INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE

Special Report on Renewable Energy Sources and Climate Change Mitigation

Expert Review of the First Order Draft
Dec 14, 2009 – Deb 8, 2010

Chapter 6

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[1] *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>>*

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by the writing team
Vahrenholt (RWE Innogy GmbH)	6	0	-	-	-	-	-	-	Chapter 6 of the IPCC SRREN FOD seems to be a fair representation of the various forms of ocean energy and their potentials. The cost predictions for the wave and tidal stream projects appear to be optimistic in our experience.	Cost information is being reviewed in the context of cross-cutting Chapter 10.
Rybach (Geowatt AG)	6	0	-	-	-	-	-	-	This chapter does not address long-term deployment in the context of carbon mitigation, especially in terms of TPES and ocean energy share for the scenario categories I+II, III+IV and V+VI of IPCC AR4.	Carbon mitigation is covered in Chapter 10, not Chapter 6.
Tran (Vietnam Institute of Meteorology, Hydrology and Environment)	6	3	2	-	-	-	-	-	Sentence unclear	This comment appears to be incorrectly referenced. Page 3 is the end of the Table of Contents.
Louis (EDF Hydro Engineering Centre)	6	4	43	-	-	-	-	-	☐ The positive social impacts ☐.	Accepted.
de Campos Barbosa (Petrobras)	6	4	12	-	-	-	-	-	"""... ocean thermal energy, ocean TIDAL currents, salinity..."". Only tidal currents can generate base load electricity, as marine currents are more variable in flow and position in the ocean"	The comment is not Accepted as the statement is not true. Will be editted in the executive summary as other details need to be clarified.
de Campos Barbosa (Petrobras)	6	4	41	4	42	-	-	-	"""...fewer environmental risks and thus HIGHER community acceptance...""""	Accepted.
campbell (Ocean Renewable Energy Group)	6	4	1	-	2	-	-	-	"""energy derived from technologies"" = ocean energy is the harvesting of the kinetic energy in waves, tidal and ocean currents, potential energy in tides or the chemical or thermal potential in the ocean."	Will modify the text.
Aelbrecht (Electricit de France - Hydro Engineering Center)	6	4	3	4	5	-	-	-	"""The technologies for the least mature"" : precise except for Tide Rise and Fall (La Rance tidal power plant in France operation since about 40 years has demonstrated reliability and efficiency of technologies involved in tide rise and fall concept)."	Accepted
Louis (EDF Hydro Engineering Centre)	6	4	18	-	-	-	-	-	1960's : La Rance was designed in the 50's and commissionned in 1966.	Will modify the text.
Louis (EDF Hydro Engineering Centre)	6	4	2	-	-	-	-	-	Except for tidal rise and fall, the technologies.	Will modify the text.
Rybach (Geowatt AG)	6	4	-	5	-	-	-	-	Executive Summary: no numbers are given whatsoever. Besides potentials, currently installed capacities and yearly productions, costs, capacity factors should be given. I should also be mentioned that single tidal rise&fall-type power plants can have significant capacities (1,000 MWe).	Accepted - will include numerical values in the revised Executive Summary
de Campos Barbosa (Petrobras)	6	4	2	4	13	-	-	-	Lack of reference	Will seek a reference to end this sentence.
Bonduelle (EE Consultant)	6	4	10	-	-	-	-	-	O-35☐ latitude	Will modify the text.
Bonduelle (EE Consultant)	6	4	25	-	-	-	-	-	prototypes	Use of singular 'prototype' is correct

