vital to point out that only a small fraction of the theoretical energy available can be extracted without significant changes in flow patterns, for example putting a large number of turbines in a channel would force water to take other paths. Typical practical extraction limits are in the order of 10% (see works by Prof. Ian Bryden for literature relating to this.)	Not valid
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	10	5	-	-	-	-	-	Where does 48TWh/y come from? CEC 1996 only talks about 12.5GW. To get the TWh claimed would require a capacity factor of 50% which is not feasible for tidal current. I think just quote the GW numbers.	Will check reference
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	10	9	10	10	-	-	-	Where does this 30-60% come from. With the oscillatory nature of tidal flows and the desire to have MW scale machines, blade tip cavitation is a severe limitation on blade length meaning that large rotors are impractical. Actual capacity factors quoted in literature and discovered in practice (I developed tidal turbines for a time) are much less than 60%.	Will find a reference
China (China Meteorological Administration)	6	10	5	10	6	6.2.3	-	-	"7000MW" should be "13965MW". References: Wang Chuankun, Lu Wei. Analysis Method and Reserves Estimation on Ocean Energy Resources [M]. Beijing: Ocean Press, 2009.	Will add text and reference
Finn Gunnar Nielsen (Statoil)	6	10	5	-	-	6.2.3	-	-	Again a mix of energy production and installed power.	Accepted
Finn Gunnar Nielsen (Statoil)	6	10	9	10	11	6.2.3	-	-	Is the definition of load factor and capacity factor obvious?	Accepted

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Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	11	12	-	-	-	-	-	Any difference could work but a larger temp difference gives a higher efficiency. Some description of this is required I believe.	Will add reference +explanation
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	11	1	-	-	-	-	-	Delete "the most" and replace "probably through" with "possible with"	Accepted
United States (U.S. Department of State)	6	11	6	11	7	-	-	-	Editors should consider using the Nihous estimates as these are conservative, science-based estimates that consider sustainability	Comment considered
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	11	17	-	-	-	-	-	I think add some context to this statement? "Should the technology, which is still in its infancy, reach technological maturity then there is potential to operate OTEC facilities almost everywhere in the etc etc "	Comment not relevant to resource
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	11	24	-	-	-	-	-	i think define debouching or just say "flow"	Edited text
David Clubb (European Environment Agency)	6	11	25	11	27	-	-	-	Irrelevant/vague comment: The point here is that sufficient freshwater is available, not that a feasibility study is required (surely this is taken as read for all renewable energy installations?)	removed sentence
United States (U.S. Department of State)	6	11	2	11	3	-	-	-	Line 2: The most direct harnessing of ocean solar power is probably through an ocean thermal energy; Line 3: conversion (OTEC) plant.  The recommendation is to delete this sentence. There is no reason to think that harnessing ocean thermal energy is any more direct than harnessing ocean wave or current energy. As a matter of fact, converting wave heave motion directly to electricity is more direct than going through a heat engine as is necessary for OTEC systems.	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	11	7	-	-	-	-	-	Only one reference is given in a book which is unreferenced in the text, for another estimate see REN21 2008 "GLOBAL POTENTIAL OF RENEWABLE ENERGY SOURCES: A LITERATURE ASSESSMENT"	Comment considered
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	11	27	11	28	-	-	-	please reference as this seems counterintuitive, wouldn't a lot of mixing already occur in a delta/estuary? Wouldn't a river mouth be best?	River mouth is delta or estuary reference to be added
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	11	5	-	-	-	-	-	References are not in the bibliography and also the years are missing	References are included

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Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	11	7	-	-	-	-	-	State that this is annual or "per year"	Accepted
United States (U.S. Department of State)	6	11	13	11	14	-	-	-	The description of locations favorable for OTEC development misses India; it is not clear whether large island nations (Indonesia, the Philippines, Papua, Taiwan ...) also fit in.	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	11	25	-	-	-	-	-	what defines a surplus?	Text revised.
United States (U.S. Department of State)	6	11	19	-	-	-	-	-	'within one mile' is much too restrictive; that leaves virtually no site (sites in Hawaii would be left out!); say 'within a few miles'.	Edited text
United Kingdom (Department of Energy and Climate Change)	6	12	16	12	19	-	-	-	Agree with TSU that references are required. Not aware of any source that shows definitively that competitive technologies will emerge by 2020.	Accepted
Steffen Schlömer (IPCC WGIII)	6	12	16	-	-	-	-	-	are expected to, add references	Accepted
Norway (Climate and Pollution Agency)	6	12	20	-	-	-	-	-	Chapter number should be 6.3.2	Text revised.
Finn Gunnar Nielsen (Statoil)	6	12	20	-	-	-	-	-	Chapter number should be 6.3.2	Text revised.
David Clubb (European Environment Agency)	6	12	10	12	12	-	-	-	Contradiction: Earlier it is asserted that there 'may never be' a convergence on technology design 'given the options for energy extraction' (page 4, line 21). But here the assertion is made that this is due to a lack of operating experience	Accepted
Australia (0)	6	12	16	-	19	-	-	-	Delete para: ocean technologies will only be 'competitive' in context of ongoing capital cost support, production incentives, renewables portfolios, carbon pricing or combinations of these. Final sentence is unfinished - "solution" to what?	Edit done
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	12	36	-	-	-	-	-	Disagree, wind turbines can be broadly described as generic across sites. Where is the evidence that wave devices will be tailored, this seems unlikely given the huge development costs.	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	12	11	-	-	-	-	-	Disagrees with Section 6.4.2 in which wave devices are stated to be sold as part of a commercial project.	Edit 6.4.2
Steffen Schlömer (IPCC WGIII)	6	12	1	-	3	-	-	-	Does that mean that the such plants are expected to run only 1000 hours per year? If so, please explain why this is supposed to be the case.	Accepted

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United States (U.S. Department of State)	6	12	1	12	3	-	-	-	Editors should seek to clarify figures and units.	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	12	3	-	-	-	-	-	For a further estimate of resource see REN21 2008 "GLOBAL POTENTIAL OF RENEWABLE ENERGY SOURCES: A LITERATURE ASSESSMENT"	Comment considered
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	12	4	12	5	-	-	-	Inconsistent, these benefits are not defined for other technologies. Recommend delete from this resource section.	Edit to do
David Clubb (European Environment Agency)	6	12	3	12	4	-	-	-	Incorrect emphasis: 'In europe alone there is the potential to generate 180TWh'. But this is roughly 10% of the global potential, and broadly in line with population distributions. What point is being made with this?	Accepted
David Clubb (European Environment Agency)	6	12	10	12	10	-	-	-	Incorrect terminology: 'tidal rise and fall' is correctly known as 'tidal range'	Text revised.
David Clubb (European Environment Agency)	6	12	21	12	22	-	-	-	Irrelevant comment: Remove reference to conception of energy technologies; this is true for every technology and the only relevant point here is that many have been demonstrated	to edit
Steffen Schlömer (IPCC WGIII)	6	12	14	-	-	-	-	-	is expected to directly benefit	Accepted
United States (U.S. Department of State)	6	12	16	12	19	-	-	-	Line 16: Competitive ocean energy technologies will emerge in the present decade, offering great promise beyond the near-term [TSU: references missing]. The abundance of globally distributed resources and the relatively high energy density of ocean energy resources make ocean energy a potentially widespread solutions.  Add $\zeta$ except for ocean thermal energy $\zeta$ after the words $\zeta$ relatively high energy density $\zeta$ in line 18	Accepted
United States (U.S. Department of State)	6	12	25	12	26	-	-	-	Line 25: A generic scheme for both ocean wave and tidal current consists of primary, secondary and tertiary conversion stages as shown in (Figure 6.5).  Delete $\zeta$ and tidal currents $\zeta$ as this section is on waves only and there is another section coming up on tidal currents.	to edit
United States (U.S. Department of State)	6	12	8	12	9	-	-	-	Line 8: Ocean energy technologies ranges from the conceptual stage to the prototype stage, as few technologies have matured to commercial availability.  Add to the beginning of this sentence $\zeta$ The current development status of $\zeta$ .	Accepted
Rafiuddin Ahmed (The University of the South Pacific)	6	12	34	-	-	-	-	-	Please provide a reference at the end of this sentence (sentence ending with ""at a particular site"").	to edit

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Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	12	14	12	15	-	-	-	Recommend delete this claim. Many new developments are occurring in ocean energy in relation to linear generators, novel power take-offs, gearbox designs, heat exchangers etc etc	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	12	32	-	-	-	-	-	Reference required	to edit
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	12	34	-	-	-	-	-	Reference required	to edit
Steffen Schlömer (IPCC WGIII)	6	12	1	-	-	-	-	-	Rephrase: Global technical potential for osmotic power plant capacity has been calculated as $\zeta$ . The technical potential for power generation has been calculated as $\zeta$ "	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	12	3	-	-	-	-	-	Scråmestø, Skilhagen and Nielsen actually say 1600-1700TWh in their paper however this is unreferenced and in an industry conference paper. The quality of their references and the level of peer review of such a piece of literature is questionable, furthermore they are employed by the company developing the technology.	Comment considered
Steffen Schlömer (IPCC WGIII)	6	12	19	-	-	-	-	-	solution to what? Climate change mitigation, energy supply, energy security, $\zeta$ ?	edit done
Norway (Climate and Pollution Agency)	6	12	27	12	29	-	-	-	Systems exists where the motion is directly transformed to electricity by e.g. linear generators. For such systems short-term storage is avoided	to edit
Steffen Schlömer (IPCC WGIII)	6	12	4	-	-	-	-	-	technical or theoretical potential?	Text revised.
United Kingdom (Department of Energy and Climate Change)	6	12	27	12	29	-	-	-	The sentence structure needs revision to clarify what is meant.	to edit
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	12	2	-	-	-	-	-	This figure 1600-1700TW is obviously in correct, it would require a capacity factor of 1.5% given the generation potential given below. What was obviously meant by Scamesto was TWh and not TW which is confirmed in the conference paper you reference immediately afterwards. Furthermore I don't feel that personal communications are a good reference for an IPCC report.	Accepted
David Clubb (European Environment Agency)	6	12	1	12	3	-	-	-	Unclear: What is the difference between these two figures and sentences?	Accepted
David Clubb (European Environment Agency)	6	12	16	12	17	-	-	-	Unsubstantiated assertion: How do we know that 'competitive ocean technologies will emerge in the present decade'?	reference

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David Clubb (European Environment Agency)	6	12	14	12	15	-	-	-	Unsubstantiated assertion: How do we know that there will be no technological breakthrough in this sector?	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	12	25	-	-	-	-	-	words "characterising" and "generation devices" missing	Accepted
United Kingdom (Department of Energy and Climate Change)	6	12	2	-	-	6.2.6	-	-	Is this a typo? Should it be TWh? These numbers are also extremely high. Are they too high? Again, the section would benefit from description of what this would mean. I.e. how many Amazon rivers are needed to realise this energy?	Accepted
Frederic Louis (EDF Hydro Engineering Centre)	6	12	-	-	-	6.3	-	-	Importance given to the least mature technologies seems disproportionate compared to the tide rise and fall : two pages for wave energy and half a page for tide rise and fall.	Technmology description only one technology for tidal rise and fall
stephen Wyatt (Carbon Trust)	6	12	14	12	15	6.3.1	-	-	This statement is more correct for wave than tidal. Tidal current presents new engineering and operational challenges which have not been encountered in the oil and gas industry. Would prefer if ζ rather than any new or major technological breakthrough ζ could be deleted.	Accepted
stephen Wyatt (Carbon Trust)	6	12	14	12	15	6.3.1	-	-	This statement is more correct for wave than tidal. Tidal current presents new engineering and operational challenges which have not been encountered in the oil and gas industry. Would prefer if ζ rather than any new or major technological breakthrough ζ could be deleted.	Accepted
Norway (Climate and Pollution Agency)	6	12	-	-	-	6.3.2	-	-	Mention that all wave power devices rely on large motions to be efficient. Such large motions may be achieved either by resonance or advanced control systems (e.g. latching)	Not necessary to add
Finn Gunnar Nielsen (Statoil)	6	12	27	12	29	6.3.2	-	-	Systems exists where the motion is directly transformed to electricity by e.g. linear generators. For such systems short-term storage is avoided	to edit
Norway (Climate and Pollution Agency)	6	12	-	-	-	6.3.2	-	-	To relate the practical extractable wave energy to the resources available, typical capture width and capacity factors should be included.	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	13	13	-	-	-	-	-	The pressure differential is between the inside of the chamber and open air, not within the chamber.	edit done
Rafiuddin Ahmed (The University of the South Pacific)	6	13	13	13	17	-	-	-	The sentence ""High velocity compressed air exhausts ζ.."" needs to be corrected. When the air attains high velocity, it is no longer compressed. For some turbines e.g. Savonius rotors, the air need not attain a high velocity. Also, the paragraph needs to mention that the air exhausts into the atmosphere and when the wave recedes, the air is drawn from the atmosphere.	Paragraph does mention air inflow from the atmosphere

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United Kingdom (Department of Energy and Climate Change)	6	13	-	-	-	-	6.5	-	Figure too small to be read	Noted.
Norway (Climate and Pollution Agency)	6	13	-	-	-	-	6.5	-	We propose that the figure can be omitted.	Noted.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	13	-	-	-	-	6.6	-	Neglects some novel technologies that propose electropolymer or bulging tubes (anaconda)	Edit text
Rafiuddin Ahmed (The University of the South Pacific)	6	13	-	-	-	-	6.6	-	Nowadays, a number of direct-drive turbines are being developed for wave energy extraction.	Accepted
Fritz Vahrenholt (Prof. Dr.) (RWE Innogy GmbH)	6	14	34	14	36	-	-	-	Also coastally attached lagoons. These could have less effects on coastal processes and be more cost-effective.	to edit
David Clubb (European Environment Agency)	6	14	34	14	36	-	-	-	Disingenuous assertion: Tidal lagoons only offer increased flexibility if you want reduced output; they do not allow increased output. However, they do greatly reduced geo-environmental impacts	to edit
United States (U.S. Department of State)	6	14	37	14	41	-	-	-	editors need to check the status of the Silwa Barrage and update this section accordingly, and the ability of the project to operate in both ebb and flow modes.	edited
United States (U.S. Department of State)	6	14	42	-	-	-	-	-	Editors need to clarify "very shallowly shelving" - this is not clear.	edited
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	14	33	-	-	-	-	-	Final sentence of the paragraph seems to have been copied from <a href="http://en.wikipedia.org/wiki/Tidal_power">http://en.wikipedia.org/wiki/Tidal_power</a> which states "two-basin schemes are very expensive to construct due to the cost of the extra length of barrage". Neither of the instances are referenced. Suggest to delete this sentence and check other aspects of the chapter for information sourced/copied from unverified internet sources.	to edit
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	14	43	-	-	-	-	-	how is the shelving coastline useful in the Severn barrage which is proposed to be in an estuary?	needed for construction
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	14	20	-	-	-	-	-	I think that these fluctuations should be stated as being from a single device.	to edit

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David Clubb (European Environment Agency)	6	14	43	14	43	-	-	-	Incorrect statement: the Severn channel lies between southwest England and south Wales	edited
David Clubb (European Environment Agency)	6	14	37	14	37	-	-	-	Incorrect terminology: 'tidal rise and fall' is correctly known as 'tidal range'	Noted.
David Clubb (European Environment Agency)	6	14	43	14	43	-	-	-	Incorrect terminology: 'tidal rise and fall' is correctly known as 'tidal range'	Noted.
David Clubb (European Environment Agency)	6	14	44	14	44	-	-	-	Incorrect terminology: 'tidal rise and fall' is correctly known as 'tidal range'	Noted.
David Clubb (European Environment Agency)	6	14	26	14	27	-	-	-	Incorrect terminology: 'tidal rise and fall' is correctly known as 'tidal range'	to edit
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	14	19	-	-	-	-	-	Lack of consistency with the terminology introduced in Figure 6.5, electricity generation happens after tertiary conversion.	toedit
David Clubb (European Environment Agency)	6	14	29	14	30	-	-	-	Lack of reference: 'more recently, new barrage configuration has been proposed based on 2-basin configuration'. In what context? I was lecturing on this four years ago; the idea is much older than that.	to edit
David Clubb (European Environment Agency)	6	14	33	14	33	-	-	-	Misleading phrase: Of course double-basin schemes are very expensive; so are 'normal' schemes. This sentence should aim to clarify that there is an extra expense associated with double-basin schemes.	to edit
United States (U.S. Department of State)	6	14	29	-	-	-	-	-	'More recently, a new ...' instead of 'More recently, new ...'	to edit
Rafiuddin Ahmed (The University of the South Pacific)	6	14	29	-	-	-	-	-	More recently, a new barrage ç..	to edit
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	14	34	14	36	-	-	-	Needs a reference. Why are they more flexible? Regarding enviro impact, studies for the Severn barrage showed that lagoons could have a significant impact, not on the area where they are constructed but also on the surrounding tidal races.	to edit