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by the writing team
campbell (Ocean Renewable Energy Group)	6	4	16	-	17	-	-	-	The ocean energy approaches currently being developed are still facing the early development costs faced by other non-renewable and renewable energy developments in the past. While currently more expensive that wind, geothermal and hydroelectric, ocean energy is already cheaper than solarPV and its high energy density suggest that it will eventually be very cost competitive.	Will modify the text.
campbell (Ocean Renewable Energy Group)	6	4	3	-	5	-	-	-	The ocean energy resource potential is overshadowed by relative immaturity of approaches to ocean energy development.	Accepted
campbell (Ocean Renewable Energy Group)	6	4	25	-	38	-	-	-	these paras can be collapsed	Will review and modify text accordingly
campbell (Ocean Renewable Energy Group)	6	4	7	-	13	-	-	-	this can be tidied and shortened	Will modify the text.
campbell (Ocean Renewable Energy Group)	6	4	26	-	29	-	-	-	this is written too negatively- Recent ocean enrrgy R&D has been funded byn,f and f g ovs,and a few venture capitalists. The move to larger scale trials at see has attracted engagement by small and large utilities and most recently the capacity of a few large industrial players. A small number of device developers are traded public companies.	Will review and modify text accordingly
SCOWCROFT (EURELECTRIC)	6	4	15	-	-	-	-	-	Tidal range can also be applied in the form of coastally attached lagoons in areas with sufficient tidal range.	Will modify the text.
Vahrenholt (RWE Innogy GmbH)	6	4	15	-	-	-	-	-	Tidal range can also be applied in the form of coastally attached lagoons in areas with sufficient tidal range.	Will modify the text.
campbell (Ocean Renewable Energy Group)	6	4	21	-	21	-	-	-	Unlike wind energy - this in not a valuable comparison - ther are multiple resources each likely with a minimum of one technical winner (wave, tidal current, tidal potential, ocean current, thermal and osmotic)	Accepted in part. Will modify the text.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by the writing team
campbell (Ocean Renewable Energy Group)	6	4	-	-	-	exec summ	-	-	"This should more clearly build the case for OE to emerge as a significant contribution. 1. there are 5 potential resources and each is huge and well distributed; 2. the opp for wave and tidal stream particularly are just entering aphase in which rapide experience development, cost reduction and potential development will be demonstrated; 3. this phase is attracting large industrial integrators/manufacturers (Rolls, Alstom, ABB, Voith Siemens), utilities and power project developers, and government efforts to move from tech push to market pull; 4. leading countries are setting notional targets of the order of 1-2GW per by 2020 and longer term targets eg 3% of total for UK???, ca 20% of new renewables developed 2010-2050 in Canada; 5. High energy density and modular technologies should result in highly competitive renewable by 2020 or 2030; 6. Challenge is to provide cost forecasts and potential deployment scenarios; 7. Ultimately these may be a function of the policy drivers and market pull created in the next decade; 8. This means there is a significant likelihood that any modelling will understimate uptake."	Accepted in part. The Executive Summary is not a sales pitch for ocean energy but the general points are valid and will be included
campbell (Ocean Renewable Energy Group)	6	5	7	-	7	-	-	-	Is this the place to summarise that several countries have advanced targets of 5-10% of electricity or 20% of new geewn electricity etc	Accepted - will include in revised Executive Summary
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."" "	Accepted - will add in revised text.
Nielsen (Statoil)	6	6	26	6	33	-	-	-	"Most of this may be omitted. The important issue is that waves are generated from wind and there is a flux of energy proportional to the wave amplitude squared and the ""energy period"", see equation 4 of SRREN_Draft1_Review_Nielsen_FinnG_Material01.pdf (Falnes, 2007)"	Accepted - will address in revised text.
campbell (Ocean Renewable Energy Group)	6	6	2	-	3	-	-	-	I believe the chapter discusses history and the current state but does not adress the Contribution ocean energy can make	Accepted - will include in revised text.
campbell (Ocean Renewable Energy Group)	6	6	26	-	26	-	-	-	I suggest that the point be made more strongly - the nearshore resource may have an average annual wave energy intensity of 30-75kw/m, with seasonal maximas several times greater.	Will address in revised text.
Bonduelle (EE Consultant)	6	6	19	-	-	-	-	-	Orders of magnitude ?	Accepted - will cite figures in revised text.
Nielsen (Statoil)	6	6	39	-	-	-	-	-	Should state how this estimate is made, e.g. total wave energy hitting coastal areas or □??	Will adddres in revised text.
Nielsen (Statoil)	6	6	33	-	-	-	-	-	the 10 seconds limit between wind waves and swells is not a usual definition (Swell are longperiodic and with a very narrow frequency spectrum)	Will address in revised text.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by the writing team
Nielsen (Statoil)	6	6	33	-	-	-	-	-	the definition of swells made here is not commonwithin ocean engineering.	Will address in revised text.
Tran (Vietnam Institute of Meteorology, Hydrology and Environment)	6	6	26	6	33	-	-	-	Too fundamental, thus, can be removed	Accepted - will address in revised text.
Gagnon (Hydro-Quebec)	6	6	39	-	-	-	-	-	Wave potential should read 32,000 TWh/year and not 32,000 TWh	Will correct in revised text.
Gagnon (Hydro-Quebec)	6	7	4	-	4	-	-	-	"suggest replacing ""total figure"" by ""worldwide potential"" "	Will addess in revised text.
campbell (Ocean Renewable Energy Group)	6	7	3	-	4	-	-	-	The 8% reference is a distraction since it is likely less than the margin of error in either study -- point is that they are both similar!	Will remove comment.
Bonduelle (EE Consultant)	6	7	-	-	-	-	-	6,1	Totals do not match	Will address revised text.
Rybach (Geowatt AG)	6	7	-	-	-	-	-	6.1	again here the number of significant digits is questionable, in view of the uncertainties of the assessment method utilized.	Difficulty is in rounding Mork's figures - we are citing a reference, so editorializing is inappropriate.
Takeuchi (Advanced Industrial Science and Technology)	6	7	-	8	-	-	6.1-6.2	6.1	Table 6.1, Figs. 6.1 and 6.2 can be eliminated for shortened the text. Even without those, readers can understand.	Reformat Table 6.1 and remove figure 6.2, replace figure 6.1 with high res.
campbell (Ocean Renewable Energy Group)	6	8	9	9	11	-	-	-	This could be simplified to a sentence or two to indicate that offshore or island resources may be higher or concentrations by bays may be possiblereource	Will address in revised text.
campbell (Ocean Renewable Energy Group)	6	9	12	9	15	-	-	-	data come from 3 sources with numerical wind/wave modelling being the third	Accepted - will modify in revised text.
Gagnon (Hydro-Quebec)	6	9	7	-	-	-	-	-	I think equation should read H>Kh instead of H<Kh, please verify	Will verify and correct, if necessary
campbell (Ocean Renewable Energy Group)	6	9	12	9	43	-	-	-	This can be significantly shortened - point is simply that technical approaches allow the resources to be assessed at all of the needed scales and intensities	Will review and edit
Nielsen (Statoil)	6	9	5	9	7	-	-	-	This limit is valid for extremly shallow water only. Use H/L < 0.142*tanh(2*pi*h/L) , L being the wave length, see Sarpkaya and Isaacson, 1981 eq. 4.254.	Will addres in revised text.
Louis (EDF Hydro Engineering Centre)	6	10	-	-	-	-	-	-	M2 constituent is not clear. Why focussing so much on the amphidromic systems ?	Will revise in edited text.
campbell (Ocean Renewable Energy Group)	6	10	30	11	5	-	-	-	This can be shortened and combined with preceeding text	Will revise in edited text.

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campbell (Ocean Renewable Energy Group)	6	10	2	10	15	-	-	-	this could be simplified and shortened, particualrly by using the reference to the theory - essential points - gravity driven and predictable - vary geographically, monthly and between seasons - refer to figure	Will review and edit.
Kruger (South African Weather Service)	6	10	20	10	20	6.2.2	-	-	"""high tides"" meaning the difference between the highest and lowest tides?"	Should be highest tidal ranges
Kruger (South African Weather Service)	6	10	2	10	2	6.2.2	-	-	□is the result of the effect of the gravitational attraction between the Eart, Moon and□	Corrected.
Kruger (South African Weather Service)	6	10	15	10	15	6.2.2	-	-	The last sentence of the paragraph can be in brackets.	Will revise in edited text.
Kruger (South African Weather Service)	6	10	25	10	29	6.2.2	6.3	-	The figure caption is unclear.	Will revise in edited text.
Nielsen (Statoil)	6	11	7	11	7	-	-	-	Can be omitted.	WIll revise in edited text.
SCOWCROFT (EURELECTRIC)	6	11	38	-	-	-	-	-	More like 30 to 40% load factors.	Will modify
Vahrenholt (RWE Innogy GmbH)	6	11	38	-	-	-	-	-	More like 30 to 40% load factors.	Will modify
Bonduelle (EE Consultant)	6	11	34	-	-	-	-	-	No reference to Asia or Oceania ?	Will add references to Indonesia and New Zealand
campbell (Ocean Renewable Energy Group)	6	11	25	11	35	-	-	-	The Canadian Atlas project is not referenced - http://oreg.ca/docs/Atlas/CHC-TR-041.pdf - 370 TWh/yr, 42000 MW in 200 sites of av 8-900 MW each	Will add reference
Nielsen (Statoil)	6	11	36	11	38	-	-	-	The terms load factor and capacity factor need to be defined. (common for all of Chapter 6?)	Will define load/capacity factors
campbell (Ocean Renewable Energy Group)	6	11	25	11	26	-	-	-	there are others, not just Hagerman - this would best be dealt with in a rewrite of the first para - characteristics and power estimates based on mean flow and cross section etc	Will revise in edited text.
Nielsen (Statoil)	6	11	20	11	24	-	-	-	This is todays limits. Will they change in the future?	Speculative but will make reference to potential reduction.
Kruger (South African Weather Service)	6	11	31	11	34	6.2.3	-	-	Refernces for the amounts necessary.	Will add references.
Kleidon (Max-Planck-Institute for Biogeochemistry)	6	11	-	-	-	6.2.3	-	-	This section should mention that the renewable energy potential from tidal currents is already included in the estimate for tidal rise and fall. That is, both forms of tidal energy taken together have an upper theoretical bound of the 3.5 TW of tidal power within the Earth system.	Check reference Charlier and Justus that 3 TW includes tidal streams????
Ahmed (The University of the South Pacific)	6	12	7	13	6	-	-	-	Lot of space is devoted to the Florida Current of the Gulf Stream system. There are a number of sites with similar potential. We can save some space by reducing the description of this site.	Will reduce emphasis on Florida current and add other examples

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Kruger (South African Weather Service)	6	12	16	12	16	6.2.4	-	-	"Put ""but"" befor ""exhibiting□""."	Will modify
Kleidon (Max-Planck-Institute for Biogeochemistry)	6	12	-	-	-	6.2.4	-	-	The power input into ocean currents is < 1.2 TW, which is the upper limit to renewable energy from ocean currents. This number should be mentioned. See e.g. Peixoto and Oort, Physics of Climate, Figure 14.1 and Munk and Wunsch (1998), Deep Sea Research I, 45, 1977-2010.	Will review reference, discuss and amend accordingly to see if references relevant
Gagnon (Hydro-Quebec)	6	13	12	-	13	-	-	-	Many dispute this claim (ex, IEA-OES) and publish that waves have a much greater worldwide potential	Will remove larger than words
campbell (Ocean Renewable Energy Group)	6	13	32	14	2	-	-	-	shorten - this should be concisely stated as a possible development in decades to come, no detail - even drop it asrelevant to this report?	Will shorten
Rybach (Geowatt AG)	6	13	6	-	-	-	-	-	the TSU remark (blue) is not necessary.	Will change format of second caption to make it into text
campbell (Ocean Renewable Energy Group)	6	13	12	14	29	-	-	-	this can be edited down significantly - lot of duplication - focus on the resource is where there is a stable temp diff of 20 between surface and deep and this allows use of a heat pump/engine	Will edit down
Kleidon (Max-Planck-Institute for Biogeochemistry)	6	13	-	-	-	6.2.5	-	-	Relevant for sustainable OTEC utilization is the supply rate of the cold reservoir in the deep ocean. This is supplied by the deep water formation regions, mostly in the North Atlantic ocean. When this factor is accounted for as well, the sustainable power potential for OTEC is estimated 3-5 TW. This limiting factor for sustainable extraction needs to be mentioned. It is about the same magnitude as other forms of ocean power. See Nihous (2005) Journal of Energy Resources Technology 127: 328-333 and Nihous (2007) Transactions of the ASME, 192, 10-17.	Will review reference and amend text accordingly
Kruger (South African Weather Service)	6	13	3	13	6	6.2.4	6.6	-	Figure has double caption.	Will change format of second caption to make it into text
Bonduelle (EE Consultant)	6	14	28	-	-	-	-	-	1984 is rather old to quote construction costs□	Will look for younger reference
Gagnon (Hydro-Quebec)	6	14	21	-	-	-	-	-	should be 90,000 TWh/year and not 90,000 TWh	Agreed
Kleidon (Max-Planck-Institute for Biogeochemistry)	6	14	32	-	38	-	-	-	The potential power from hydrothermal vents is also mentioned in Table 4.1 as a form of geothermal energy. This should be mentioned	Will review table 4.1
Kruger (South African Weather Service)	6	14	4	14	4	6.2.5	-	-	"""solar"" before ""intensity□""?"	Will modify text
Kruger (South African Weather Service)	6	14	14	14	16	6.2.5	-	-	A reference is needed for this statement	Will add reference
Kruger (South African Weather Service)	6	14	32	14	34	6.2.5	-	-	Rephrase sentence, unclear.	Will clarify sentence

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Kruger (South African Weather Service)	6	14	22	14	23	6.2.5	-	-	Rephrase sentence, unclear.	Will correct text
Ahmed (The University of the South Pacific)	6	14	-	-	-	-	6.7	-	A better resolution Fig. 6.7 is available with contours of temperature difference (I saw it in one of the publications of Inst of Ocean Energy, Saga University).	Have found a figure from Saga but it is only of NW Pacific.
Ahmed (The University of the South Pacific)	6	15	32	-	-	-	-	-	"It will be better to write ""The global osmotic power generation capacity was estimated to be □ """	Agreed
Tran (Vietnam Institute of Meteorology, Hydrology and Environment)	6	15	15	-	-	-	-	-	"River water volume regime□ should be "River discharge regime□ or "Hydrological regime□;;;;; Thuc;Tran;Vietnam Institute of Meteorology, Hydrology and Environment;Viet Nam;11;6;15;30;15;31;;;;EIA required for not only this type of RE. The sentence should be removed;;;;;	Will modify to 'discharge'
Bonduelle (EE Consultant)	6	15	33	-	-	-	-	-	Old reference, outdated ?	Will seek more recent reference and replace
Rybach (Geowatt AG)	6	15	1	-	-	-	-	-	the □extreme□ ocean thermal energy is actually geothermal energy, see	This comment does not appear to be justified to us
Gagnon (Hydro-Quebec)	6	15	11	-	12	-	-	-	Why is this a limitations? Why cant an osmotic plant operate in low flow conditions? Please expand, the reasoning is not obvious.	Will expand - water extraction at low flows may cause environmental damage and offtakes are usually limited in these conditions
Kruger (South African Weather Service)	6	15	10	15	10	6.2.6	-	-	Replace 80th with 20th?	wording in document is correct
campbell (Ocean Renewable Energy Group)	6	15	3	15	37	6.2.6	-	-	why not shorten and simplify - opportunity may be ubiquitous where estuaries offer acces to both salt and freshwater - technology may limit the potential - global and EU estimates are□.Value may be baseload□	Some detail on this proposed resource and technology is justified, since knowledge is not widespread
Nielsen (Statoil)	6	16	20	-	-	-	-	-	"""..routine questions..""": But no simple answer!"	Will amend
campbell (Ocean Renewable Energy Group)	6	16	16	-	-	-	-	-	Add:Combined with the relatively high energy density of ocean energy resources (ca 50x wind and 100x solar) it can be expected that competive technical approaches will be refined in the coming decade.	Will add
campbell (Ocean Renewable Energy Group)	6	16	19	-	-	-	-	-	Application of engineering principles to new□ bot just hydrodynamics!!	Will amend
de Campos Barbosa (Petrobras)	6	16	7	26	9	-	-	-	It should be clear in the sentence that the only commercial available ocean energy technology is the tidal range (tidal rise and fall), as explained in section 6.4.1	Will add emphasis on tidal rise and fall