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Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	14	23	12	24	-	-	-	Please provide references for these strong statements, I would suggest they are not true for all devices, eg nearshore surging devices do not really need resonance nor advanced control systems, see M. Folley, T.W.T. Whittaker and J. van't Hoff 2007, "The design of small seabed-mounted bottom-hinged wave energy converters" Proceedings of the 7th European Wave and Tidal Energy Conference, Porto, Portugal. Also overtopping devices do not require resonance or advanced control systems. Recommend reword these sentences.	edit done
United States (U.S. Department of State)	6	14	38	-	-	-	-	-	"power plant at La Rance ...' instead of 'power plant La Rance ...'	edited
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	14	3	-	-	-	-	-	propose delete the word differential and replace "oscillating" with oscillatory"	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	14	10	-	-	-	-	-	Propose insert "secondary" before the word "power"	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	14	3	-	-	-	-	-	Propose to delete the words "of different mass" unless this can be referenced/justified.	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	14	27	-	-	-	-	-	sentence structure	to edit
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	14	42	-	-	-	-	-	Suggest should read "shallow"	edited
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	14	17	-	-	-	-	-	Suggest to change the word "devices" as they are actually not distinct devices, just methods of conversion.	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	14	29	-	-	-	-	-	suggest to describe the "generating units" they are conventional low-head hydro turbines	specialised turbines but are developed
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	14	30	14	33	-	-	-	The idea of two basin schemes have been around a long time, indeed 3 basin schemes have also been proposed. I'd suggest reducing the focus on such a scheme as none exist that I'm aware of. Also the phrase "highly flesible could read "more flexible" and delete the term "amy" preceding it.	to edit



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Frederic Louis (EDF Hydro Engineering Centre)	6	14	40	-	41	-	-	-	The Sihwa bulb turbines generate electricity only one way (ebb) and operate in orifice mode (flow).	edited
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	14	-	-	-	6.3.1.2	-	-	Surging devices have been neglected	to edit Langlee
Denis Aelbrecht (EDF)	6	14	-	15	6	6.3.2	-	-	In section 6.3.2 : there is a new kind of tidal rise and fall scheme which has been suggested by Lemperiere (2006), and which consist in creating a coastal lagoon along a rocky or cliff shoreline, allowing then to avoid the construction of an entire loop of breakwater.	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	15	11	15	12	-	-	-	A) why are these companies chosen but not others? for example arguably the most advanced developer, Marine Current Turbines, is neglected and B) why are specific companies listed in this area of the technology section but not the others such as wave power, should be consistent.	must edit
United States (U.S. Department of State)	6	15	4	15	5	-	-	-	Editors need to decide if River kinetic technologies are to be included as part of ocean energy.	edited
United States (U.S. Department of State)	6	15	8	15	8	-	-	-	Editors need to decide if River kinetic technologies are to be included as part of ocean energy.	edited
United States (U.S. Department of State)	6	15	21	15	23	-	-	-	Line 21: Axial-flow turbines will either reverse nacelle direction ~180° with each tide or, alternatively, the nacelle will have a fixed position but the rotor blades will accept flow from two directions - usually at some performance penalty.  The recommendation is to delete $\hat{\zeta}$ $\hat{\zeta}$ usually at some performance penalty). Whereas this is true for fixed pitch blades, it is not true for variable pitch blades, such as the Marine Current Turbine machines.	Edited
United States (U.S. Department of State)	6	15	9	-	-	-	-	-	Line 9: Several classification schemes for tidal and ocean current energy systems have been proposed .  This write up misses a key point about the classification of turbine type tidal and open-ocean current systems, i.e., whereas all axial rotor turbines have their axis of rotation parallel to the horizon, cross flow turbines can be designed with their axis of rotation either vertical or parallel to the horizon. This is the major distinction and that open rotor vs ducted rotor distinctions are at the next level down in terms of differentiation of the types.	to edit
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	15	11	15	12	-	-	-	None of these references are in the bibliography, they are simply websites of companies.	to edit

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Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	15	33	-	-	-	-	-	Ponte Di Archimede is not in the bibliography, only a website.	to edit
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	15	26	-	-	-	-	-	Reference for claim on shroud costs? Poor phasing. Suggest "for this to be economically beneficial the additional enery captured over the life of the device must offset the cost of the shroud"	economics OK
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	15	23	-	-	-	-	-	reference for the claim on reduced performance? Simply rotating the blades 180 degree allows reverse flow o be achieved at no penalty (except for off axial flows, however this isnt mentioned in the IPCC text)	edited
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	15	19	15	20	-	-	-	Suggest change this sentence, the challenge of reversing flow has already been described in the previous sentence	needed for comparison
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	15	7	-	-	-	-	-	suggest replace "can" with "must be able to"	edited
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	15	34	-	-	-	-	-	suggest replace "likely" with desirable	edited
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	15	29	-	-	-	-	-	suggest replace "requires" with "is likely to require"	edited
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	15	26	15	28	-	-	-	Unreferenced and strongly disagree, the limit is nearly always going to be blade tip cavitation from excess blade tip speeds, not the size of the channel. Otherwise a large channel could allow a huge rotor, but this is not practical, to keep a decent rotational speed to allow a decent gearbox (ie less stages, lower torque) then blade tip speed becomes a huge problem. I say this based on my firsthand experience in the design of tidal turbine blades and rotors, I would suggest deletion of these sentences.	edited
Denis Aelbrecht (EDF)	6	15	4	16	6	6.3.3	-	-	In section 6.3.3 : similarly, wake effect in a farm of tidal energy converter devices is not mentioned. Studies have been performed to optimize spacing and positioning of multiple devices, depending on environment conditions - see for instance Peyrard, C., Buvat, C., Lafon, F. & Abonnel, C. (2006) : Investigations of the wake effects in marine current farms through numerical modelling with the telemac system, in 1st $\zeta$ Ocean Energy International Conference $\zeta$ , Bremerhaven, Germany.	to edit

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Denis Aelbrecht (EDF)	6	15	4	16	6	6.3.3	-	-	In section 6.3.3 : wave-induced perturbation on tidal energy converter device performance is not pointed out. This may be particularly important in shallow areas, where wave height might be significant and may affect the flow structure in the water column.	Most projects planned where waves are small
China (China Meteorological Administration)	6	15	12	-	-	6.3.3	-	-	The research on tidal current turbines has been made for long time in China, especially for cross-flow turbines. So it should be cited according to published literature in China after "2009", for example, Zhang et al, 2007. References: Zhang L and Sun, K. Tidal Current Energy Developments in China, IEA-OES News Letter Issue 8, May 2007".	must edit You to provide reference
United States (U.S. Department of State)	6	16	30	-	-	-	-	-	add a comma after 'decades'	edited
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	16	6	-	-	-	-	-	I'm sure they have been evaluated but not in the public domain, i think this needs to be clearer.	edited
Australia (0)	6	16	27	-	30	-	-	-	More detail needed: what is the nature of the energy exploited by salinity gradient technologies?	stated in sections
United States (U.S. Department of State)	6	16	13	-	-	-	-	-	Need to verify accuracy of statement..are closed cycle systems actually more efficient?	to edit
United States (U.S. Department of State)	6	16	9	16	10	-	-	-	Proposed rewrite: 'In the open conversion cycle, about 0.5% of the warm surface seawater is flash-evaporated in a vacuum chamber. This steam is the cycle's working fluid which passes through a power-generating turbine before being condensed by deep cold seawater.'	no reference to support
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	16	27	-	-	-	-	-	Reference for the "centuries" claim required. Scramesto only supports the second half of the sentence.	edited
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	16	43	-	-	-	-	-	reference? I would suggest that this is not true. What is the drive mechanism in a huge ocean current turbine, some kind of enormous hightorque gearbox with many stages? As with tidal current technologies, tip speed and the resulting cavitation will very quickly limit the size of rotors.	no such line
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	16	3	16	6	-	-	-	Suggest moving this before the ocean current paragraph to keep it with tidal current.	edited
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	16	8	-	-	-	-	-	Suggest replace "have" with "to date have had"	no other possibilities

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Rafiuddin Ahmed (The University of the South Pacific)	6	16	12	-	-	-	-	-	There are a large number of possible by-products that can be obtained from a multi-purpose OTEC plant. For example, Hydrogen, lithium, uranium, ocean mineral water, and cold deep ocean water for chilling applications and for agriculture and aquaculture can be obtained from such a plant. A full article on this is available on the website of Saga University that can be provided as reference: <a href="http://www.ioes.saga-u.ac.jp/.../OTEC%20Power%20Generation%20Saves%20Mankind.pdf">www.ioes.saga-u.ac.jp/.../OTEC%20Power%20Generation%20Saves%20Mankind.pdf</a>	edit if space
stephen Wyatt (Carbon Trust)	6	16	5	16	6	-	-	-	There is one example of a reciprocating device at the 100KW scale in the Humber estuary UK that is worth noting.	edit if space
stephen Wyatt (Carbon Trust)	6	16	5	16	6	-	-	-	There is one example of a reciprocating device at the 100KW scale in the Humber estuary UK that is worth noting.	edit if space
United States (U.S. Department of State)	6	16	21	-	-	-	-	-	'turbines are' instead of 'turbines may be'	Accepted
Steffen Schlömer (IPCC WGIII)	6	16	-	17	-	6.3.5	-	-	What about the demonstration plant built by Statkraft?	include
Finn Gunnar Nielsen (Statoil)	6	17	18	-	-	-	-	-	replace "".. Concentration of salt concentration between.."" by "".. Concentration of salt between..""	edit done
Norway (Climate and Pollution Agency)	6	17	18	-	-	-	-	-	replace ".. Concentration of salt concentration between.." by ".. Concentration of salt between.."	edit done
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	17	12	17	13	-	-	-	suggest delete, this is the basis of membrane desalination and moreover it is not relevant to the audience.	Noted.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	17	17	17	25	-	-	-	suggest shorten, too much detail for one companies process given that no wave or tidal devices are described in detail.	Noted.
United States (U.S. Department of State)	6	18	7	-	-	-	-	-	add a comma after '10 years'	edited
Steffen Schlömer (IPCC WGIII)	6	18	12	-	-	-	-	-	complementary uses and co-benefits?	edited
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	18	10	18	11	-	-	-	confusing 'full size and operational' with 'commercial'. Please provide evidence that tidal barrages are profitable. None have been built in the last 30 years except one CDM project in an emerging economy, this does not seem to support the idea that they are "commercial"	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	18	1	-	-	-	-	-	de Laleu is not in the bibliography	to edit

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United Kingdom (Department of Energy and Climate Change)	6	18	40	18	42	-	-	-	Does the author mean enabling rather than promoting? Accessing existing capabilities would accelerate the development of the technologies and supply chains.	edited
Steffen Schlömer (IPCC WGIII)	6	18	33	-	36	-	-	-	Include cross-reference to chapter 10.5 and 10.6 as well as chapter 11.	to edit
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	18	29	-	-	-	-	-	Joint Implementation is between Annex I countries, not developing to Annex I. Delete.	to edit
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	18	23	18	24	-	-	-	Later on you say that 21GW of tidal barrage are being planned but here you say that there is not commercial market for ocean energy technologies? Also the commercial wave farm in Portugal does not support this claim, nor the recent successful bidding for Pentland firth leases in Scotland with a number of utilities acquiring leases.	Text revised.
United States (U.S. Department of State)	6	18	35	18	36	-	-	-	Line 35 This will make renewable energy technologies, such as wave and tidal stream technologies, which produce no emissions in operation, more competitive. The recommendation is to replace ζwave and tidal stream technologiesζ with ζocean energy technologiesζ.	Text revised.
Steffen Schlömer (IPCC WGIII)	6	18	37	-	38	-	-	-	Markets for both electricity and potable water already exist. Whether or not ocean energy-based technologies will be able to enter this market depends on their cost competitiveness and government support policies. The sentence reads as if it was certain that ocean energy technologies will enter those markets.	Will develop f rom ocean energy
Steffen Schlömer (IPCC WGIII)	6	18	19	18	20	-	-	-	On p. 12, l. 30 you say more than 50 wave energy devices are under development, cross-reference may be useful	not necessary
United States (U.S. Department of State)	6	18	12	18	14	-	-	-	One complementary use at La Rance is that the tidal power plant it has definitely become a tourist attraction.	no space to include
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	18	18	-	-	-	-	-	Only mention of marine biomass. Would be good to say why it was excluded in the introduction.	to edit
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	18	37	18	38	-	-	-	Poor phrasing, suggests that markets for potable water will develop, there is already a demand/market for potable water.	Text revised.
United States (U.S. Department of State)	6	18	16	18	19	-	-	-	Recommend deleting references to submarine geothermal and marine biomass as it further confuses the topic.	to edit
Steffen Schlömer (IPCC WGIII)	6	18	18	-	-	-	-	-	Submarine geothermal and marine biomass are currently not dealt with in this chapter. Include reference to other parts of the report or include in footnote reason for not dealing with them.	to edit

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United States (U.S. Department of State)	6	18	22	18	23	-	-	-	The focus of this section is overly centric on tidal barrages. A single facility (La Rance) provides 240 MW of the total global capacity (265 MW), with a limited number of potential deployment sites (20 around the world).	Text revised.
United Kingdom (Department of Energy and Climate Change)	6	18	16	18	24	-	-	-	The second of the two paragraphs repeats the key message. One should be cut,	important to restate
United States (U.S. Department of State)	6	18	34	-	-	-	-	-	The word 'uptake' may be misused here; 'uptake of ocean energy' might work, or 'takeoff of ocean energy technologies' perhaps.	Rejected
United States (U.S. Department of State)	6	18	26	-	-	-	-	-	The word 'uptake' may be misused here; 'uptake of ocean power' might work, or 'takeoff of ocean power technologies' perhaps.	edited
United Kingdom (Department of Energy and Climate Change)	6	18	33	18	36	-	-	-	This paragraph should be cut; the competition for ocean technologies is other low carbon technologies.	Text revised.
Steffen Schlömer (IPCC WGIII)	6	18	35	-	36	-	-	-	This will BRING renewable energy technologies, such as wave and tidal stream technologies, which produce no emissions in operation, closer to competitiveness.	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	18	7	18	9	-	-	-	Unreferenced and unlikely to be true. They have been pursued because they are deemed to be most likely to be profitable, 'permissible' ie able to get environmental consenting and perceived to be closer to commercialisation.	to edit
Canada (Environment Canada)	6	18	5	21	18	6.4	-	-	There is some inconsistency in the writing style between sections 6.4.2. and 6.4.4. Section 6.4.2 on wave energy notes many technologies that are under development, what stage they are at, etc. Section 6.4.4 on tidal and ocean current does not include any information about the technologies under development, but rather what countries (an incomplete list) are pursuing the technologies	Text revised.
United States (U.S. Department of State)	6	19	38	19	38	-	-	-	A proper quote would be "The most maturely developed oscillating-body device is the 750 kW Pelamis Wavepower attenuator device".	edited
Steffen Schlömer (IPCC WGIII)	6	19	30	19	31	-	-	-	"Costs of electricity from these early projects are already lower than those for solar PV" - the cost of solar PV depend on a wide range of factors and can vary by orders of magnitude. Please give a concrete monetary cost value instead of this ambiguous comparison.	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	19	35	-	-	-	-	-	I believe that Siemens has owned Wavegen for a couple of years now.	Irrelevant