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by the writing team
Nielsen (Statoil)	6	16	27	16	35	-	-	-	You can not split the wave energy this way. However, one may state that the kinetic and potential energy in water waves are of equal magintude. Further, the wave energy absorber can move in the three degrees of freedom mentioned. A pure heaving point absorber have a maximum capture width of Lambda/(2*pi) , (Lamba = wave length). A combined heaving, pitching and surging point absorber has a maximum capture width 3 times the heaving only unit.	REWRITE - page 16 - from Wave Energy to ….. Components
Kruger (South African Weather Service)	6	16	8	16	8	6.3.1	-	-	"Replace ""but"" with ""as""?"	Added
campbell (Ocean Renewable Energy Group)	6	16	22	19	7	6.3.2	-	-	I suggest that this be simplified and shortened with emphasis on the point that differing environments/applications may will be addresed by different technical approaches	Needs editing and some streamlining (reduction)
campbell (Ocean Renewable Energy Group)	6	16	-	-	-	631	-	-	Not sure where to addres this - either here or in each subsection - modularity, scale, particular environment/application. This section needs to give the reader an understanding of how the technology will be deployed and scaled up asa power source, and it should also give some understanding of where it will work eg estuaries, narrow passes and embayments, nearshore on exposed coasts etc etc	Will edit to account for these comments
Ahmed (The University of the South Pacific)	6	17	16	17	3	-	-	-	"The ""wave motion"" itself does not trap volume of air. It will be better to re-write this sentence as well as the next. For example, in line 18 ""a closed chamber, where it is exhausted at high velocity □"" the word ""where"" is incorrect and gives wrong meanings."	REWRITE -pag 18 - 2 sentences highlighted
Nielsen (Statoil)	6	17	16	18	7	-	-	-	Mention that the water column has to be tuned to resonance to be efficient.	INCLUDE a sentence
campbell (Ocean Renewable Energy Group)	6	17	17	-	-	6.3.6	-	-	Again, the technical write up could be edited and a vision for the scale and scope developed	Will revisit the section 6.3.6 and include Statkraft demonstration
Nielsen (Statoil)	6	18	28	18	34	-	-	-	Mention that running several devices, the sum power may be smoother than from each of the devices. Include also a statement on the importance of advanced control systems to extract maximum power.	Include as proposed
Nielsen (Statoil)	6	18	18	18	22	-	-	-	This not a hydrostatic pressure, but a hydrodynamic (AWS - hydrostatic)	Will edit
BHUYAN (Powertech Labs Inc)	6	18	28	-	34	-	-	-	This section could have shown some examples of electrical power outputs from some of the pilot projects being demonstrated currently	Include examples

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MANNEH (MINISTRY OF FINANCE AND ECONOMIC AFFAIRS)	6	19	9	45	41	-	-	-	The Chapter could be shortened from these ranges or areas without affecting the substance	Fit into allocated total pages
Kruger (South African Weather Service)	6	19	14	19	14	6.3.3	-	-	"Insert ""power"" before ""generation"" and after ""generate""."	Accepted
campbell (Ocean Renewable Energy Group)	6	19	8	-	-	6.3.3	-	-	Probably shorten this also and bring some emphasis on the potential application - new project in Korea, potential project in UK etc	Revisit
Rybach (Geowatt AG)	6	19	-	-	-	-	-	see comment	Table 6.10a, 6.11, 6.12:approximate horizontal/vertical scales would be helpful.	Will revisit figures
SCOWCROFT (EURELECTRIC)	6	20	6	-	-	-	-	-	Also coastally attached lagoons as proposed for the Severn Estuary.	Text revised.
Vahrenholt (RWE Innogy GmbH)	6	20	6	-	-	-	-	-	Also coastally attached lagoons as proposed for the Severn Estuary.	Accepted
Louis (EDF Hydro Engineering Centre)	6	20	6	-	10	-	-	-	The text leads to think that the only option for offshore tidal lagoon is the multi basin option. This is not true.	Will edit
Rybach (Geowatt AG)	6	20	-	-	-	-	-	6.13, 6.14	approximate scales would be helpful.	Will revisit figures
Louis (EDF Hydro Engineering Centre)	6	21	17	-	20	-	-	-	"To my knowledge, Sihwa project was constructed ""in the dry"" behind cofferdams and not by using floating caissons. Furthermore, caissons may be used to accommodate one or 2 units, i.e. up to 50 MW but certainly not up to 200 MW, at least today."	Accepted
Louis (EDF Hydro Engineering Centre)	6	21	-	-	-	-	-	-	Add a picture of La Rance Tidal : SRREN_Draft0_Review_Frederic_Louis_Material01.jpg	Add in figure of La Rance if possible
SCOWCROFT (EURELECTRIC)	6	21	19	-	-	-	-	-	For information purposes, Shiwa power plant was actually built within a cofferdam.	Accepted
Vahrenholt (RWE Innogy GmbH)	6	21	19	-	-	-	-	-	For information purposes, Shiwa power plant was actually built within a cofferdam.	Text revised.
Nielsen (Statoil)	6	21	4	-	-	-	-	-	What is meant by orthogonal units?	Accepted
Takeuchi (Advanced Industrial Science and Technology)	6	21	-	-	-	-	6.15	-	Fig6.15 should be eliminated to reduce pages, because readers can discuss without this Photo.	Could remove 6.13 but add in description of Annapolis dam. Can we find turbine picture for Straflo alonside figure 6.14
Ahmed (The University of the South Pacific)	6	22	4	-	-	-	-	-	Tidal turbines do not reverse flow direction. This sentence needs to be corrected.	Accepted
Kruger (South African Weather Service)	6	22	2	22	2	6.3.4	-	-	"Replace ""but"" with ""with""."	Accepted
Kruger (South African Weather Service)	6	22	15	23	5	6.3.4	-	-	Make this two separate figures.	Accepted
Bonduelle (EE Consultant)	6	22	-	-	-	-	6,16	-	No legend	Accepted

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by the writing team
Bonduelle (EE Consultant)	6	22	-	-	-	-	6,17	-	legend for each view would be welcome	Accepted
Ahmed (The University of the South Pacific)	6	23	6	23	7	-	-	-	"The sentence ""Many of the water current energy conversion systems resemble wind turbine technology, but marine turbines must also account for"" can be replaced with ""Many of the water current energy conversion systems resemble wind energy conversion systems; however, the marine turbine designers must also take into consideration factors like ..."""."	Accepted
Nielsen (Statoil)	6	23	9	-	-	-	-	-	Note that the 40 -50% refers to the kinetic energy of the fluid flowing throug the projected area of the turbine	Rewrite
campbell (Ocean Renewable Energy Group)	6	23	41	-	-	6.3.5	-	-	I think the technical part could be shortened and simplified and the emphasis here should be to convey the project scale/application rather than the engineering. You might need to emphasise a measure of progress/investment to date	Shorten technical ? & add progress/investment (here or in 6.4?)
Ahmed (The University of the South Pacific)	6	24	1	24	2	-	-	-	"To be corrected as ""generating power, after which it is condensed in a condenser by using cool water pumped from the deep sea. By employing an appropriate cycle, desalinated water can be obtained as an additional product."" This section can be improved by briefly highlighting advantages of hybrid cycles and also by highlighting the various by-products a multi-purpose OTEC plant can provide."	Accepted
Bonduelle (EE Consultant)	6	24	19	-	-	-	-	-	Several more recent papers and synthesis exist / 1977 is too old	Will contact Statkraft re modern reference
Kruger (South African Weather Service)	6	24	18	24	18	6.3.5	-	-	"Replace ""so"" with ""therefore""?"	Could not find "so"
Bonduelle (EE Consultant)	6	24	-	-	-	-	6,18	-	No legend, and 1993 is already old for these technologies	Fundamental reference for principle of technology described in the text and which has not changed will review figure e.g Ikegami
Bonduelle (EE Consultant)	6	25	-	-	-	-	6,19	-	A legend would be welcome	Accepted
Bonduelle (EE Consultant)	6	25	-	-	-	-	6,20	-	More details would help. Reference is recent.	Accepted
Bonduelle (EE Consultant)	6	26	11	-	-	-	-	-	"After 40 years of operation it is maybe no more a ""project"""	Accepted
campbell (Ocean Renewable Energy Group)	6	26	18	-	-	-	-	-	"What is telling☐ Is the point here that the opportunity is being recognised by a large number of countries; the second point being a depth of technical approaches from which refined production approaches will appear"	Accepted
Bonduelle (EE Consultant)	6	26	41	-	-	-	-	-	70000 persons visited the Rance plant in 2006, according to EDF	WHERE?
Bonduelle (EE Consultant)	6	26	7	-	-	-	-	-	Britanny is in North-West France	Accepted
Gagnon (Hydro-Quebec)	6	26	15	-	-	-	-	-	Marine biomass is not part or discussed elsewere in this chapter and should be rmoved from this enumeration	Accepted