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United States (U.S. Department of State)	6	19	41	-	-	-	-	-	Line 41 Power Technologies $\zeta$ PowerBuoy8, a small (40 $\zeta$ 150 kW) vertical axis device, which has been deployed in Hawaii New Jersey and off the north Spanish coast.  The recommendation is to replace with $\zeta$ , a point absorber heaving buoy device which has deployed in Hawaii (a 40 kW device), New Jersey (a 40 kW device) and off the north Spanish coast (a 150 kW device). OPT is currently manufacturing another 150 kW for the coast of Oregon and has designed a 250 kW device. $\zeta$	no space to accommodate
David Clubb (European Environment Agency)	6	19	30	19	32	-	-	-	Missing reference: for the cost of electricity in comparison with solar PV. Also, I couldn't find 'Carbon Trust 2007' in your list of references (I see later - page 31 - that figures are provided so I assume the report is the CT 2006 one). However, most LCOE figures I see for PV are around $\zeta$ 0.15/kWh; using the CT 2006 report, the lowest LCOE is stated as 9p/kWh (approximately $\zeta$ 0.11/kWh), and the highest is 44p. Surely if marine renewables were cheaper than PV, we would be seeing a huge market interest, and much less need for Government support?	rewrite
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	19	7	-	-	-	-	-	none of these references are in the bibliography	to resolve
United States (U.S. Department of State)	6	19	6	19	11	-	-	-	Paragraph needs to be re-written.	no reasons given
Gerrit Hansen (TSU)	6	19	30	-	33	-	-	-	please justify the statement "costs are already lower than solar PV" and give concrete figures/source.	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	19	30	19	31	-	-	-	reference for the cost claim?	Accepted
United Kingdom (Department of Energy and Climate Change)	6	19	30	-	-	-	-	-	Some don't agree with the statement about the relative costs of PV and marine energy, when deployed in locations with good resource for each, using commercially available technologies. Probably best to avoid this comparison.	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	19	28	-	-	-	-	-	suggest delete "becomes commercially avail"	done
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	19	25	-	-	-	-	-	suggest delete "we"	done

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Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	19	23	-	-	-	-	-	suggest delete "with appropriate scientific basis"	edited
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	19	2	-	-	-	-	-	suggest replace "orkney" with "Scotland"	edited
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	19	26	19	27	-	-	-	These numbers could be removed as they add little value and are largely incorrect. A 1:100 model of a 10m device would be 10cm! Typically tanks tests at 1:30 or 1:20 scale, something of that order. Also open sea testing is rarely done with 1:10 scale devices, it would be completely unrepresentative. Also 1:1 is full scale, just say "full scale"	done
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	19	39	19	40	-	-	-	This phrase contradicts with many other places in the chapter that say that no ocean technologies are commercially available or viable except for barrages.	edited
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	19	10	19	11	-	-	-	this sentence uses the word development 4 times.	to edit
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	19	24	19	25	-	-	-	This varies a great deal between developers. Needs to be clear. Some are later discussed as being involved in commercial projects such as pelamis, seems at odds with this sentence.	edited
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	19	1	-	-	-	-	-	Why is this unusual, there are many places one can test a wind turbine or solar panel?	Not relevant
stephen Wyatt (Carbon Trust)	6	19	1	19	5	6.4.1	-	-	Worth saying that there test centres have been developed mainly to share the high cost of testing prototype devices, esp. at the grid connected scale such those at EMEC.	edited
stephen Wyatt (Carbon Trust)	6	19	1	19	5	6.4.1	-	-	Worth saying that there test centres have been developed mainly to share the high cost of testing prototype devices, esp. at the grid connected scale such those at EMEC.	edited
stephen Wyatt (Carbon Trust)	6	19	30	19	32	6.4.2	-	-	Cost uncertainties for both Solar and wave are large, this is dangerous comparison. Consider: $\zeta$ costs for wave energy are significantly higher than more conventional forms of generation, and higher than some renewables. Cost reduction is possible, and $\zeta\zeta$	to do
stephen Wyatt (Carbon Trust)	6	19	30	19	32	6.4.2	-	-	Cost uncertainties for both Solar and wave are large, this is dangerous comparison. Consider: $\zeta$ costs for wave energy are significantly higher than more conventional forms of generation, and higher than some renewables. Cost reduction is possible, and $\zeta\zeta$	to do



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Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	20	21	-	-	-	-	-	Disagree, Marine Current Turbine device at full scale is arguably pre-commercial.	The text says it is pre-commercial
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	20	27	-	-	-	-	-	EDF is not in the bibliography and it is a company, not a peer reviewed article.	See 417
Rafiuddin Ahmed (The University of the South Pacific)	6	20	17	-	-	-	-	-	Figure 6.11 does not talk about barrages or tidal lagoon concepts. Also, the total planned capacity (from Fig. 6.11) is greater than 21.9 GW mentioned in the sentence.	Will correct
Ladislav Rybach (Geowatt AG Zurich (company))	6	20	7	-	-	-	-	-	In line 7 replace 'La Rance' be 'La Rance, France'.	Edited
David Clubb (European Environment Agency)	6	20	4	20	4	-	-	-	Incorrect terminology: 'tidal rise and fall' is correctly known as 'tidal range'	Text revised.
David Clubb (European Environment Agency)	6	20	14	20	14	-	-	-	Incorrect terminology: 'tidal rise and fall' is correctly known as 'tidal range'	Will be addressed
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	20	17	-	-	-	-	-	It is not planned, only under consideration. Misleading language.	Will change to 'under consideration'
United States (U.S. Department of State)	6	20	24	-	-	-	-	-	It looks like 'Most of these projections ...' means 'Most market projections ...'	Need to re-edit
Frederic Louis (EDF Hydro Engineering Centre)	6	20	12	-	-	-	-	-	ref : Paik D and Schmid H.G. ""developing the Sihwa tidal project in Korea"", HRW Vol 14, N°5, 32-34, 2006	Text revised.
Steffen Schlömer (IPCC WGIII)	6	20	22	-	-	-	-	-	Seagen tidal turbine: Link to webpage should be included as done for other projects	Will check with TSU to ensure that websites are listed as footnotes
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	20	23	20	24	-	-	-	Suggest delete sentence related to accreditation, little relevance	Will seek a further reference from NI Electricity
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	20	14	-	-	-	-	-	suggest delete this sentence, self evident from the above paragraph	Sentence has value

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Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	20	6	-	-	-	-	-	suggest replace "industrial" with "utility"	edited
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	20	26	20	27	-	-	-	This list is different to the list given in the resource section 6.2.3. Lack of consistency.	Need to check and differentiate resources and markets
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	20	1	20	2	-	-	-	Why choose these two, there are about 30 others including more advanced devices (Aquamarine's Oyster was deployed in 2009 at full scale.)	dealt with
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	20	23	-	-	-	-	-	Why not link to the Seagen website as a footnote, it is done for all other companies?	Already addressed
Steffen Schlömer (IPCC WGIII)	6	21	22	-	-	-	-	-	Another barge?	Will clarify
Steffen Schlömer (IPCC WGIII)	6	21	13	-	-	-	-	-	are expected to drive down costs, add references, rather delete to a competitive level.	Change 'will' to 'are expected to'; have deleted competitive
Canada (Environment Canada)	6	21	7	21	14	-	-	-	Canada is also supporting the tidal current sector with the development of Fundy Ocean Research Centre for Energy (FORCE) to test tidal turbines, and supporting the development of Canadian technologies	Will add Canada to list
David Clubb (European Environment Agency)	6	21	12	21	13	-	-	-	Context missing: competitive with what?	Will change to 'comparative levels with other renewables
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	21	15	21	18	-	-	-	Contradicts previous claim that the technologies would be the same. Lack of consistency.	Will check to make consistency
Steffen Schlömer (IPCC WGIII)	6	21	31	-	-	-	-	-	define rpm	rpm is generally understood
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	21	15	21	18	-	-	-	Doesn't capture key point that there are no prototypes or devices being tested anywhere at this stage.	Will add comment that technologies are not yet deployed
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	21	30	21	36	-	-	-	Excessive detail, lack of relevance, suggest delete.	Will reduce in line with other technologies - 1.5 pages to go to 0.5 pages

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David Clubb (European Environment Agency)	6	21	8	21	9	-	-	-	False assumption: Increased knowledge of costs could cause this threshold to rise or fall	Will see reference to 1.5 m/sec threshold
United States (U.S. Department of State)	6	21	20	21	46	-	-	-	<p>First of all, one might consider ordering the paragraphs along some chronological order for the projects described. The Nauru plant was built and operated in 1982-1983.</p> <p>Secondly, there seems to be a confusion between the projects' turbogenerator ratings - or gross power (e.g., 255 kW for the Hawaii OC-OTEC experiment) and the projects' net power outputs (when all in-plant parasitic power has been supplied). It is not that the engineers were so wrong, or that the plants behaved so badly. This must be clarified.</p> <p>The reference 'Ocean Thermal Energy, 2007' for the Hawaii OC-OTEC experiment is obscure (and missing from the reference list).</p> <p>Lines 39-40: regarding the Hawaii OC-OTEC experiment, the sentence 'Various ...' should be re-written, e.g. as 'Various operational aspects related to out-gassing of the seawater in the vacuum chamber, the vacuum pump, varying output from the turbogenerator and electrical grid connection were extensively studied.' The fact here is that when difficulties were encountered, they got resolved! The way this is written it gives the impression that there were failures that led to reduced power production, but in fact it was due to inherent inefficiencies that led to reduced power production (as was predicted) when compared to overall power "rating".</p>	Will add material
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	21	10	21	11	-	-	-	Generic sentence, applies to all technologies, suggest delete.	Will delete sentence as too general
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	21	8	21	9	-	-	-	How can you define such an exact threshold (unreferenced) and then say in the following words that not enough is known about costs?	Will address with reference
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	21	5	-	-	-	-	-	If you look there are studies available that show that predictability actually have a very small market value per MWh. Developers are not considering this in the economic models I can assure you.	Good point which we will review; see O'Malley paper
Australia (0)	6	21	39	-	-	-	-	-	include CO2 in "outgassing"	rejected - not a combustion process, actually flash evaporation
Steffen Schlömer (IPCC WGIII)	6	21	33	-	-	-	-	-	limited operational capacity	Section will be edited and may disappear

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United States (U.S. Department of State)	6	21	18	-	-	-	-	-	Line 18 They do involve much larger water volumes, promising project scale.  The recommendation is to add this new sentence before the final sentence in this paragraph: "Open-ocean current applications, since they are unidirectional and do not go through sinusoidal variations, require a constant velocity of about 1.3 m/s in order to achieve an annual average power density of at least 1 kW/m2."	Rejected for lack of a reference to the velocity/power calculation
United States (U.S. Department of State)	6	21	8	21	9	-	-	-	Line 8 The threshold for this velocity is at least 1.5 ms <sup>-1</sup> but not enough is known about costs and this threshold will decline as technologies improve.  What is important is not the velocity but the average annual power density in kW/m2. EPRI studies have shown this an average annual power density of at least 1 kW/m2 (see EPRI TP 008 available under the tidal page at <a href="http://www.epri.com.oceanenergy/">www.epri.com.oceanenergy/</a> ) is required for a potential of economic viability. For a typical diurnal tidal site, this translates to a mean max spring peak velocity of about 3 m/s.	1.5 m/sec is the average velocity; will check reference
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	21	18	-	-	-	-	-	MMS not in bibliography	Will add to reference list
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	21	37	-	-	-	-	-	not in bibliography	Will address
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	21	22	-	-	-	-	-	Ravindran 2007 is not in the bibliography, only a 2002 publication.	Will locate reference and include in bibliography
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	21	20	21	25	-	-	-	Recommend delete and replace with a sentence. Also it is unclear on what was actually built/achieved and only describes one of the two projects listed.	See above
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	21	1	20	6	-	-	-	References missing for these claims, Suggest that the claim of tidal being close to population centres is not necessarily true, eg Scotland.	The text only says 'often' not 'always; add in 'population centres or grid connections'
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	21	13	-	-	-	-	-	Suggest delete "to a competitive level"	See above
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	21	37	21	40	-	-	-	Suggest reduce detail and summarise more about the overall findings of such a key project.	Section will be edited and significantly reduced

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Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	21	28	-	-	-	-	-	suggest replace 'ideal' with 'promising'	Replace with 'appropriate'
Peter Johnston (Environmental & Energy Consultants, Ltd)	6	21	41	21	46	-	-	-	The first land-based OTEC plant to ever produce net power was in Nauru in the central Pacific in 1981 but it produced less power than this section suggests and it is misleading to say that it operated for several months: In 1981 and 1982, the Tokyo Electric Power Company (TEPCO) in association with Toshiba installed and began technical trials of a mini-OTEC facility at the west coast of Nauru on the shore across from the Civic Centre in Aiwo. The facility had a gross power continuous rating of 100 kW and was expected to provide a net power of around 14.9 kW. The design was of the closed cycle low pressure turbine type and used Freon 22 as the working fluid. Very expensive titanium heat exchangers were used to provide high efficiency heat exchange at the low temperatures used in the plant. The design was to use a 27.8 kW peak rated pump to bring 0.395 m <sup>3</sup> /s of warm 29.8° surface water into the facility on the hot side. For the cold side, a 43.3 kW peak rated pump brought water at 7° from 580 metres deep through a 945 metre long 700 mmpolyethylene inlet pipe at a flow rate of 0.382 m <sup>3</sup> /s. A Freon pump rated at 15.3 kW peak circulated the working fluid at 74 tonnes/hour and a 2.5 kW pump provided high pressure oil for the bearings of the 3000 rpm axial flow turbine. Although intended for 100kW continuous operation, the system flows could be increased to provide a maximum of 120 kW gross which delivered a maximum net power of 31.5 kW. , the Nauru installation was the first land based OTEC plant in the world to produce net power, it was also the highest power OTEC plant ever operational and the first to feed power to an operating commercial grid. it actually operated as a power generator feeding the Nauru grid for only 240 hours (a record for OTEC at the time) Source: Pacific Regional Energy Assessment: Nauru National Report (SPREP, UNDP/GEF, 2005) available from SPREP (Secretariat of the Pacific Regional Environment Programme) at www.sprep.org/climate_change/piggarep/index.asp. The report was based in part on interviews with Nauruan officials & documents availbale in Nauru.	Useful information but no reference and text will be reduced to 1/3 of current length
Rafiuddin Ahmed (The University of the South Pacific)	6	21	45	-	46	-	-	-	The prototype at Saga University is still functional. So, the last sentence should be modified to ""The prototype uses a mixed water/ammonia working fluid, and generates electric power"".	Accepted
Rafiuddin Ahmed (The University of the South Pacific)	6	21	22	-	-	-	-	-	The reference provided here does not match with that in the list of references (page 41).	See above
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	21	12	-	-	-	-	-	This includes countries that are not listed on the previous page of good markets, lack of consistency. Furthermore, what are "development projects"?	Rejected ad dealt with in previous comment

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United Kingdom (Department of Energy and Climate Change)	6	21	7	21	14	-	-	-	This paragraph is confusing. Tidal stream technology is not yet cost competitive; does this mean that currents as low as 1.5m/s will in future be competitive with say nuclear power and what evidence is there for this.	Will address in section 6.7
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	21	42	-	-	-	-	-	Unclear phrasing, Nauru is a pacific island, not in Japan.	Will re-order sentences, taking account of comment 461 - need to find a reference
David Clubb (European Environment Agency)	6	21	22	21	25	-	-	-	Unclear: the installation successfully produced 100,000 litres of water a day but was never completed? How is this possible?	Add clarify
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	21	30	-	-	-	-	-	Vega 1999 does not appear to be peer reviewed.	Accept - it is grey literature but only available
stephen Wyatt (Carbon Trust)	6	21	3	21	4	6.4.3	-	-	Tidal current locations are new land, not necessarily near populations (Pentland Firth being the UK's key tidal resource and not near a high population density area).	See above
stephen Wyatt (Carbon Trust)	6	21	3	21	4	6.4.3	-	-	Tidal current locations are new land, not necessarily near populations (Pentland Firth being the UK's key tidal resource and not near a high population density area).	See above