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by the writing team
campbell (Ocean Renewable Energy Group)	6	26	24	27	1	-	-	-	Simply state that tidal barrages have been incorporated into electricity protfolios. The second part of the sentence is unnecessarily negative, the next sence builds on the negative	Accepted
Bonduelle (EE Consultant)	6	26	7	-	-	-	-	-	The capacity and producible should be given	Accepted
Bonduelle (EE Consultant)	6	26	23	-	-	-	-	-	This chapter belittles environment problems. For example, the Severn project with a dam would destroy large portions of wetlands in the area.	This issue is addressed in Section 6.5
campbell (Ocean Renewable Energy Group)	6	26	5	-	-	6.4.1	-	-	"would it be more useful to present this intro around project scales and within those, the ""amenability"" to a changing development dynamic - I am thinking that the refinement and phased development of modular approaches might ultimately be easier than the approval and launch of larger multiMW solutions??"	Accepted
Kruger (South African Weather Service)	6	26	18	26	19	6.4.1	-	-	Language- what is telling...?	Accepted
campbell (Ocean Renewable Energy Group)	6	27	30	-	-	-	-	-	"""deployment"" this might convey too narrow a meaning (or none!) - ocean power project development is what we need"	Accepted
campbell (Ocean Renewable Energy Group)	6	27	25	27	30	-	-	-	"Why not write this as ""as the industry passes from it current R,D&D phase, capacity from related industries and supply chains will be drawn in and this will lead□"	Accepted
Bonduelle (EE Consultant)	6	27	18	-	-	-	-	-	553 GWh/yr expected (size matters in this report)	Accepted
campbell (Ocean Renewable Energy Group)	6	27	4	27	9	-	-	-	If this was moved to the opening after the barrage comment, it could be phrased in the context that pioneer markets to support experience development, technical refinement and cost reduction are being created by scotland, ireland, UK,Germany, France, Spain and Portugal etc etc. Follow this with the disc of R&D and capital incentives - details?? how do you do this without adding all the small initiatives in Canada, US, NZ etc - -perhaps a generic statement and list of countries? What you need to show is that there is a basis to see OE emerge as a power solution - where doo we consider the wave zone, wave hub, EMEC, Force(Canada), Wave Coonect and the RFP for Pentland Firth??????????	Accepted
Bonduelle (EE Consultant)	6	27	4	-	-	-	-	-	Maybe mention the existence of EMEC in the Orkneys Islands, the only research center of the kind	WHERE?

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by the writing team
campbell (Ocean Renewable Energy Group)	6	27	31	27	38	-	-	-	this can simply be rewitten to state that regions supporting industry cluster development, and more particularly leading in the development of scalable power developments will see a concentration of indstry development. (support for the R&D end creates highly mobile technology and expetise which will gravitate to the real activity centres.)	Accepted
campbell (Ocean Renewable Energy Group)	6	27	25	27	30	-	-	-	This I written negatively. I suggest you lead with line 38-40 and add Canada nad US as begiinning roadmaps.	Accepted
Nielsen (Statoil)	6	28	28	-	-	-	-	-	"Mention also Buldra that has been tested in ""halfscale"", See http://renewable.no/sitepageview.aspx?articleID=208#anker_2"	Buldra was abandoned. Should be mentioned?
Rybach (Geowatt AG)	6	28	33	-	34	-	-	-	is the La Rance tidal rise&fall-type power plant located in France?	Accepted
Gagnon (Hydro-Quebec)	6	28	39	-	-	-	-	-	should probably read 1967 instead 1997	Accepted
Louis (EDF Hydro Engineering Centre)	6	28	39	-	-	-	-	-	Since 1967 and not 1997.	Accepted
campbell (Ocean Renewable Energy Group)	6	28	36	28	37	-	-	-	this sentence is an example of some of the duplication that creeps in across the first 4 sections - same story on images here	Accepted
campbell (Ocean Renewable Energy Group)	6	28	-	-	-	6.4.2	-	-	"Not sure what to do here! Think we should focus on the emergence of the first array projects - CEO Portugal, proposals from OPT and friends, Sottish power/pemais, Wavegen, CETo etc - - then follow with exmples of modular full scle etc, then cluster of large scale prototypes and huge following class - problem is who gets named?? eg of line 14 ""none are truly commercial"" is unhelpful and innaccurate - reality is better served by stating the positive ""pre-commercial trials of individual modules and small arrays began in recent years and are expected to accelerate through the next decade. Costs of electricity from these early projects are already lower than those for solarPV and efforts such as the Carbon Trust Marine Accelerator and incentivised pilot markets are intended to accelerate the cost reduction experience to make wave a cometive renewable."	Accepted
Kruger (South African Weather Service)	6	28	22	28	22	6.4.2	-	-	Is the mentioned company Pelamis?	Accepted
Kruger (South African Weather Service)	6	28	25	28	28	6.4.2	-	-	References available for the statements?	Accepted
campbell (Ocean Renewable Energy Group)	6	29	13	29	18	-	-	-	similar to page 28 comments - emphasise that competive pricing is expected within the decade	Accepted

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by the writing team
Bonduelle (EE Consultant)	6	29	-	-	-	-	6,22	-	Power figure to be verified	Why? Are there reasons to doubt of the correctness?
Bonduelle (EE Consultant)	6	29	-	-	-	-	6,23	-	No power given	Same
Takeuchi (Advanced Industrial Science and Technology)	6	29	-	-	-	-	6.22&23	-	Figs 6.22 and 6.23 Even without these figures, it will be no problem to understand the argument which the author would like to describe.	Same
Gagnon (Hydro-Quebec)	6	29	-	-	-	-	6.23	-	" I would prefer seeing ""proposed"" instead of ""planned"" in the caption. Some of these projects have benn 'planned' for decades and never have come to realisation mainly due to important impacts seen over the years at sites such as LaRance. "	Accepted
Gagnon (Hydro-Quebec)	6	30	5	-	5	-	-	-	1 m/sec for tidal is not consistent with the 1.5 m/sec presented for tidal on page 11 line 22	Text revised.
campbell (Ocean Renewable Energy Group)	6	30	6	30	7	-	-	-	This is another example that should be written positively - - supported markets in scotland,Ireland, UK, France, Spain and Portugal will launch development projects through the coming decade, the experience and scale up wil ldrve down costs to a competive leveli	Accepted
campbell (Ocean Renewable Energy Group)	6	31	33	-	-	-	-	-	Financial incentives - this should be a bullet of its own and titled Market Development and reference wholesale market supplements and marine supply obligations	New item - Market Development
Bonduelle (EE Consultant)	6	32	10	-	-	-	-	-	Already mentioned	Text revised.
campbell (Ocean Renewable Energy Group)	6	32	5	32	10	-	-	-	I believe it would be better to deal with the market pull discussion first, then R&D and capital assistance as support for meeting targets. I suggest that the Rocs, MSO and FIT's in place be more explicit since they are likely the largest financial supports for the sector. Not all countries are listed - there could be reference to the efffort by these countries to amend and modify the approaches until they work	Text revised.
campbell (Ocean Renewable Energy Group)	6	32	2	-	-	-	-	-	is this US reference actually correct?	Text revised.
campbell (Ocean Renewable Energy Group)	6	32	9	32	10	-	-	-	While a cash prize to reward progress , the true value of the Saltire is the visibility it will give to progress - it is clearly not an incentive in itself	visibility
Sims (Massey University)	6	32	-	-	-	-	-	6.2	"""Most"" European and n American countries? Really?"	where?

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by the writing team
campbell (Ocean Renewable Energy Group)	6	32	-	-	-	-	-	6.2	Aspirtional targets - Canada 14000MW by 2050 National Roundtabel on the environment and economy. Project Deployment Capital grants - Clean Energy Fund Canada. Feed in tarrifs - what about rest of countries? National Marien Energy Centre Fundy Ocean Resources Centre - Canada. Testing Centres and Hubs - important to recognise that most of the newer approaches are actually development centres, anticipating power project development to grow out of the testing berths/phase. Standards/protocols - UK effort has to be set in context of the international effort for IEC. Permitting regimes - could add Canada's Pacific and atlantic coasts	Proposals Accepted for some proposals
campbell (Ocean Renewable Energy Group)	6	33	-	-	-	6.5	-	-	There is unnneeded repetition between intro section and the rest. The general tone could better be one of developing a new marine industry/technology with an awareness appropriate to early 21st C.Generally, I think this section could be more positive, shorter and more focused by referencing that this has been and is being actively studied as any project proposals move forwaed.	Must check for duplication
Kruger (South African Weather Service)	6	33	5	33	5	6.5.1	-	-	"Replace ""accounted"" with ""considered""?"	Will change
campbell (Ocean Renewable Energy Group)	6	33	-	-	-	6.5.1	-	-	This section could best open with a discussion of the SEA's in Scotland and Atlantic Canada, the environmental studies in Europe and Oregon and the project EA's (Verdant, MCT, Enersis, FORCE,Aquaenergy etc). This analysis could then set the ecene that -veGHG issues are restricted to manuf, inst and maint, intrusions are mostly in the installation phase etc Intro should deal with the concept that ocean energy plant sites are likely to remain in production for ever, though with eqipment renewal and upgrading. The discussion of reversibility is incorrect and innapprropriate. Leave the resource by resource disc to the following sections	Revisit editing
SCOWCROFT (EURELECTRIC)	6	34	42	-	-	-	-	-	Also coastally attached lagoons.	Will amend the text
Vahrenholt (RWE Innogy GmbH)	6	34	42	-	-	-	-	-	Also coastally attached lagoons.	Will amend the text
campbell (Ocean Renewable Energy Group)	6	34	19	-	-	-	-	-	EM fields, not pulses	Will edit
campbell (Ocean Renewable Energy Group)	6	34	25	34	25	-	-	-	I think this could be stated as downsream wave energy raising concerns about beach structure and for leisure communities like surfers	Need Reference

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by the writing team
campbell (Ocean Renewable Energy Group)	6	34	34	34	37	-	-	-	stay out of fishery debate - simply state that the active work sites may be exclusion areas to fishing and will de facto create refuges which may be anet benefit to fishery resources, but an disruption for local fisheries	Will modify
de Campos Barbosa (Petrobras)	6	34	25	34	27	-	-	-	The negative impacts of wave height alteration are beyond the surfing communities, as it can possibly affect some important ocean dynamics, specially on nearshore and shoreline areas.	Need Reference
campbell (Ocean Renewable Energy Group)	6	34	16	34	19	-	-	-	this could be situated better with ref to exiasting experience with transmission cables	Need Reference
Kruger (South African Weather Service)	6	34	26	34	26	6.5.2	-	-	Isnt the reduction of swell conditions highly unlikely in most cases?	Will edit
Kruger (South African Weather Service)	6	34	5	34	6	6.5.2	-	-	What is the public perception that is mentioned in the sentence?	Needs Reference
Bonduelle (EE Consultant)	6	35	6	-	-	-	-	-	"Precise ""responsible operation"""	Added 'environmentally aware operations'
SCOWCROFT (EURELECTRIC)	6	35	39	-	-	-	-	-	Areas with high tidal currents can be rich in biodiversity and may be environmentally designated.	Will include reference to biodiversity and environmental designation
Vahrenholt (RWE Innogy GmbH)	6	35	39	-	-	-	-	-	Areas with high tidal currents can be rich in biodiversity and may be environmentally designated.	Will include reference to biodiversity and environmental designation
SCOWCROFT (EURELECTRIC)	6	35	17	35	20	-	-	-	Coastal processes may be disrupted.	Will add section on effects on coastal processes
Vahrenholt (RWE Innogy GmbH)	6	35	17	35	20	-	-	-	Coastal processes may be disrupted.	Will add section on effects on coastal processes
campbell (Ocean Renewable Energy Group)	6	35	10	-	-	-	-	-	Flat - better term might be still-water or slack-tidal	Changed to 'slack tidal'
campbell (Ocean Renewable Energy Group)	6	35	19	-	-	-	-	-	not sure I understand the double ref to currents in this section	Text revised.
campbell (Ocean Renewable Energy Group)	6	35	42	-	-	-	-	-	slow sppeed also compared to vessel propellors etc	Will include reference to vessel propeller speeds
Bonduelle (EE Consultant)	6	35	4	-	-	-	-	-	The Rance is not a project	Replaced 'project' with 'installation'
Bonduelle (EE Consultant)	6	36	16	-	-	-	-	-	Ancient reference (1966)	fundamental reference
campbell (Ocean Renewable Energy Group)	6	36	1	-	-	-	-	-	no need to reference trawling specifically	Will edit