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United States (U.S. Department of State)	6	22	6	22	12	-	-	-	(Continued from above)  With RED, a salt solution and fresh water pass through a stack of alternating cathode and anode exchange membranes. The chemical potential difference between salt and fresh water generates a voltage over each membrane and the total potential of the system is the sum of the potential differences over all membranes. It is important to remember that the process works through differences in ion concentration instead of an electric field, which has implications for the type of membrane needed. In RED, as in a fuel cell, the cells are stacked. A module with a capacity of 250 kW is the size of a shipping container. With PRO, seawater is pumped into a chamber that is separated from a fresh water solution by a semi-permeable membrane. As a result of the osmotic pressure difference between the two solutions, water diffuses through the membrane into the seawater chamber thereby diluting the seawater and increasing its volume. Pressure compensation in the chamber spins a turbine to generate electricity. Salinity gradient technologies are being developed into commercial use in the Netherlands (for RED) and Norway (for PRO).  A new proposal to improve a 75-year-old dike, the Afsluitdijk, in The Netherlands could make it the world's leading site for generating power using RED technology. The Afsluitdijk is a 20-mile-long causeway which was constructed in part to dam off the Zuiderzee inlet of the North Sea, turning it into the massive freshwater lake of the IJsselmeer. The lake is periodically discharged since it is continually being fed by rivers and streams, which makes it an ideal location for the RED saltwater power plant.  Statkraft of Norway has been developing osmotic power since 1997 with a view to achieving cost-effective osmotic power production, making it the world leader in the development of PRO technology. The world's first osmotic power plant was opened in November, 2009 at Tofte, outside Oslo, Norway. This plant has been in development for more than a year. The plant will have a limited production capacity (designed for 10 kW but will initially operate at 2-4 kW) and is intended primarily for testing and development purposes. The aim is to be capable of constructing a commercial osmotic power plant within a few years' time.	See above
Rafiuddin Ahmed (The University of the South Pacific)	6	22	37	-	-	-	-	-	' the Scottish Executive ' to be changed to ' the Scottish Government '	Accepted

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Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	22	18	22	20	-	-	-	Effectively recreates the same list twice, suggest delete.	Will modify listings and make bullet points consistent with table 6.2
United States (U.S. Department of State)	6	22	16	-	-	-	-	-	'emission-free' instead of 'emissions-free'	Normally used in plural to acknowledge variety of gases
Steffen Schlömer (IPCC WGIII)	6	22	10	-	-	-	-	-	is expected to benefit	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	22	10	-	-	-	-	-	Lack of clarity, it only benefits PRO which uses the same membranes, not RED.	Accepted - will clarify
United States (U.S. Department of State)	6	22	6	22	12	-	-	-	<p>Line 6: 6.4.6 Salinity Gradient Osmotic power is still a concept under development (Scråmestø et al., 2009). Utility sector and research groups initiated early development of osmotic power systems but, more recently, new groups have become engaged as the industry emerges. The parallel development of related technologies, such as desalination, will benefit the osmotic power industry. Several governments and organizations are already supporting the development itself and consideration of necessary instruments to bring this source of renewable energy to the market.</p> <p>The following paragraph should be added:</p> <p>¿When a river runs into the ocean and fresh water mixes with sea water, huge amounts of energy are unleashed. Salinity gradient power or osmotic power is the energy retrieved from the difference in the salt concentration between seawater and river water. Two practical methods for this are Reverse Electro Dialysis (RED), and Pressure Retarded Osmosis (PRO). Both processes rely on osmosis with ion specific membranes. (Osmosis: Diffusion of fluid through a semi-permeable membrane from a solution with a low solute concentration to a solution with a higher solute concentration until there is an equal concentration of fluid on both sides of the membrane.)</p>	Already included in Resources and Technology sections
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	22	33	-	-	-	-	-	not sure I would list Germany, they do not have a feed in tariff for ocean energy as far as I'm aware?	Will remove Germany
Kristin Seyboth (IPCC WG III TSU)	6	22	32	22	38	-	-	-	Reference to Ch. 11 discussion of these mechanisms would be useful.	Already accepted



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Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	22	32	-	-	-	-	-	repetition	Not repetition - energy and electricity generation targets are not the same
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	22	1	22	5	-	-	-	Strongly suggest delete, no peer reviewed reference and lack of relevance/likelihood-of-realisation	Will replace with some data from Lockheed Marting
Canada (Environment Canada)	6	22	40	22	41	-	-	-	Suggest clarifying what makes UK and US R&D grant programs the "largest and most sophisticated". Explanation could more objectively describe why these programs excel over others.	Replace 'sophisticated' with 'comprehensive'; add reference to table 6.2
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	22	37	22	38	-	-	-	Suggest remove Saltire prize, it is not referenced anyway. Generally not regarded as a good market incentivisation tool, whichever company wins the 'prize' is necessarily already quite successful	Acknowledged but need to be inclusive
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	22	34	-	-	-	-	-	suggest rephrase "performance incentives", could just say "payments"	Accepted - 'additional payments'
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	22	30	-	-	-	-	-	suggest to be clearer eg "A limited number of countries have a mixture of legislated or, more often, aspirational targets" this is a global survey and most have no targets.	Will modify text
Kristin Seyboth (IPCC WG III TSU)	6	22	21	22	26	-	-	-	This is a good, clear presentation, but coordination with policy categories in 11.2 would be extremely useful to help the reader understand how these fit into the broader RE policy characterization. This comment also applies to Table 6.2	Will cross-reference chapter
Steffen Schlömer (IPCC WGIII)	6	22	21	-	-	-	-	-	Try to classify according to scheme proposed by chapter 11, e.g. table 11.1	OK will address
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	22	35	-	-	-	-	-	Unclear phrasing, ROCs are also market pull.	Rejected - the text indicates it is a market-pull mechanism
United States (U.S. Department of State)	6	22	30	-	-	-	-	-	what does 'develop' mean here?	Have addressed
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	22	9	-	-	-	-	-	What new groups? I'm only aware of two companies working on this in any kind of big way, both are tied to utilities I believe?	Will address
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	22	39	22	42	-	-	-	Would be useful to have more detail as well as estimates of the total spend by governments on ocean technology R&D. How does this compare to other technologies? Etc	Too much detail for this technology chapter. May be covered in Ch 11

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Kristin Seyboth (IPCC WG III TSU)	6	22	-	-	-	6.4.7	-	-	In general, this is a well-structured, clear section. Still, the reader misses any recommendation as to what policies are most needed for further development of ocean technologies. I.e. what key design features/policy types have been most successful in deploying ocean energy. See e.g. wind and geothermal sections 7.4.4 and 4.4.4 respectively.	Rejected - not our role to be prescriptive
stephen Wyatt (Carbon Trust)	6	22	35	22	37	6.4.7	-	-	Saltire Prize is a Scottish Gov initiative. Also worth mentioning the enhances RO banding in Scotland.	Repeated comment
stephen Wyatt (Carbon Trust)	6	22	35	22	37	6.4.7	-	-	Saltire Prize is a Scottish Gov initiative. Also worth mentioning the enhances RO banding in Scotland.	Accepted
David Clubb (European Environment Agency)	6	23	1	26	-	-	-	-	Incomplete, sometimes innacurate. Suggested reference: Page 59, Impacts of renewable energy infrastructures on biodiversity (http://circa.europa.eu/Public/irc/env/biodiversity_climate/library?l=/contract_biodiversity/report_task_4pdf/_EN_1.0_&a=d)	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	23	1	-	-	-	-	-	wrong year, 2008 in bibliography	Accepted
China (China Meteorological Administration)	6	23	5	-	-	6.4.7	-	6.2	Add 'China' in fifth row, second column, and add 'Marine Renewables Deployment Fund' in the fifth row, third column.	Have included China but MRDF is already present
John Twidell (AMSET Centre)	6	23	-	-	-	-	-	6.2	Offshore hubs: add the Okney, Scotland,wave and tidal-current hubs (European Marine Energy Centre). See http://www.bwea.com/marine/facilities.html and http://www.emec.org.uk/	Rejected; EMEC included as a testing centre
Canada (Environment Canada)	6	23	1	23	1	6.4.7.	-	6.2	The forecast target of 14,000 MW of ocean energy in Canada by 2050 is incorrect. The industry association (Ocean Renewable Energy Group - OREG) has promoted a target of 15,000 MW by 2050, but this is not an official target for Canada.	Accepted
Canada (Environment Canada)	6	23	1	23	1	6.4.7.	-	6.2	Under marine energy testing centre for Canada: the correct name is "Fundy Ocean Research Centre for Energy" (FORCE), located in the Bay of Fundy in Canada.	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	24	35	-	-	-	-	-	as per comment 216	Comment is not clear
United Kingdom (Department of Energy and Climate Change)	6	24	38	24	41	-	-	-	Burrows showed that large scale implementation of barrages along the West coast of England could raise the maximum tidal range on the East coast of Ireland.	Will locate Burrows reference
United States (U.S. Department of State)	6	24	32	24	33	-	-	-	Delete line 32-38, and replace with "In order to address public concern over the potential environmental effects of ocean energy, pilot projects must be undertaken after which operational and environmental data will be available."	See above

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United States (U.S. Department of State)	6	24	39	24	41	-	-	-	Delete line 39/page 24 to line 2/page 25. For an overview on potential environmental impacts, editors should see the report "Ecological Effects of Wave Energy Development in the Pacific Northwest: A Scientific workshop, Oct 11-12, 2007".	See above
United States (U.S. Department of State)	6	24	9	24	12	-	-	-	Delete the sentence beginning with "Most ocean energy projects" because it tends towards advocacy and it is premature considering the state of the technology.	Text revised.
Steffen Schlömer (IPCC WGIII)	6	24	34	-	-	-	-	-	Do you really want to refer to the oil industry when discussing impacts of ocean energy on the environment?	Yes, even negatives are valuable
Norway (Climate and Pollution Agency)	6	24	20	-	-	-	-	-	I am not convinced that any ocean power station automatically will become attractive for tourism and generate jobs. Substantiate with reference or add qualifier 'may'. From a recent review of the wind power literature, I seem to understand that there are virtually no published papers on the tourism potential.	Comment considered.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	24	27	-	-	-	-	-	I would argue that social benefits are by definition 'social' and should not be described as 'individual'. These are individual benefits, distinct from social benefits.	Text revised.
David Clubb (European Environment Agency)	6	24	4	24	5	-	-	-	Incomplete: other environmental benefits include improved habitat for marine life	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	24	32	-	-	-	-	-	Is there public concern? What supports the idea that there is any concern?	Will find reference to California and Cornwall
United States (U.S. Department of State)	6	24	17	-	-	-	-	-	Line 17 More governments are undertaking Strategic Environmental Assessments (SEAs)  I do not understand what 'More governments' means. The recommendation is to list those Governments who have which should be very few.	Text revised.
United States (U.S. Department of State)	6	24	20	24	21	-	-	-	Line 20: An ocean power station of any type becomes a source of eco-tourism and attraction in its own right  Line 21: providing jobs in tourism and services  Delete this sentence. While it may be true the ocean power station is a novelty, it is not true in the long run. What is important and seems to be missing is that the ocean power plant will create jobs while using an indigenous resource.	Text revised.

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Norway (Climate and Pollution Agency)	6	24	5	24	20	-	-	-	Line 5 and line 20: The use of the term "eco-tourism" is wrong. What is meant here is marine tourism or nature-based tourism. There may even be a new kind of tourism focusing on renewable energy sources ("technotourism") the term eco-tourism refers specifically to tourism that is not environmentally harmful and fulfills a range of other criteria. I suggest the use of the generic term "tourism".	Comment considered
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	24	19	-	-	-	-	-	rather than "evaluate" a better term would be "justify"	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	24	29	24	30	-	-	-	Recommend to delete this sentence. This is misquoted from the reference given and also not that relevant without knowing the context of that job creation, it is a little or a lot?. Those numbers describe a range of scenarios and are not "at present rates".	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	24	36	24	38	-	-	-	reference required for such a bold claim.	Will require reference
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	24	33	24	34	-	-	-	reference required, the technologies are completely different. One underwater, the other above.	Not true
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	24	28	-	-	-	-	-	repetition, skills and capabilities are much the same	Text revised.
United States (U.S. Department of State)	6	24	13	24	15	-	-	-	Rewrite the sentence as follows: "The general concerns comprise the effect of deployment scale or size, design, installation, operation and maintenance (O&M) and decommissioning on the physical and biological environment."	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	24	20	24	21	-	-	-	Strongly suggest to delete this unreferenced claim. What about submerged technologies (the majority) or OTEC or salinity plants. These are not tourist attractions and this sentence reads as somewhat naive at present.	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	24	23	-	-	-	-	-	suggest change "options" to "impacts"	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	24	22	-	-	-	-	-	suggest change "will require" to "will likely require"	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	24	15	-	-	-	-	-	suggest change "will" to "may"	Text revised.

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Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	24	21	-	-	-	-	-	-	suggest change to "any type of large scale ocean energy"	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	24	4	-	-	-	-	-	-	suggest change to "effects may include"	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	24	3	-	-	-	-	-	-	suggest delete "all". Furthermore, they are not necessarily "attractive" only "suitable". Being "attractive" depends on many other factors.	Text revised.
United Kingdom (Department of Energy and Climate Change)	6	24	9	24	12	-	-	-	-	The meaning of this sentence is unclear.	Text revised.
United Kingdom (Department of Energy and Climate Change)	6	24	5	-	-	-	-	-	-	The potential impact of tidal stream devices on marine life, especially mammals, should be mentioned.	Comment considered
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	24	39	25	2	-	-	-	-	These are all the exact kind of issues where some experience could actually be drawn from other marine industries. We already run cables and paint ships and make noise underwater. This should be put in context and as it currently sounds like we know nothing of these topics.	Will locate reference
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	24	17	-	-	-	-	-	-	These are also commonly known as Environmental Impact Assessments (EIA) in Europe.	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	24	30	-	-	-	-	-	-	This is not a peer reviewed paper, the MEG are a marine energy advocacy/industry association.	Text revised.
United Kingdom (Department of Energy and Climate Change)	6	24	34	24	38	-	-	-	-	This paragraph contradicts itself.	Text has been modified
United Kingdom (Department of Energy and Climate Change)	6	24	20	24	25	-	-	-	-	This paragraph could be cut without losing anything.	Text revised.
David Clubb (European Environment Agency)	6	24	5	24	5	-	-	-	-	Unsupported assertion: What evidence is there that ocean renewable energy generates eco tourism?	Comment considered

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Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	24	11	24	12	-	-	-	What does this mean? What kind of projects could be so thoroughly decommissioned?\	
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	24	17	-	-	-	-	-	What is meant by "more"? More than what/when?	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	24	10	-	-	-	-	-	What is the reference for these lifetimes? 100yrs seems excessive, there are not many operational pieces of infrastructure from 1910.	Most bridge, sewerage and harbour infrastructure is older than 100 years
China (China Meteorological Administration)	6	24	12	5	-	6,2	-	-	There are many contents used to introduce common ocean energy knowledge. It is suggested to cut the contents short by page 1, this section should be greatly shortened.	Text revised.
( )	6	24	13	24	16					Comment considered
United States (U.S. Department of State)	6	25	41	-	-	-	-	-	add a comma after 'Further'.	Done
Australia (0)	6	25	20	-	-	-	-	-	floating caissons sunk - replace sunk with submerged.	Accepted
David Clubb (European Environment Agency)	6	25	14	25	14	-	-	-	Incorrect terminology: 'tidal rise and fall' is correctly known as 'tidal range'	Already covered
United States (U.S. Department of State)	6	25	15	25	17	-	-	-	Line 15: Estuaries are complex, unique and dynamic natural environments, which require very specific and careful attention. The impacts on the natural environment have to be addressed for both the construction phase and for future operations.  The recommendation is to add ζand decommissioningζ to the end of this sentence.	Accepted
United States (U.S. Department of State)	6	25	23	25	24	-	-	-	Line 23: The environmental impacts during construction of the Sihwa tidal power plant have been very limited.  This is an unfair and highly misleading sentence without telling the reader that the barrage existed and is not part of the current project to convert that barrage into tidal rise and fall electricity generation.	Will modify sentence
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	25	8	25	13	-	-	-	need references, particularly for the fishery claim.	Will locate reference; find reference to quote - Langhamer

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Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	25	5	-	-	-	-	-	Not just surfers, the environmental impacts of sedimentation/movement and also reduced wave climates are also important to understand.	Check for reference on coastal processes
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	25	21	25	33	-	-	-	Not sure I agree, see C. Retiere 1994 "Tidal power and the aquatic environment of La Rance" Biological Journal of the Linnean Society and J Wolf, IA Walkington, J Holt, R Burrows "ENVIRONMENTAL IMPACTS OF TIDAL POWER SCHEMES"	Check reference
Frederic Louis (EDF Hydro Engineering Centre)	6	25	33	-	-	-	-	-	Reference : Comparative study of dredging and flushing effects on sedimentation in the upper part of the Rance estuary, Chantal Bonnot-Courtois La Houille Blanche 8 (1993) 539-550"	Will incorporate reference
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	25	41	-	-	-	-	-	Reference required, estuaries often have people living around them?	We are talking about offshore tidal lagoons
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	25	42	25	44	-	-	-	suggest delete, speculation about an untested technology that has no plans to be implemented at this stage.	Comments are conditional
United States (U.S. Department of State)	6	26	9	26	12	-	-	-	Editors should consider toning down unsubstantiated conclusions in this sections.	Accepted; will add references to support claims
Rafiuddin Ahmed (The University of the South Pacific)	6	26	16	-	-	-	-	-	escape velocity"" is a specific term used for a particular velocity. It is better not to use it here.	Need Strangford Lough reference
Australia (0)	6	26	16	-	-	-	-	-	Lack of evidence of harm to marine life is more likely from small number of deployments, limited time in service and features of test locations. More study is needed before conclusions are drawn.	Text changed and reference added
United States (U.S. Department of State)	6	26	15	-	-	-	-	-	maybe 'seals' should be added to the list of animals.	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	26	43	-	-	-	-	-	reference for "major" claim needed.	Accepted; need a reference
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	26	36	-	-	-	-	-	suggest delete sport fishing sentence, speculative and of little relevance.	Removed reference to sports fishing
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	26	6	-	-	-	-	-	suggest delete the CO2 reduction comment. Speculation. It may also increase emissions as people drive more due to the ease.	Accepted

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Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	26	3	-	-	-	-	-	Suggest replace "often" with "may be". There has only been one major barrage built so far that created a road, the other sihwa utilised an existing structure.	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	26	33	-	-	-	-	-	suggest that this say "are likely to operate"	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	26	25	-	-	-	-	-	this claim about not altering needs to be referenced and qualified.	As above
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	26	26	-	-	-	-	-	This is incorrect, Sverdrup drift is a generic term and can both poleward and equatorward with corresponding opposite western boundary currents.	Text is specific and correct
United States (U.S. Department of State)	6	26	17	26	18	-	-	-	This is pure supposition, and unsubstantiated.	Need reference to confirm
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	26	12	-	-	-	-	-	would be useful to explain that such environments typically have a low biodiversity or level or level of wildlife/benthos with a reference.	Will add reference to low biodiversity in
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	27	14	-	-	-	-	-	attracted by warmer water not nutrients?	See above
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	27	32	-	-	-	-	-	contradicts the earlier discussion of a commercial wave project.	Projects are pre-commercial
United States (U.S. Department of State)	6	27	11	-	-	-	-	-	delete 'aspects'.	Text deleted
United States (U.S. Department of State)	6	27	13	27	15	-	-	-	Delete lines 13-15 and replace with: "Two issues that have been considered are the bio-fouling in the heat exchangers and, possibly, other seawater-carrying hardware, and Plankton (and perhaps food web) growth as nutrient-rich deepwater effluents are released; this might only occur if sufficient light (UVs) is also available at the stabilized plume depth (generally deeper than the discharge depth!)."	Have added text and will rationalize para
United Kingdom (Department of Energy and Climate Change)	6	27	10	27	15	-	-	-	It is not clear why these paragraphs are inserted into a discussion of environmental impacts.	See above



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Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	27	32	-	-	-	-	-	language "very nascent" should ideally be rephrased.	Have accepted
United States (U.S. Department of State)	6	27	37	27	40	-	-	-	Line 37: As has happened with wind turbine generators, wave energy devices will iterate to the scale of the largest practical machine, to minimize the number of operation and maintenance (O&M) service visits, reduce installation and decommissioning costs and limit mooring requirements. The largest cost reductions will come from maximizing power production by individual wave.  Replace the word "will" with the word "may" in line 37 - this is likely, but, not a foregone conclusion. There is one camp that believes that cost reductions will be achieved through mass production of small machines.	Completed
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	27	25	27	26	-	-	-	Need a reference	See above
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	27	17	27	24	-	-	-	opening of this paragraph and the latter sentences contradict one another. First no impact, then there is an impact.	Will modify para and add reference
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	27	5	-	-	-	-	-	reference for grazing?	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	27	40	-	-	-	-	-	reference missing and unlikely to be true. Reductions in capital costs such as fabrication and particularly installation are key as well as improved O&M costs due to the difficulty of intervening in the offshore environment.	Need a reference to confirm
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	27	33	-	-	-	-	-	reference should be 2008	Will address
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	27	10	27	12	-	-	-	Seems to be in the wrong section of the chapter	Accepted - have removed text
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	27	9	-	-	-	-	-	suggest change "recommended" to "required". Does not seem to be the scope of the report to set research agendas. The rest of the chapter makes no recommendations.	Removed reference to recommendations

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Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	27	33	-	-	-	-	-	tautology, projections are inherently speculative.	Accepted
United Kingdom (Department of Energy and Climate Change)	6	27	32	28	2	-	-	-	There are a number of debatable points in this section. A more forensic analysis of developments would be helpful.	Will address
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	27	42	27	44	-	-	-	This sentence seems to repeat the same idea twice in different words.	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	27	28	27	29	-	-	-	Underground only reduces visual impact, not environmental, needs rephrasing.	Accept and add reference to visual impact
Denis Aelbrecht (EDF)	6	27	-	28	-	6.6	-	-	It seems that colocation of different technologies at a same site has not been envisioned as a way to improve cost-effectiveness and cost-sharing of power generation. Examples :  - Tidal energy converter + offshore wind turbine : can use same structure  - Embedding OWC wave energy converters in existing of future breakwaters  These opportunities may be expressed in section 6.6 or another one, or even in the global Tech summary and summary for Policy makers	Need a comment on hybrid systems in section 6.1
Finn Gunnar Nielsen (Statoil)	6	27	-	-	-	6.6.1	-	-	Add that future developments must have increased focus on system survivability during extreme weather conditions.	Done
Rafiuddin Ahmed (The University of the South Pacific)	6	28	27	-	29	-	-	-	A reference is needed at the end of this strong statement.	As above
United States (U.S. Department of State)	6	28	18	-	-	-	-	-	are at an early stage' instead of 'are in an early stage'.	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	28	24	28	25	-	-	-	disagree see comment 115	Have addressed
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	28	32	28	33	-	-	-	I think a reference about the new materials is required. I don't believe this is holding the industry back at this stage	Have softened this sentence

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Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	28	10	28	11	-	-	-	I think this is already well understood for a relatively long time now. In fact full designs were drawn up for a plant that was almost built on the west coast of Australia at a place called Derby however the project was rejected in 2000.	Rejected; text does not suggest the comment
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	28	13	28	14	-	-	-	I think this needs a reference. Hydroplants operate at excellent efficiencies over a range of heads i believe, so i'm not sure these are genuine research needs that are listed here.	Have addressed
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	28	8	28	9	-	-	-	I think this reads like a tautology, ie they are cost effective so they are cost effective	Addressed
David Clubb (European Environment Agency)	6	28	3	28	3	-	-	-	Incorrect terminology: 'tidal rise and fall' is correctly known as 'tidal range'	See above
United Kingdom (Department of Energy and Climate Change)	6	28	18	28	33	-	-	-	It is astounding that no reference is made in either the wave or tidal sections to cost-effective device insertion and extraction. While it may be considered that this problem has been solved by some wave developers, it is a major unsolved problem for tidal stream devices. The cost of making these processes easy is high or less is spent and they are difficult and unreliable.	Addressed
David Clubb (European Environment Agency)	6	28	27	28	29	-	-	-	Missing reference: the 'well-documented' increase in wind resource - this makes sense but it would be good to have the reference	Will supply a reference
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	28	1	-	-	-	-	-	Not sure that this is a true statement, even in wind parks it is not common to leave a turbine out of service for very long due to the effect on availability and revenue	See above
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	28	40	-	-	-	-	-	reference required I believe	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	28	28	28	29	-	-	-	Should be referenced given the "well documented" statement	As above
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	28	1	-	-	-	-	-	suggest change "will" to "could"	Deleted sentence
Steffen Schläömer (IPCC WGIII)	6	28	8	-	9	-	-	-	Term cost-effective needs to be used consistently throughout the SRREN. Definition for the SRREN still lacking, please mark and make sure that it is used according to definition which is still to be included in glossary.	Link to glossary

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Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	28	42	29	2	-	-	-	This feels more suited to the technology description and not really about future development	Disagree with comment
Canada (Environment Canada)	6	28	17	28	33	6.6.3	-	-	Arrays will also be pursued for tidal and ocean currents	Accepted
United States (U.S. Department of State)	6	29	7	-	-	-	-	-	add 'that' in front of 'of warm surface water' and in front of 'of deep sea cold water'.	Addressed
United States (U.S. Department of State)	6	29	33	-	-	-	-	-	add these additional key variables that are important; they are 1) financing rates, 2) tax rates, 3) depreciation schedules and 4) production incentives/renewable energy certificates.	Comment considered
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	29	33	-	-	-	-	-	Could be worded differently to express the idea that a wide range of techniques were used across the available literature?	Text revised.
United States (U.S. Department of State)	6	29	5	29	5	-	-	-	Delete "easily" from this sentence.	Accepted
United States (U.S. Department of State)	6	29	36	-	-	-	-	-	Line 36 Annual Energy Production or Performance (AEP) <sup>14</sup> - 14 This term is widely accepted in the industry, even though $\zeta$ energy production $\zeta$ is incorrect  AEP is an acronym for annual energy (i.e., electrical energy) production in MWhr only and is correct. AEP does NOT mean annual energy performance.	Comment considered
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	29	30	-	-	-	-	-	not in bibliography	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	29	5	-	-	-	-	-	reference required I believe	Accepted
United States (U.S. Department of State)	6	29	9	-	-	-	-	-	Replace 'high evaporation' with 'high enthalpy of evaporation'.	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	29	6	29	10	-	-	-	see comment 257	Will add reference

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Steffen Schläömer (IPCC WGIII)	6	29	32	-	39	6.7	-	-	I think it would be useful to distinguish between near-term forecasts based on "current" technology and longer-term forecasts, which take into account learning-by-doing-based cost reductions or cost reductions from future R&D.	Comment considered
United States (U.S. Department of State)	6	30	11	-	-	-	-	-	Add 'those of' in front of 'commercial devices'.	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	30	6	-	-	-	-	-	CEC is the same acronym as is used for the commission of european communities, also this CEC 2009 is not in the bibliography. Also the footnote could be deleted and standard reference used I think.	Comment considered
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	30	7	-	-	-	-	-	I think it's important to say that you are talking about tidal current and not all current technologies	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	30	4	30	5	-	-	-	I'd suggest to include these in the table above? Should Beppard et al (used later in the paragraph) also be listed here?	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	30	2	-	-	-	-	-	Should say Wave and Tidal Current Energy (also i think that these should be split apart, there isn't any apparent reason that costs should be the same for these technologies?)	Text revised.
Frederic Louis (EDF Hydro Engineering Centre)	6	30	-	-	-	6.7.2	-	-	Importance given to the least mature technologies seems disproportionate compared to the tide rise and fall : two and a half pages for wave energy and 10 lines for tide rise and fall.	Text revised.
United Kingdom (Department of Energy and Climate Change)	6	30	-	-	-	6.7.2	-	-	This section is a mass of numbers. The charts help. Suggest that the section is rewritten by drawing the charts that would be used to explain its content in a seminar and then writing the explanatory material which takes the reader through the sources, assumptions and conclusions around the charts in a simple way.	Comment considered
Finn Gunnar Nielsen (Statoil)	6	30	-	-	-	-	-	6.3	Please check the LCOE numbers for tidal and wave energy. They do not seem to be consistent with the Capex numbers. The units may be wrong (US\$ versus USc ?). If it is not possible to fill in more information in the table, several columns should be deleted.	Checked
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	31	36	31	43	-	-	-	All that has ben done is to take the Carbon Trust prototype costs and apply their learning curve but then it is quoted so factually, i think the source should be referenced more explicitly and the relatively crude nature of the cost estimations (ie single source of data and learning rates and assumption that ocean power 'learns' at the same rate as wind) discussed as a limitation. These numbers will be used for years to come by many organisations, i think it is good to be clear where they came from (ie Carbon trust and a single reference for wind learning). Also this 11% doesn't include any R&D, yet ocean power is likely to see significant R&D cost benefits.	Values based on wind energy data.

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Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	31	25	31	26	-	-	-	Costs also decrease from economies and scale and R&D, might be good to summarise all the effects here.	Lack of space to include all effects.
Fritz Vahrenholt (Prof. Dr.) (RWE Innogy GmbH)	6	31	14	31	15	-	-	-	How were lower costs predicted then? Does not seem to make sense.	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	31	32	31	33	-	-	-	I think a ref is needed here, carbon trust for example could be quoted at this point as they estimate 10-15%.	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	31	17	31	19	-	-	-	I think a reference is needed for this claim about wind turbines	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	31	39	-	-	-	-	-	I think the 667.5 could be qualified as being in 2050.	Scenarios considered in another chapter.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	31	37	-	-	-	-	-	I think the very aggressive nature of 2-5GW target (given less than 2-3MW presently and a timeline of only 10yrs) could be mentioned.	Scenarios considered in another chapter.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	31	19	31	21	-	-	-	I think this needs a reference. I'm not sure I agree, my experience is that there is also huge uncertainty in future CAPEX cost reductions in the future and also in installation costs due to variations in vessel rates and weather delays.	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	31	10	31	12	-	-	-	I think this sentence can be deleted as it feels generic "Some are more expensive and they might get cheaper".	Accepted
David Clubb (European Environment Agency)	6	31	21	31	22	-	-	-	Incorrect assertion: To achieve competitive costs, future AEP and O&M must have higher efficiency and reliability; higher estimations of these are irrelevant without the necessary engineering improvements	Text revised.
David Clubb (European Environment Agency)	6	31	6	31	15	-	-	-	Just a point of interest - if the LCOE for wave and tidal stream is 9-44p/kWh, and solar is at least 12p/kWh, how come wave and tidal are not doing better than PV?	Comparative costs presented in the TS.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	31	42	31	43	-	-	-	Maybe discuss why this is considered as an assumption, that all technologies would take an equal share?	Lack of space for further discussion.