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by the writing team
campbell (Ocean Renewable Energy Group)	6	36	-	-	-	6.5.4.2	-	-	this could likely be shortened with statement that likely to be in deper water lower sensitivity areas, scale of extraction vs resource in place might be useful	Duplicate
campbell (Ocean Renewable Energy Group)	6	36	-	-	-	6.5.5	-	-	this could likely be shortened with statement that likely to be in deper water lower sensitivity areas, scale of extraction vs resource in place might be useful	Editing would help
Gagnon (Hydro-Quebec)	6	37	26	-	27	-	-	-	same as above.Why is this a limitations? Why cant an osmotic plant operate in low flow conditions? Please expand, the reasoning is not obvious	Can rephrase to clarify
campbell (Ocean Renewable Energy Group)	6	37	-	-	-	6.5.6	-	-	this could likely be shortened with statement that likely to be in areas of extensive natural mixing, scale of extraction vs resource in place might be useful	Not easy to change
campbell (Ocean Renewable Energy Group)	6	37	-	-	-	6.6	-	-	This section is too negative and abstract to help. It could open with statements about the efforts underway to mature technologies and develop installation, operation and maintenance experience. It might emphasis some of the reasons why an accelerated learning curve might be possible - with modularity being central to most approaches inergenerational improvements can be expected rapidly and they may be able to be adopted within normal capital lifetimes by swapins during maintenance, some of the larger infrastructural approaches can benefit from incorporation into marine infrastructure projects etc. This section could highlight the roadmapping efforts in the UK and beginning in Canada and the US. It should highlight the recent entry of rolls, Alstom, DCNS, ABB, Voith Siemens, Lockheed Martin,Spanish and Portueges industrials. It can make the poiojn t that a supply chain is beginning to emerge with experience from the fist projects and alliances being built for future activity. It should emphasise that the market pull mechanisms are designed to move productive and integrated solutions forward - all of these moves are destined to accelerate reliability, performance and cost pictures.	Can incorporate some of these concepts into section
campbell (Ocean Renewable Energy Group)	6	37	-	-	-	6.6.1	-	-	these sections are written as technology improvement rather than system installation, ops and maint.	Title of 6.6.1 is technology improvement.
campbell (Ocean Renewable Energy Group)	6	37	-	-	-	6.6.2	-	-	Should the commonality with hydro be emphasised, with point that lots of tech improvement in recent decades	Reference Hydro Chapter
campbell (Ocean Renewable Energy Group)	6	37	-	-	-	6.6.3	-	-	This one also begins with a negative!!!!!!	Will deal with

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by the writing team
Ahmed (The University of the South Pacific)	6	39	26	-	-	-	-	-	"""hest exchanger"" to be corrected to ""heat exchanger""."	Will change
Gagnon (Hydro-Quebec)	6	39	34	-	-	-	-	-	"for clarity, I suggest to add ""of R-12/31"" after ""main advantages"" "	Will include with 307
Ahmed (The University of the South Pacific)	6	39	14	-	-	-	-	-	"Suggested change ""convert the working fluid from liquid to vapor phase and ...""""	Will change
Bonduelle (EE Consultant)	6	39	9	-	-	-	-	-	Is this a hope ?	We should add in here experience with Strangford Lough MCT
Bonduelle (EE Consultant)	6	39	33	-	-	-	-	-	R-12/31 is dichlorodifluoromethane, bad for the ozone layer and a powerful GHG□	Edit to say appropriate commercial refrigerants
campbell (Ocean Renewable Energy Group)	6	39	-	-	-	6.6.5	-	-	this is silent on the energy intensity question - will this limit scale and applicability?	Resource magnitude is covered in section 6.2.6
Bonduelle (EE Consultant)	6	40	24	40	30	-	-	-	Does it take into account present copper costs, and the grid connection costs ?	Yes
campbell (Ocean Renewable Energy Group)	6	40	-	-	-	6.7	-	-	lot of overlap/repetition in these sections- causes confusion	Walt Will revisit with editted text.
Kruger (South African Weather Service)	6	40	21	40	21	6.7.1	-	-	"Insert ""cost"" before ""studies□""."	Not necessary as cost is elsewhere in the sentence and whole is contained in cost section.
Kruger (South African Weather Service)	6	40	19	40	19	6.7.1	-	-	"Insert ""therefore"" before ""national..."""."	Will Change
Kruger (South African Weather Service)	6	40	35	40	35	6.7.1	-	-	A reference is needed for the Carbon Trust report.	Will add reference
campbell (Ocean Renewable Energy Group)	6	40	-	-	-	6.7.1	-	-	why not start with statement that incented markets are being used to drive the learning that will establish short -term costs and the trajectory to longer term competiive performance, then simply state that the Portuguese FIT (=?) and the Scotalnd % Rocs (=?) are moving projects ahead and establishing a 2010 starting price. You can then simply state that the earlier analysis have proven low but likely reflect what will be seen in coming years	Will add appropriate text to section 6.4.7
campbell (Ocean Renewable Energy Group)	6	41	11	41	13	-	-	-	does thi sentence make sense??	Add using
SCOWCROFT (EURELECTRIC)	6	41	35	-	-	-	-	-	However, wave power schemes are offshore with high associated external costs and also cannot have the same benefit of scaling up as wind turbines, so learning rate may be lower.	Duplicate