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Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	31	8	31	10	-	-	-	Might be clearer to just list US\$? Or the graph in the carbon trust report is also very clear.	Values in US\$ 2005 for the report as a whole.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	31	5	-	-	-	-	-	Please check this number, it looks to be out by a factor of 100. I think it should be \$0.04/kWh	Checked
Steffen Schlömer (IPCC WGIII)	6	32	15	32	18	-	-	-	"Cost reductions will derive from manufacturing economies, new technology designs, knowledge and experience transfer from other industries and design modifications realized through operation and experience. All will contribute to rapid LCOE reductions." - replace "will" by "can". If this is not only a mere possibility, but a concrete expectation, references should be given to indicate the degree to which this expectation is shared and by whom.	Text revised.
Steffen Schlömer (IPCC WGIII)	6	32	15	-	-	-	-	-	are expected to derive from	Accepted
Steffen Schlömer (IPCC WGIII)	6	32	17	-	18	-	-	-	delete	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	32	13	32	14	-	-	-	Is \$0.10 - 0.20/kWh competitive? What are the 2020 costs of the competing technologies that are referred to?	Considered in another chapter
United Kingdom (Department of Energy and Climate Change)	6	32	14	-	-	-	-	-	It would be helpful to the reader to point out that the quality wave resource is usually far offshore with high significant wave heights, highlighting reliability and O&M as key challenges and that tidal current is usually close to shore, but in very difficult conditions, requiring expensive vessels for effective device insertion and extraction.	Comment considered in different text locations.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	32	11	-	-	-	-	-	language is unclear. It is not the learning rate that changes, but the starting capital costs.	Text revised.
United States (U.S. Department of State)	6	32	41	34	42	-	-	-	Line 41: In general, the near-term forecast for ocean energy does not envisage a substantial contribution to near-term carbon mitigation.  Please define near term? The paragraph above this one says "Significant growth in the decade 2010 - 2020 will see a substantial increase in ocean energy's contribution to energy/electricity supply and thus climate change reductions." 2020 is near term for this capital intensive electricity generation industry.	Comment considered in another chapter

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United States (U.S. Department of State)	6	32	44	32	46	-	-	-	Line 44: The long-term deployment potential for ocean energy is significant in terms of future carbon mitigation. Substantial technology development is expected over the next 10 years, making ocean energy's proportionate larger in longer-term scenarios.  10 years is not considered long term for this capital intensive electricity generation industry.	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	32	17	-	-	-	-	-	reference/rationale for the statement "rapid"?	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	32	18	32	19	-	-	-	What is the rationale/reference for this? They might be considerably different in terms of depth, scale, deployment methodology, design and infrastructure?	Considered in the text
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	32	10	-	-	-	-	-	Wiser 2009 is not a standard reference nor peer reviewed. Perhaps reference the actual methodological approach that Wiser use in the calculator, the actual algorithm is what is important, not the spreadsheet?	Accepted.
Finn Gunnar Nielsen (Statoil)	6	32	-	-	-	-	6.12	-	revise axis legend	Accepted
Norway (Climate and Pollution Agency)	6	32	-	-	-	-	6.12	-	revise axis legend	Accepted
United States (U.S. Department of State)	6	33	17	-	-	-	-	-	a parenthesis is missing.	OK
Steffen Schlömer (IPCC WGIII)	6	33	7	-	-	-	-	-	are expected to allow for	Accepted
Steffen Schlömer (IPCC WGIII)	6	33	31	-	-	-	-	-	are expected to prove helpful	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	33	38	-	-	-	-	-	As per a previous comment i think care should be taken in using this reference in regards to costs. This is an industry conference and the authors work for a salinity gradient power developer.	Comment considered.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	33	9	33	11	-	-	-	I strongly suggest delete or move to the general policy section. These incentives apply in some form to all types of ocean energy not just tidal rise and fall.	Revised



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Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	33	5	-	-	-	-	-	I think a reference for this is required. For example, is it so much more than a conventional thermal station or nuclear plant?	Considered in the text
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	33	7	-	-	-	-	-	I think be careful using 'tend' given that there are only two large projects in existence.	Considered in the text
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	33	30	33	31	-	-	-	I think the synergies between offshore wind turbines and OTEC are not obvious. What is the reference for these statements?	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	33	33	33	34	-	-	-	I think the two closing statements need references, particularly the 'dramatically' comment.	Text revised.
David Clubb (European Environment Agency)	6	33	1	33	9	-	-	-	Incorrect terminology: 'tidal rise and fall' is correctly known as 'tidal range'	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	33	16	33	21	-	-	-	Not very clear, a chart or table would be better?	Text revised.
United States (U.S. Department of State)	6	33	41	-	-	-	-	-	on the development' instead of 'on development'.	Text revised.
Steffen Schlömer (IPCC WGIII)	6	33	34	-	-	-	-	-	Replace last sentence by, e.g.: "Based on experience with other innovative technologies, which realized substantial opportunities for learning particularly during early deployment phases, costs are expected to decline with increasing deployment." Include reference to other chapters/sections, particularly 10.5.2) of this report and/or appropriate literature.	Text revised.
Steffen Schlömer (IPCC WGIII)	6	33	9	-	11	-	-	-	This does not directly relate to costs of ocean energy, but is rather a technology-specific policy issue. Hence, delete here and include in 6.4.7	Revised
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	33	39	-	-	-	-	-	what is 'hydropower knowledge'?	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	33	21	-	-	-	-	-	What is the reference for the \$0.08-0.16/kWh costs?	Text revised.

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Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	33	26	-	-	-	-	-	Why are they the most reliable?	Text revised.
United Kingdom (Department of Energy and Climate Change)	6	34	8	-	-	-	-	-	57.5TWh/year by 2020. In the UK, we estimate that there will be 3 TWh produced in 2020. If the UK is meant to be a world leader in marine technologies, where is the rest of it going to come from? I.e. what are Russia doing? Our estimate for the UK is published in DECC's 2050 pathways analysis.	Comment considered.
Steffen Schlömer (IPCC WGIII)	6	34	11	-	12	-	-	-	Delete: "The proportion of ocean $\zeta$ is expected to grow well beyond the 2050 horizon." This is highly speculative and depends on a multitude of factors. If there are references that support this statement, these have to be stated. However, the speculative nature needs to be pointed out explicitly. Writing: "is expected to" is not sufficient.	Text revised.
David Clubb (European Environment Agency)	6	34	33	34	42	-	-	-	Duplication: this content is more or less duplicated earlier	Text revised.
Steffen Schlömer (IPCC WGIII)	6	34	8	-	9	-	-	-	Forecasted deployment should be called such and ranges based on assessment of more than just one scenario need to be given. Include ETP (2008) projections for ocean energy, even if technological resolution is not very high.	Comment considered.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	34	8	-	-	-	-	-	I think the terminology is unclear. Are these numbers forecast deployments based on a cost model? What is a technical potential?	Comment considered.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	34	38	34	39	-	-	-	If they have announced the targets, what are they? References for this?	Text revised.
Steffen Schlömer (IPCC WGIII)	6	34	8	-	10	-	-	-	Mixing of terms and concepts: forecasted deployment is called technical potential, the reference to current installations doesn't make the statement any clearer.	Comment considered.
Australia (0)	6	34	23	-	-	-	-	-	Note that estimates in this table are significantly different from those developed by IEA for the World Energy Outlook, which estimates 13 TWh in 2030 (versus 151 TWh in SSREN).	References with different estimatives.
United States (U.S. Department of State)	6	34	46	-	-	-	-	-	proportion' instead of 'proportionate'.	Text revised.
United States (U.S. Department of State)	6	34	17	-	-	-	-	-	remove 'generation'.	Text revised.
Steffen Schlömer (IPCC WGIII)	6	34	14	-	-	-	-	-	replace "climate change reduction" by "mitigation of climate change"	Text revised.

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Steffen Schlömer (IPCC WGIII)	6	34	44	-	45	-	-	-	Replace: "The long-term deployment potential for ocean energy is significant in terms of future carbon mitigation." e.g. by "The potential for ocean energy supply to make contributions in terms of mitigation of climate change is expected to increase to significant levels in the longer term, if higher levels of deployment are achieved and costs continue to decline."	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	34	46	-	-	-	-	-	sentence structure	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	34	23	-	-	-	-	-	spelling "PlaNet"	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	34	39	-	-	-	-	-	suggest delete "independent"	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	34	34	-	-	-	-	-	suggest needs an introductory phrase "due to current uncompetitive costs for ocean energy technologies;"	Text revised.
Rafiuddin Ahmed (The University of the South Pacific)	6	34	18	-	-	-	-	-	The reference "'SRREN Database 2010'" is not clear.	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	34	38	-	-	-	-	-	UKERC is not in the bibliography	Text revised.
China (China Meteorological Administration)	6	34	23	5	-	6,8	-	6,4	Delete the estimated Ocean Energy Deployment about China.	Text revised.
United States (U.S. Department of State)	6	35	42	-	-	-	-	-	'are' instead of 'will be'	Text revised.
David Clubb (European Environment Agency)	6	35	34	35	36	-	-	-	Contradiction: Either this statement is true, or the earlier statement about cost compared with PV is true (or neither or true). But both cannot be because in that case ocean renewables would have a much larger market interest than it currently does	Text revised.
David Clubb (European Environment Agency)	6	35	13	35	13	-	-	-	Incorrect terminology: 'tidal rise and fall' is correctly known as 'tidal range'	Text revised.

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United States (U.S. Department of State)	6	35	16	35	17	-	-	-	Line 16: Tidal currents energy is globally distributed but is locally limited to sites, where local bathymetry accelerates existing currents  The recommendation is to add the words 'geography and ' in front of the word bathymetry as it is not only the bathymetry but also the geography of the land forming a narrow passageway that accelerates the flow of the currents.	Text revised.
United States (U.S. Department of State)	6	35	20	35	23	-	-	-	Outstanding OTEC resources exist along Atlantic coastlines too.	Text revised.
Australia (0)	6	35	20	-	-	-	-	-	replace 'c' with 'around'	Text revised.
United States (U.S. Department of State)	6	35	38	35	39	-	-	-	Seawater air-conditioning (SWAC) technologies, not mentioned in this report, and some ocean thermal desalination technologies do not deal with electrical generation per se.	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	35	31	-	-	-	-	-	Strongly suggest delete "southern ocean" as only antarctica borders the southern ocean.	Text revised.
United States (U.S. Department of State)	6	35	38	-	-	-	-	-	The successful ...' instead of 'Successful ...'  'is' instead of 'are'	Text revised.
Rafiuddin Ahmed (The University of the South Pacific)	6	35	20	-	-	-	-	-	to be changed to "' where temperature differences of 20 deg C occur'".	Text revised.
United Kingdom (Department of Energy and Climate Change)	6	35	35	-	-	-	-	-	Wave and tidal current technologies require a sophisticated O&M infrastructure on sufficient scale to make the operation cost effective. Different technologies require different support vessels due to differences in insertion and extraction methods etc. Until there are dominant technologies there is therefore a huge barrier to industry growth.	Text revised.
stephen Wyatt (Carbon Trust)	6	35	35	35	36	6.8.2.3	-	-	Consider: Availability of vessels is considered a supply chain pinch point.	Text revised.
stephen Wyatt (Carbon Trust)	6	35	35	35	36	6.8.2.3	-	-	Consider: Availability of vessels is considered a supply chain pinch point.	
Steffen Schlömer (IPCC WGIII)	6	36	25	-	26	-	-	-	"The modelling process established here" - what do you mean by that? There has been no IPCC scenario, but only an assessment of different scenarios available in the literature! Future modelling can only be improved, if more precise data inputs to those models are supplied by technology experts. Hence, I suggest to write something like "Future modelling needs to include ocean energies in a more disaggregated way to allow for more precise estimates of future developments."	Text revised.

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United States (U.S. Department of State)	6	36	1	36	2	-	-	-	<p>1. Technical improvements will enhance capacity factors, give access to more remote sites and</p> <p>2. Tolerance of poorer quality resources (poorer wave climates or lower average current velocities).</p> <p>Delete <math>\zeta</math> enhance capacity factors<math>\zeta</math> since capacity factors are largely dictated by the characteristics of the resource and not technology and are a design parameter to be optimized and not a performance criteria.</p>	Text revised.
United States (U.S. Department of State)	6	36	11	36	11	-	-	-	<p>Line 11: generation has forecastable characteristics on longer-term variability than wind or solar insulation.</p> <p>The word <math>\zeta</math>insulation<math>\zeta</math> is misspelled; it should be <math>\zeta</math>insolation<math>\zeta</math>.</p>	Text revised.
United States (U.S. Department of State)	6	36	21	36	24	-	-	-	<p>Line 21. The preliminary estimation of aggregated ocean energy deployment presented here is the first attempt to include ocean energy in any of the IPCC scenario modeling. Ocean power technologies have promising potential to mitigate long-term climate change by offsetting GHG emissions with predicted deployments resulting in energy delivery of 2.437 EJ/yr (677.5 TWh/yr) by 2050.</p> <p>Add the word <math>\zeta</math>help<math>\zeta</math> before the word mitigate in line 23 and the following words at the end of the sentence <math>\zeta</math>if the regulatory environment treats ocean energy as it current allows rapid, low cost and certain permitting of fossil fuel plants and the Governments of the world treat ocean power on an equal playing field with fossil fuel and other renewable energy generation.<math>\zeta</math></p>	Text revised.
United States (U.S. Department of State)	6	36	5	36	6	-	-	-	<p>Line 5: Small-scale off-grid applications are also possible. Large-scale deployment scenarios will require forecasting capability (which may be good in some instances).</p> <p>The recommendation is to replace <math>\zeta</math>(which may be good in some instances)<math>\zeta</math> with <math>\zeta</math>(which is good for ocean energy and is one of the primary advantages as compared to wind and solar).</p>	Text revised.
United States (U.S. Department of State)	6	36	17	-	-	-	-	-	'resources sites': 'resources' or 'sites' (one suffices)	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	36	24	-	-	-	-	-	see comment 315, there are a large number of qualifying statements / caveats that should probably be included when quoting such a large capacity that is not seen in any other study to date	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	36	11	-	-	-	-	-	should say 'insolation' not insulation	

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Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	36	23	-	-	-	-	-	-	suggest delete "promising", tautology	Text revised.
Rafiuddin Ahmed (The University of the South Pacific)	6	36	11	-	-	-	-	-	-	the last word should be corrected to ""insolation"".	
United Kingdom (Department of Energy and Climate Change)	6	36	10	-	-	-	-	-	-	Waves are driven by wind and are therefore chaotic and not stochastic. The meaning of this sentence is unclear, although insulation is probably insolation. Perhaps the author could say that little data has been collected on long term variation of wave energy, although it is recognised to vary considerably.	
United Kingdom (Department of Energy and Climate Change)	6	36	-	-	-	6.8.3	-	-	-	Given the apparent importance of the forecast in Table 6.4, it would be helpful if this section could discuss the main drivers and uncertainties, for example the energy strategy of China.	Text revised.
stephen Wyatt (Carbon Trust)	6	36	24	36	24	6.8.4	-	-	-	Figures imply greater level of accuracy than likely to be present.	Comment considered
stephen Wyatt (Carbon Trust)	6	36	24	36	24	6.8.4	-	-	-	Figures imply greater level of accuracy than likely to be present.	Comment considered
Rafiuddin Ahmed (The University of the South Pacific)	6	37	33	-	34	-	-	-	-	For references of books, there is no need to provide the URL - normally the publisher's name and the year are provided. Similarly, on page 38, lines 13-19. A lot of space can be saved by deleting the URL of books.	Text revised.
Rafiuddin Ahmed (The University of the South Pacific)	6	37	-	43	-	-	-	-	-	In References, the page numbers are not written uniformly. For example, on page 37, lines 3 and 6 have page numbers written differently compared to lines 15 and 24.	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	37	2	-	-	-	-	-	-	not used in chapter	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	37	12	-	-	-	-	-	-	not used in chapter	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	37	20	-	-	-	-	-	-	not used in chapter	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	37	24	-	-	-	-	-	-	not used in chapter	Text revised.

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Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	37	33	-	-	-	-	-	not used in chapter	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	37	37	-	-	-	-	-	not used in chapter	Text revised.
Rafiuddin Ahmed (The University of the South Pacific)	6	37	-	43	-	-	-	-	There are too many internet sites given as references, even for Conference papers and books. It is advisable to reduce the number of such references.	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	38	8	-	-	-	-	-	not used in chapter	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	38	33	-	-	-	-	-	not used in chapter	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	38	38	-	-	-	-	-	not used in chapter	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	38	43	-	-	-	-	-	not used in chapter	Text revised.
Rafiuddin Ahmed (The University of the South Pacific)	6	38	28	-	-	-	-	-	R.J. to be deleted before the third author's name.	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	39	1	-	-	-	-	-	not used in chapter	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	39	7	-	-	-	-	-	not used in chapter	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	39	12	-	-	-	-	-	not used in chapter	Text revised.

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Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	39	28	-	-	-	-	-	not used in chapter	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	39	34	-	-	-	-	-	not used in chapter	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	39	38	-	-	-	-	-	not used in chapter	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	40	24	-	-	-	-	-	Not a good reference, he works for an OTEC company	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	40	34	-	-	-	-	-	not used in chapter, and not peer reviewed	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	41	13	-	-	-	-	-	not peer reviewed	Comment considered
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	41	18	-	-	-	-	-	not peer reviewed	Comment considered
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	41	37	-	-	-	-	-	Recommend to use the book rather than a speech and to use the new one that was just released?	Comment considered.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	42	17	-	-	-	-	-	not peer reviewed	Comment considered
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	43	16	-	-	-	-	-	link dead. All internet links should have the date retrieved?	Comment considered
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	43	12	-	-	-	-	-	not peer reviewed	Comment considered



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Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	-	-	-	-	"tide rise and fall" is not a recognised term in the ocean energy community. Searching for "tide rise and fall XXX" where XXX is 'energy', 'resource' or 'power' returns zero hits on google. Searching for "tidal rise and fall energy" returns only three hits. I think it is a significant inefficiency to introduce the new term 'tide rise and fall' as a separate source of energy as this is not a factual statement, it should either be called 'Tidal range' and have it made clear that it is the tidal potential energy that then becomes tidal kinetic energy as streams or else be discussed together with tidal stream as simply 'tidal energy'. They are the same energy, just different forms.	Will accept
Patrick Matschoss (TSU)	6	-	-	-	-	-	-	-	-	ch1, p. 36-7, l. 43-2 mentions the rules governing sea lanes do not consider ocean energy needs. This is not mentioned in ch6. Pls consider whether it is worth mentioning and communicate result to ch1; It should not be mentioned in ch1 if not covered in ch6	Will consider adding into Ch 6
Patrick Matschoss (TSU)	6	-	-	-	-	-	-	-	-	check definitions in glossary: p. 5, l.22-4; liaise with chapter 1 if not consistent	Already identified
Ladislav Rybach (Geowatt AG Zurich (company))	6	-	-	-	-	-	-	-	-	My comments to Chapter 6 of the FOD have been considered, except: The Executive Summary still does not include any numbers about resource potential, currently installed capacity and production, availability factors, installation and production costs, development trends (e.g. annual rate of increase). These must be given to make SRREN more uniform!	ES will be revised
Peter de Haan (Ernst Basler + Partner AG)	6	-	-	-	-	-	-	-	-	no comments from Reviewer P de Haan	-
Kristie Ebi (Department of Global Ecology)	6	-	-	-	-	-	-	-	-	Section 6.5.1, line 8. There should be a mention of possible impacts on ocean ecosystems.	Replace 'flora and fauna' with 'ecosystem'
Kristie Ebi (Department of Global Ecology)	6	-	-	-	-	-	-	-	-	Section 6.5.2, line 39. Noise and vibration would be an issue for/to whom?	Add in reference to marine mammals
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	-	-	-	-	The grouping of technologies does not follow a logical pattern, in the introduction 5 resources are introduced with ocean current and tidal current grouped together. Yet these two share only a common characteristic that involves flowing volumes of water, they are very different resources. They are not grouped in discussing resource, they are grouped when discussing technology, they are grouped when discussing market development (even though they are very different stages of development). Ocean currents are then omitted from discussions on costs in section 6.7, yet wave and tidal are grouped together. Wave and tidal are entirely different technologies and there is no reason why costs should converge or be similar between these two resource groups. I would suggest that the 6 resource types are kept completely separate throughout the entire chapter for clarity and accuracy; or if grouping would occur then the tidal rise/fall and tidal stream at least have the same source of energy (ie gravitational potential).	Partially accepted; make clear differences and similarities of grouping by resources/technologies
Stephen Wyatt (Carbon Trust)	6	-	-	-	-	-	-	-	-	Throughout the term "Ocean power technologies" is used, suggest this is changed to avoid confusion with the company of the same name.	See above

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stephen Wyatt (Carbon Trust)	6	-	-	-	-	-	-	-	Throughout the term ""Ocean power technologies"" is used, suggest this is changes to avoid confusion with the company of the same name.	Will replace with ocean energy technologies
United States (U.S. Department of State)	6	-	-	-	-	6,5	-	-	General Comment on Environmental and Social Impacts Section (6.5): This section does not adequately consider the economic impacts and benefits of these technologies. It is not proven that (pg 25/line 8) that large scale implementation will have positive impacts at the general and local levels. Pg 26/line 17 - arrays: effects are far from understood without any proof of benefits yet determined.	Text revised.
United States (U.S. Department of State)	6	-	-	-	-	6,5	-	-	General Comment on Environmental and Social Impacts Section (6.5): This section largely dismisses a large part of the environmental concerns, and tends toward advocacy without significantly addressing the true potential for environmental impacts, especially if projects do not undertake concerted efforts at environmental effects mitigation and thorough environmental monitoring.	Text revised.
Australia (0)	6	-	-	-	-	6,5	-	-	The discussions in this section tend to under-state the possible negative environmental and social impacts of ocean renewable energy, and over-state potential positive impacts. With limited deployments of these technologies, more study and experience of these issues is needed before conclusions can be drawn.	Will review all comments from 500 to 534

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United States (U.S. Department of State)	6	-	-	-	-	6,7	-	-	<p>Section 6.7.2 should be deleted in its entirety. It is full of inaccuracies and misstatements. Replace with the following:- Capital costs of ocean energy devices should be lower than those for wind and solar because of the much greater power density of the resource (except for ocean thermal which is a low power density resource)</p> <p>- Installation and operation and maintenance cost will be higher for ocean energy than for land-based wind and solar due to the remoteness and sometimes hostility of the operating environment</p> <p>- The challenge to the ocean energy industry is to develop technology that will enable the disadvantage of higher installation and O&amp;M cost to not out weigh the advantage of the lower capital cost</p> <p>- Today, ocean energy is more expensive than wind energy due to the fact that these two technologies are at very different levels of commercialization. There is well over 100,000 MW of worldwide wind power deployed to date. Worldwide deployment of MHK power to date is only a few MWs.</p> <p>- If governments provide incentives to create a market for ocean energy, the cumulative deployment capacities will increase and learning will take effect and drive cost reductions</p>	Text revised.
Steffen Schlömer (IPCC WGIII)	6	-	-	-	-	6.2	-	-	<p>If possible, please report technical potentials as well for all technologies. Currently, you report technical potentials only for tidal current technologies, though not explicitly calling it technical potential. You say, using present-day-technology, this potential could be harnessed or the like. The term technical potential is only used in 6.8 of your chapter. Please use the term in 6.2, even if it's only for the sake of stating that there's no estimation of the technical potential yet as a knowledge gap.</p>	Will add reference to technical potential

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United Kingdom (Department of Energy and Climate Change)	6	-	-	-	-	6.2	-	-	This whole section should be consistent in the type of figures it quotes. Unusable wave power is quoted in the wave energy section (6.2.1) - rather than electricity from wave power - but in the section on tidal stream, numbers are quoted "using present-day technologies." (page 10, line 4). Energy from devices would be my suggested approach because this takes into consideration that some forms of energy is harder to harness than other forms of energy. For example, wave machine efficiency is much lower than tidal stream device efficiency. Pelamis are hoping for 15% efficiency. MCT are closer to 50% efficiency. Wave power is not relevant on its own.	Delete section and move to technology section
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	6.2.1	-	-	I think key points have been omitted. i) The seasonal variation of wave energy, ii) the lower seasonal variation in the southern hemisphere that is discussed elsewhere in the chapter iii) the fact that the wave climate can change from year to year so long term averages are used iv) that global databases of wind and wave data are available over relatively long periods of time. v) potential changes in wind patterns with climate change, is it considered be important? or perhaps there is no evidence? vi) although the wave climate in the nearshore is less energetic it has fewer damaging extreme events which may compensate for this in terms of cost, see Folley & Whittaker 2009 "Analysis of the nearshore wave energy resource"	Accepted; will add text into 6.21
Gerrit Hansen (TSU)	6	-	-	-	-	6.2.1	-	-	please convert TWh to EJ consistently	Not problem for ch 6. TSU needs to determine this
Steffen Schlömer (IPCC WGIII)	6	-	-	-	-	6.2.1	-	-	This section is quite long and contains very specific technicalities. One of the crucial questions to me seems to be whether or not information about technically exploitable wave energy potential is sufficient and up to which stage of concrete project planning. That is how much additional effort is required in planning wave energy projects. I think it would be worthwhile to focus the section on this issue.	Will address technical potential
United Kingdom (Department of Energy and Climate Change)	6	-	-	-	-	6.2.1	-	-	This section talks about wave power, rather than electricity that could be extracted from the wave power. This needs to be made much clearer at the very least. I think it would be more helpful to talk about power from (hypothetical) devices. I.e. quote figures of useable energy (electricity, or power for de-salination), rather than wave power.	Will include if possible

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United States (U.S. Department of State)	6	-	-	-	-	6.2.3	-	-	<p>Section 6.2.3. Resources <math>\zeta</math> Wave Energy</p> <p>If you think that this section should contain a statement about what we know and what we do not know about the U.S. wave energy resource then I recommend the following</p> <p>Available U.S. Wave Energy Resource</p> <p>EPRI has estimated the U.S. wave energy resource from decades of wave height and period measurements by NOAA and Scripps data buoys. The analysis used the methodology described in EPRI Report WP-001 . The available wave energy resource is about 2,100 TWh/yr (for all state coastlines with an average annual wave power flux &gt; 10 kW/m). This energy is divided regionally as follows:</p> <ul style="list-style-type: none"> <li>- New England and Mid-Atlantic States = 100 TWh/yr</li> <li>- Northern California, Oregon and Washington = 440 TWh/yr</li> <li>- Alaska (Pacific coastline only) = 1,250 TWh/yr</li> <li>- Hawaii and Midway Islands (northern EEZ border)= 330 TWh/yr</li> </ul> <p>Extractable U.S. Wave Energy Resource</p> <p>The amount of the available wave energy that can be extracted is not known given the uncertainties of societal, device spacing, conflicts of sea space and environmental limits.</p> <p>A preliminary estimate can be made by assuming an extraction of 15% of the total available wave energy resource, a <math>\zeta</math> wave-to-wire <math>\zeta</math> conversion efficiency of 90% and a plant availability of 90%. The electricity produced using this assumption is about 255 TWh/yr or equal to an average annual power of about 30 GW. The rated power is about 90 GW given the typical capacity factor of 33%. This amount of energy is comparable to the total energy generation from all conventional hydro power, or about 6% of current U.S. electricity consumption.</p>	Rejected; too much detail and also country-specific
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United States (U.S. Department of State)	6	-	-	-	-	6.2.4	-	-	<p>Page 11 ζ Resources ζ Ocean Thermal</p> <p>This paragraph needs to add the fact that, unlike wave and tidal and open-ocean currents which are high power density, the ocean thermal resource is VERY low power density.</p> <p>If the authors think that this section should contain a statement about is known and what is unknown about the U.S. open thermal energy resource the following is recommended:</p> <p>ζAn order-of-magnitude estimate of the OTEC electrical power generation has been performed by the University of Hawaii; that estimate is 3 TWζ (source A Preliminary Assessment of Ocean Thermal Energy Conversion Resources, Gérard C. Nihous Associate Researcher Hawaii Natural Energy Institute, University of Hawaii, 1680 East-West Road, POST 109, Honolulu, HI 96822</p> <p>e-mail: nihous@hawaii.edu</p>	Text revised.
United States (U.S. Department of State)	6	-	-	-	-	6.2.4	-	-	<p>Section 6.2.4. Resources ζ Open-Ocean Currents</p> <p>If the authors think that this section should contain a statement about is known and what is unknown about the U.S. open ocean current resource the following is recommended:</p> <p>The primary ocean current resource available to the U.S. is located about 30 km off the shores of Southern Florida. The total available resource is not known, however, both Aeroviroment in the 1970s and recently Florida Atlantic University have estimated an extractable energy of 50 TWh/yr and an average annual power of about 10 GW (a capacity factor of 57%).</p>	Comment should be in deployment section 6.8

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United States (U.S. Department of State)	6	-	-	-	-	6.2.4	-	-	<p>Section 6.2.4. Resources <math>\zeta</math> Tidal Currents</p> <p>If the authors think that this section should contain a statement about is known and what is unknown about the U.S. tidal resource. The following is recommended: (CONTINUED from above comment)</p> <p>Extractable U.S. Tidal Hydro-kinetic Energy Resource</p> <p>The amount of the available tidal hydrokinetic energy resource that can be extracted is not known given the uncertainties in societal, physical, ecological and environmental limits. Further, the kinetic resource across a particular transect at a site is a poor predictor of both the maximum possible level of extraction for that site and the environmental impacts of extracting kinetic energy. From an array standpoint, one could determine the number of turbines that could be sited within a constrained channel if the maximum packing fraction for turbines was known. This would depend on the limitations of seabed space within the high-velocity transects and the requirement to maintain adequate navigation clearance. However, this could be limited to even lower levels of extraction by the ecological implications of changing the tidal regime by extracting energy from the flow. There also is a self-limiting point at which it will not be economic to add additional turbines to an array due to reductions in kinetic energy due to extraction. It is unclear whether this factor, available space, or social and environmental pressures will pose the most stringent limits on resource extraction. There is also insufficient understanding to predict how extracting hydro-kinetic energy at one site would affect the availability of hydro-kinetic energy at another site within the same estuary or bay.</p> <p>A preliminary assessment has been made assuming an extraction of 15% of the total available tidal hydrokinetic resource can serve as a conservative proxy for the limiting factors discussed above, a <math>\zeta</math> water-to-wire efficiency of 90%, and a plant availability of 90%. The electricity produced using this assumption for the sites studied by EPRI is about 14 TWh/yr. This corresponds to an average annual power of 1,600 MW and a rated power of about 4,800 MW given a typical capacity factor of 33%. These estimates should be considered as the lower bound of the tidal hydro-kinetic resource because not all the U.S. tidal sites with potential have been evaluated.</p>	<p>This comment is about tidal currents but the text of concern is on ocean currents; material is too detailed and specific on the US</p>
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United States (U.S. Department of State)	6	-	-	-	-	6.2.4	-	-	<p>Section 6.2.4. Resources <math>\zeta</math> Tidal Currents</p> <p>If the authors think that this section should contain a statement about is known and what is unknown about the U.S. tidal resource. The following is recommended:</p> <p>Available U.S. Tidal Hydro-kinetic Energy Resource</p> <p>Tidal stream hydrokinetic energy resources are not as well understood as wave energy resources in the U.S.. High hydro-kinetic tidal energy sites typically occur in narrow passageways between ocean and large estuaries or bays. The total in-stream resource for a site is the product of the kinetic power density and the cross-sectional area of the channel. The kinetic power density varies considerably vertically from the water surface to the channel bottom as well as across the channel width. As a first order estimate of the available energy through a given channel transect, single-point current predictions and bathymetric data made by the National Oceanographic and Atmospheric Administration (NOAA) may be used, but, this generally requires extrapolation of stream speeds vertically and horizontally from the reference point. The methodology for estimating the available tidal resource for a single transect is described in EPRI Report TP 001 .</p> <p>EPRI has studied many, but not all, potential U.S. tidal energy sites. The tidal energy resource at all sites evaluated by EPRI to date is estimated to be 115 TWh/yr with 6 TWh/yr at sites in the continental U.S. and the remaining 109 TWh/yr in Alaska. Tidal hydro-kinetic energy resources may be locally important resources for the following regions in the lower 48 states; Maine, New York, San Francisco and Washington, <math>\zeta</math>s Puget Sound. High power density and large size sites exist in Southeast Alaska, Cook Inlet, and the Aleutian Islands. The 115 TWh/yr estimate excludes sites with annual average power densities less than 1 kW/m<sup>2</sup>. If in-stream energy conversion device technology is economical at power densities less than 1 kW/m<sup>2</sup>, then the available resource in the lower 48 states could be much greater. These estimates therefore should be considered as the lower bound of the tidal hydro-kinetic resource because not all the U.S. tidal sites with potential have been evaluated.</p>	Text revised.
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United Kingdom (Department of Energy and Climate Change)	6	-	-	-	-	6.2.5	-	-	The numbers presented for this technology are very large. However, are they useful? The section might need a reality check and/or some descriptive language around the area required for this energy to be created. Country-sized sea areas will be required (the power density - in W(electricity)/m <sup>2</sup> - is similar to wind). Is it appropriate to mention the low Carnot efficiency of heat engines operating with these temperature differences??	Comment information is incorrect
Steffen Schlömer (IPCC WGIII)	6	-	-	-	-	6.3	-	-	Make sure that statement on variability of output included in SPM is reflected in the chapter. "Some of these technologies have short-term (e.g., waves) and medium-term (e.g., swells, tidal and ocean currents) variable output profiles, while others may be capable of constant or even controllable operation (e.g., OTEC and salinity gradient)." (SPM, p.7, ll. 29-31)	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	6.3.2	-	-	Capacity factor not discussed	Comment considered
Finn Gunnar Nielsen (Statoil)	6	-	-	-	-	6.3.2	-	-	Mention that all wave power devices rely on large motions to be efficient. Such large motions may be achieved either by resonance or advanced control systems (e.g. latching)	not all devices
Finn Gunnar Nielsen (Statoil)	6	-	-	-	-	6.3.2	-	-	To relate the practical extractable wave energy to the resources available, typical capture width and capacity factors should be included.	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	6.3.3	-	-	Capacity factor not discussed	Comment considered
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	6.3.4	-	-	Discussions on base load should be in this section if it is desired to be in the report	to edit
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	6.3.4	-	-	Efficiency not discussed (it is low, should be mentioned in some context)	not relevant as down to costs
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	6.3.4	-	-	Suggest that it would be good to discuss some of the issues holding OTEC back, important context as to why it isn't widespread, otherwise this report to this point sounds unfairly positive about OTEC. Eg: biofouling, exchanger gas erosion, maintaining vacuum.	relevant to deployment chapter
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	6.3.5	-	-	Overly detailed given that it is only describing two companies whereas the previous sections summarised hundreds.	no companies mentioned in OTEC
Australia (0)	6	-	-	-	-	6.4.1.2	-	-	Focus of this section could be more on the status of the ocean renewable energy industry in terms of the nature of the companies involved, linkages with other industries, skills needs and supply chains.	Text revised.

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United Kingdom (Department of Energy and Climate Change)	6	-	-	-	-	6.4.2	-	-	Aquamarine's Oyster is an important near-shore device that is being tested on the coast of Orkney. You should include it the list of important devices.	will include
United Kingdom (Department of Energy and Climate Change)	6	-	-	-	-	6.4.4	-	-	This section seems a bit unfair relative to 6.4.2 on wave. We consider development of tidal stream turbines to be going better than the wave. You might have said: "the only device supplying energy to the grid is SeaGen in Strangford Lough, Northern Ireland. Other devices being tested: Open Hydro, Tidal Generation Limited.	Will add some new devices
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	6.4.4	-	-	Why is only one developer mentioned out of the 30 or so companies and technologies. Inconsistent with the preceding wave section.	See above
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	6.4.5	-	-	Far too much detail on very specific projects as compared to preceding sections. Also there is no discussion of market, just a list of test projects.	Will reduce technology section and add market review
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	6.4.5	-	-	Needs an introduction to give context eg "At this stage on a small number of test facilities have been trialed globally"	Will add introductory sentence
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	6.4.6	-	-	Seems like an opportune section of the report to mention the two large groups that are working on salinity gradient in norway and the netherlands?	Should be covered in 6.3.6.1
Steffen Schlömer (IPCC WGIII)	6	-	-	-	-	6.4.7	-	-	Cross-reference to chapter 11 needed, standard sentence recommended	Will provide link to Ch 11
Steffen Schlömer (IPCC WGIII)	6	-	-	-	-	6.5	-	-	Much of the information in this section is not based on available literature, but on expert judgment and experience of the authors. It might be argued that this is not in line with the IPCC mandate, irrespective of how useful and balanced the information actually is. It is, however, the IPCC's mandate to point out gaps in knowledge. Therefore, it should be clearly stated that the information presented here are largely based on the authors' personal experience and judgment and that they represent a gap (of knowledge) in the existing literature on ocean energy. However, the best options would, of course, be to add references that support the findings presented here.	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	6.5.1	-	-	Would benefit from an introductory sentence that starts like "The lack of experience in deploying and operating ocean energy technologies at scale means that there is also not much information regarding the environmental or social impact of such technologies."	Text revised.
United States (U.S. Department of State)	6	-	-	-	-	6.5.2	-	-	Editors should make a better effort at defining the "potential" environmental effects, as the degree of these potential effects is unknown at this time. The environmental effects will vary by location, as well. Again, this points to the need for pilot project demonstrations so that we can gather data and assess the impacts.	Text revised.

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Steffen Schlömer (IPCC WGIII)	6	-	-	-	-	6.6	-	-	In almost all cases, the use of the term "will" seems to be inappropriate wrt to the level of uncertainty involved. Hypothetical/theoretical statements should use the term would, views and expectations should be supported by literature and use expressions like "X is expected to affect Y" or "Hinz and Kunz (2010) expect this and that to happen"...	See above
Steffen Schlömer (IPCC WGIII)	6	-	-	-	-	6.6	-	-	Much of the information in this section is not supported by scientific literature, but rather expert judgment. Future developments are mostly described as if they were 100% certain. This impression can be avoided by a slight change in wording. Instead of stating that something will happen, you should state that something is expected to happen and provide references to make it transparent by whom and by how many actors this expectation is shared.	Will address
Norway (Climate and Pollution Agency)	6	-	-	-	-	6.6.1	-	-	Add that future developments must have increased focus on system survivability during extreme weather conditions.	Will add text
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	6.6.3	-	-	I feel that two very important developments that need to occur that could be stressed more are 1) the cost of installation, novel installation and/or mooring/foundation techniques will be required for the high speed tidal races that are an operating environment and resulting small installation windows. Current oil and gas vessels can be prohibitively expensive. 2) novel intervention techniques for maintenance and repairs for the same reasons as point 1	Add bullet points on these issues
Fritz Vahrenholt (Prof. Dr.) (RWE Innogy GmbH)	6	-	-	-	-	6.6.3	-	-	Should mention that a key requirement is development of cheaper installation and O&M methods are needed.	Will address
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	6.6.4	-	-	As per the other sections, some kind of introduction that gives context is important ie OTEC is still at a relatively early stage of development, even when compared to other ocean technologies such as wave and tidal power.	6.6.1, 6.6.2 and 6.6.3 have comments
Fritz Vahrenholt (Prof. Dr.) (RWE Innogy GmbH)	6	-	-	-	-	6.6.4	-	-	Needs to give more information as per the title of the section 6. Eg. what is relevance of last paragraph?	These are technology improvements
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	6.6.5	-	-	This whole section seems to be about one existing plant for one technology. It does not talk very much about future developments given the focus of this section. It also does not talk about the RED process nor the idea that advances in desalination membranes will continue to incidentally benefit the PRO process.	Will add something
Steffen Schlömer (IPCC WGIII)	6	-	-	-	-	6.7	-	-	Plocek et al. (2009) is not included in the overview table	Comment considered
Fritz Vahrenholt (Prof. Dr.) (RWE Innogy GmbH)	6	-	-	-	-	6.7.2	-	-	Should mention that no schemes exist so hard to predict costs at this stage. See first sentence of 6.7.4.	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	6.7.3	-	-	At a number of occasions in the rest of the report tidal rise and fall is described as being a commercial technology. I think it makes sense to justify this here with some actual cost figures. There is a wealth of information available for the proposed Severn barrage that could be used.	Comment considered

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Fritz Vahrenholt (Prof. Dr.) (RWE Innogy GmbH)	6	-	-	-	-	6.7.3	-	-	No useful data - needs some figures - compare it with previous section? Figures are available, eg. see DECC study on Severn for figures. At least tidal range schemes exist, unlike those in 6.7.2.	Comment considered
Oluf Ulseth (Statkraft AS)	6	-	18	-	-	6.7.5	-	-	The paragraph looks a bit fragmented. Consider changing sentence starting at line 18 to: Osmotic power is capital intensive and dependent of reliable, large scale and low-cost membranes, but the combination with base load capacity factor give prospects of profitable LCOE.  The reference has a misspelling. The correct name is "Skråmestø", the reference list should also be updated accordingly.	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	6.7.5	-	-	This is only for PRO, what about RED?	Comment considered
Steffen Schlömer (IPCC WGIII)	6	-	-	-	-	6.8	-	-	Change heading back into: Potential deployment	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	6.8	-	-	I think an introduction is required to say roughly how the modelling was done and that this is the first time a major study has included all these different aspects of ocean energy?	Text revised.
Steffen Schlömer (IPCC WGIII)	6	-	-	-	-	6.8	-	-	Include ETP (2008) projections for future deployment and discuss those in combination with ER forecasts. Also mention explicitly that those are the only forecasts available in the literature. The IEA ETP 2008 on p. 85 states tidal energy production of 1 TWh/y by 2005, 10 TWh/y by 2050 in their baseline scenario, 35-111 TWh/y by 2050 in their ACT scenarios, and 110-4452 TWh/y by 2050 in their BLUE scenarios.	Text revised.
Steffen Schlömer (IPCC WGIII)	6	-	-	-	-	6.8	-	-	Replace "IPCC scenario modelling" (used twice). The IPCC does not undertake any modelling exercise, but only assesses existing scenarios. Hence, use "IPCC scenario assessments". Btw, this section is part of that assessment.	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	6.8.1	-	-	Table 6.4 suggests that 57.5TWh is possible in 2020 or 18GW at 35% average capacity factor. The credibility and 'achieve-ability' of this number should be discussed I believe. Is it likely that 18GW will be deployed within 10 years and what form would it take? This is an enormous and tremendously difficult target that seems to warrant further discussion. For example there is 13TWh shown in russia which is assumed to be tidal rise and fall.	Comment considered
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	6.8.2	-	-	Maybe discuss the 2050 number? For example it is 4 times larger than the Greenpeace [R]evolution scenarios for ocean energy that were made with the same MESAP model. Is it reasonable? What is the underlying cost assumption that is required to get there? What is the likely split of technologies?	Comment considered
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	6.8.2.1	-	-	This is all repetition of previous sections with the same comments on resource as were given there. Suggest much of it could be omitted. Also references are missing for all statements. Maybe just a summary of estimated resource by region could be useful which must surely exist as an input to Chapter 10?	Comment considered

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Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	6.8.2.2	-	-	Suggest be more explicit, a list of the countries that are leading development for each of the different technologies?	Comment considered
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	6.8.2.3	-	-	This is not a very useful summary of the ocean energy supply chain. There is literature on marine energy supply chains, particularly from the UK, that could be included here (see Section 6.4.1.2). There is strong competition for vessels for deployment with the oil and gas industries, there is a lack of vessels that can operate in rough water/tidal streams, there are supply chain elements that missing (eg specialist piping for OTEC deployments) and other topics that could be introduced here.	Comment considered
Gerrit Hansen (TSU)	6	-	-	-	-	6.8.2.5	-	-	please rephrase sentence refraining from comparison to other RE technologies (also in p 9, ln 3-5)	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	6.8.2.6	-	-	I think more detail could be included here, this doesn't discuss many of the specifics of ocean energy in relation to social and environmental impacts.	Text revised.
China (China Meteorological Administration)	6	-	-	-	-	all	-	-	It is suggested that the status of ocean energy research and development of China be properly presented.	Add references to China; need references
Steffen Schlömer (IPCC WGIII)	6	-	-	-	-	ES	-	-	Did not follow Oslo-Oxford-Accord.	Will be re-edited anyway
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	Exec Sum	-	-	The list of 6 resource types is never clearly defined but probably should be introduced at the very beginning.	Will revise ES
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	References	-	-	I think the idea from the above list is apparent and I don't have time to search for the rest of them, many references in the bibliography are not relevant and/or not used in the actual report so should be omitted	Text revised.
United States (U.S. Department of State)	6	-	-	-	-	-	6,12	-	Ordinate label is not readable.	Text revised.
United States (U.S. Department of State)	6	-	-	-	-	-	6,13	-	Ordinate label is not readable.	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	-	6.1	-	The quality of reproduction of this figure seems very poor in this version of the report.	Will address
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	-	6.1	-	The reference for this figure is not in the bibliography	Will address

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Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	-	6.10	-	suggest delete	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	-	6.11	-	EDF is not in the bibliography and it is a company, not a peer reviewed article. Suggest replace with the more detailed and referenced list in Kerr, 2007 "Marine Energy" Philosophical Transactions of the Royal Society.	Will review
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	-	6.12	-	I think be explicit that the 11% is taken from the wind study quoted on the previous page and is conjecture. Also it doesn't include R&D which could be considered a conservative approach for marine energy.	Comment considered
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	-	6.13	-	I think in presenting such a figure the discount factor and design life should be stated, these are key parameters.	Comment considered
Finn Gunnar Nielsen (Statoil)	6	-	-	-	-	-	6.13	-	revise axis legend	Text revised.
Norway (Climate and Pollution Agency)	6	-	-	-	-	-	6.13	-	revise axis legend	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	-	6.3	-	Incorrect reference for the figure	Done
Finn Gunnar Nielsen (Statoil)	6	-	-	-	-	-	6.5	-	Figure can be omitted.	Comment considered
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	-	6.7	-	Neglects Venturi Effect devices	included in text
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	-	6.8	-	Suggest delete, this level of detail is not given in the preceding sections and it adds little value	Comment considered
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	-	6.9	-	suggest delete	Text revised.
United States (U.S. Department of State)	6	-	-	-	-	-	-	6,2	Column Example Description:  Row Renewables Obligations: one right parenthesis is missing  Row National Marine Energy Centres: 'Hawaii for OTEC/wave'	Accepted

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United States (U.S. Department of State)	6	-	-	-	-	-	-	6.2	The 3rd column says ¿US DoE Hydrokinetic Program (capital grants for R&D and market acceleration)¿ The US DoE Program is called ¿Waterpower¿ and not ¿Hydrokinetic¿ (although "hydrokinetic" is the word used by the US FERC).	Accepted
United States (U.S. Department of State)	6	-	-	-	-	-	-	6.4	Line 23 Table 6.4: Ocean Energy Deployment from MESAP/PlanNet - Energy [R]evolution Scenario  For the US, the estimated deployment capacities have a few key assumptions that unless these come true, these estimates will not be realized. It is recommended that the key assumptions behind these numbers be made explicit. In the US, they are:  1. The regulatory policies resulting in extremely long and expensive permitting and even carry an uncertainty of never getting a license has to change to be equivalent to permitting fossil fuel plants  2. Government policies must treat ocean energy on a level playing field with fossil fuel and other renewable energy generation technologies. That means things such as charging fossil fuel plants for the pollutants emitted, equal incentives and tax treatment for all renewable technologies, etc.	Text revised.
Hiromi Takeuchi (Advanced Industrial Science and Technology)	6	-	-	-	-	-	-	6.1	Readers will be able to understand without this table.	Table explains regional distribution
Hiromi Takeuchi (Advanced Industrial Science and Technology)	6	-	-	-	-	-	-	6.2	ditto	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	-	-	6.2	Suggest that this table is confusing and incomplete. Much better policy summary is available in the IEA OCEANS annual reports, such as 2009. Also has more information there on permitting regimes.	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	-	-	6.3	I think there are more references/costs available in REN21 2008 "GLOBAL POTENTIAL OF RENEWABLE ENERGY SOURCES: A LITERATURE ASSESSMENT"	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	-	-	6.3	I'm not sure the Vega and SERI numbers should be split over multiple lines, it gives a large focus to OTEC, maybe pick the most representative of these estimates or give a range as other studies do?	Comment considered

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Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	-	-	6.3	Lennard 2004 does not look to be a peer reviewed source	Comment considered
Norway (Climate and Pollution Agency)	6	-	-	-	-	-	-	6.3	Please check the LCOE numbers for tidal and wave energy. They do not seem to be consistent with the Capex numbers. The units may be wrong (US\$ versus USc ?). If it is not possible to fill in more information in the table, several columns should be deleted.	Comment considered
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	-	-	6.3	SERI, Cohen, Francis are not in the bibliography	Comment considered
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	-	-	6.3	The comment that "many are highly speculative" probably needs some qualifying ie by saying that it is considered that they are often speculative in nature	Comment considered
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	-	-	6.4	I think more needs to be described regarding the table, how were the resource potentials for each region generated for example. Are they reasonable. eg China is shown to have 260TWh (0.9EJ/yr or roughly 84GW) by 2050 from ocean energy, moreover in chapter 10 the technical potential is stated at 7EJ/yr, 7 times this amount. But earlier the potential for tidal stream is stated as 7GW in China, what is the rest (remaining 600-700GW) of this resource? Also the regional spread could be discussed. Why is China expected to have so much ocean energy when other places would seem to have more favourable resource levels?	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	-	-	6.4	I think this is a strange choice of row headings, what about deployments in other places eg canada, southeast asia, south america, australasia etc. Maybe by region or continent?	Text revised.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	6	-	-	-	-	-	-	6.4	This table suggests in the order of 815MW installed in 2010 for ocean power (at 35% capacity factor) which is difficult to agree with, please check	Text revised.
Steffen Schlömer (IPCC WGIII)	6	-	-	-	-	SPM	-	Table SPM 1	Please check Table SPM 1 in SPM, p. 8, l 25: As far as I understand the concept, OTEC is usually not used to generate heat, right? Then the table needs to be changed accordingly.	Rejected as text has been replaced