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by the writing team
Vahrenholt (RWE Innogy GmbH)	6	41	35	-	-	-	-	-	However, wave power schemes are offshore with high associated external costs and also cannot have the same benefit of scaling up as wind turbines, so learning rate may be lower.	Walt to add sentences to justify learning curve used and scaling issues
campbell (Ocean Renewable Energy Group)	6	41	-	-	-	6.7.2	-	-	"should this and 6.7.3 be combined to reduce duplication and make the point that both are subject to same issues; "	Not easy to see how or what as very different
campbell (Ocean Renewable Energy Group)	6	42	-	-	-	6.2.4	-	-	much of the discussion in these sections should be framed around the start of the competitive phase (2020, 2-5GW and emphasising that Capacity Factors are expected to be in the 30-40% range	Not sure where this refers as 6.2.4 not this
Rybach (Geowatt AG)	6	43	19	-	20	-	-	-	☐costs associated with tidal rise and fall technologies may appear high☐ ☐ how high?	Willl edit
campbell (Ocean Renewable Energy Group)	6	43	7	43	9	-	-	-	this can be expresed differently --early projects will pick the best sites to optimise output. Experience is likely to open up options for lower energy sites.	Will add in
campbell (Ocean Renewable Energy Group)	6	43	-	-	-	6.7.3	-	-	Cost is a confusing term here - is the point that these tend to be mega projects with high up front capital costs?	will edit as 322
Bonduelle (EE Consultant)	6	44	6	-	-	-	-	-	"Predictable may be a little optimistic. Why not ""foreseen"""	will edit
Gagnon (Hydro-Quebec)	6	44	34	-	-	-	-	-	for consistency should be 0.10-0.30 US$/kWh	Will edit
Gagnon (Hydro-Quebec)	6	44	28	-	-	-	-	-	for consistency should be 0.143 US$/kWh	Will edit
campbell (Ocean Renewable Energy Group)	6	44	36	44	39	-	-	-	I don't agree - these are likely to be entirely different scal, interconnection and operating environment	Will edit
Sims (Massey University)	6	44	15	-	-	-	-	-	When will it become compeitive? Decades or years or months???	Walt will revisit references to investigate timescales
Gagnon (Hydro-Quebec)	6	45	8	-	-	-	-	-	"should read "" and $0,18/kWh for"""	Units
Gagnon (Hydro-Quebec)	6	45	6	-	-	-	-	-	"should read "",and $12,300/kW for"" "	Units
Bonduelle (EE Consultant)	6	45	31	-	-	-	-	-	Figures in Euro when all others are in US dollars	Must edit
campbell (Ocean Renewable Energy Group)	6	45	31	45	31	-	-	-	this cost estimate is not qualified in any way - current, future, what scale? How reliable? Where does potential for osmotic a base load get discussed?	Needs Reference
campbell (Ocean Renewable Energy Group)	6	45	-	-	-	6.7.5	-	-	should this discuss the challnege for a technology in which each iteration is so big and expensive	Will revisit to streamline the text . Record Ocean thermal cooling/desalination etc in section 6.3.5
Gagnon (Hydro-Quebec)	6	46	5	-	-	-	-	-	"has been instead of ""has being"" "	Will do

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by the writing team
BHUYAN (Powertech Labs Inc)	6	46	37	-	-	-	-	-	Information need to be updated considering recent Korean government's announcement for planning/construction phase for another tidal barrage project (>1000 MW)	Will update
campbell (Ocean Renewable Energy Group)	6	46	23	46	23	-	-	-	pre-commercial is not a good term - pilot power plant status is the critical stage, likely that true commercial is a way off!	Walt to be aware of definitions and descriptions in redrafting the new 6.8
Rybach (Geowatt AG)	6	46	44	-	-	-	-	-	reference should be made here to Figure 6.23.	Will update
campbell (Ocean Renewable Energy Group)	6	46	25	46	33	-	-	-	the key point that must be brought out is that the policy tool that has emerged in the last few years is market pull and access to sites/incubators, capital grants serving to get the access.	Build into discussion section 6.8
campbell (Ocean Renewable Energy Group)	6	46	12	46	14	-	-	-	this should be the opening point in this section - countires leading are using market pull	Walt rewriting 6.8 to take into account
campbell (Ocean Renewable Energy Group)	6	46	-	-	-	6.8	-	-	before reading chapter 10 I decided that this chapter must put forward for each resource a table for each of the next four decades - a quantitative or even qualitative assessment of the likely progress- even if all this does is identify likely decade when OE becomes competive with wind	Walt rewriting 6.8 to take into account
Aelbrecht (Electricit&#65533; de France - Hydro Engineering Center)	6	46	16	46	17	6.8.1	-	-	The opportunity of embedding OWC devices into breakwaters should be emphasized and developped : colocation of coastal protective structures (breakwaters) and OWC devices would significantly reduce infrastructures and civil engineering costs for this kind of Wave energy conversion technology.	Build into new 6.8
Aelbrecht (Electricit&#65533; de France - Hydro Engineering Center)	6	46	-	-	-	6.8.2	-	-	Development opportunities of Tide rise and fall technology in Canada (Bay of Fundy) is not mentioned, whereas it is the highest tidal range that can be encountered worldwide.	No planned development
campbell (Ocean Renewable Energy Group)	6	47	10	47	12	-	-	-	do not agree with this - Nova scotia will use two ducted turbines and many of the proposed euro and asian projects include them.	Will incorporate
campbell (Ocean Renewable Energy Group)	6	47	26	47	30	-	-	-	this is a repeat of an earlier position I think is wrong	Will review
campbell (Ocean Renewable Energy Group)	6	47	17	47	18	-	-	-	this sentence is unneccessarily negative - it could be put the other way around with disc of the entrance of RR , Alstom etc as players who can take the early generation machines commercial	Will incorporate

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by the writing team
campbell (Ocean Renewable Energy Group)	6	47	-	-	-	6.8.4	-	-	diplacement discussion and comments on resource not being the issue is common to all - issue is that of scale and closeness to markets. If the offshore energy to ammonia is to be discussed it also should be discussed as the longer term possibility for offshore wind, wave and remote tidal - this may ne a point somewhere in the chapter, but it creates a bit of a science fiction story here.	Will review and address emphasis of issues
Louis (EDF Hydro Engineering Centre)	6	58	15	-	16	-	-	-	"Use of local labor is not only an advantage for small scale projects. For the 1070 MW project in central Laos, more than 80% of the work force was recuited in the host country (""Lao preference"")."	Alert TSU that this could be wrongly assigned
campbell (Ocean Renewable Energy Group)	6	-	-	-	-	-	-	-	"address how OE can be a part of the solution; need an ""iconic pathway"" - perhaps a table of resources(thorpe or better?), distribution (ubiqu, local, etc), scope scale and timing; best effort at projections needed (standard LCOE template, offer from Daniel??? to help)"	Cost information is being revised for SOD. Will look at addressing remainder of the comment.
campbell (Ocean Renewable Energy Group)	6	-	-	-	-	-	-	-	"Suggestions at the Wash meeting to use Scottish acceptance of 5 Rocs as triggering 2010 market then apply a range of cost reduction curves; summarise country targets and use additively for a low deployment rate and as a percentage of resources to generate a high estimate"	Will try to develop cumulative total for ocean energy national targets but this information may be optimistic as a minimum scenario.
campbell (Ocean Renewable Energy Group)	6	-	-	-	-	-	-	-	"The chapter does the sector a disservice by failing to articualte any estimate of the contribution that Ocean energy may offer CC solutions. See for instance - 200GW by 2025 - http://www.pikeresearch.com/research/hydrokinetic-and-ocean-energy. Leads to chap 10 p7 l21""overall contribution is limited"" andC 10 p19 35 on - no mention at all . Chapter 10 has to rely on IEA docs to do any modelling"	Will include in re-write of Section 6.8
Dunn (GE Energy)	6	-	-	-	-	-	-	-	As mentioned during expert review meeting, prototype/early-stage of ocean technology lends itself well to multiple case studies that can pull together information on projects that is currently scattered throughout the chapter.	Technologies are at an early stage if development. Techniologies are diverse and no one case study would be representative of the whole of ocean technologies There is also a limitaiton in respect of pages allocated to Chapter 6.
SCOWCROFT (EURELECTRIC)	6	-	-	-	-	-	-	-	Chapter 6 of the IPCC SRREN FOD seems to be a fair representation of the various forms of ocean energy and their potentials. The cost predictions for the wave and tidal stream projects appear to be optimistic in our experience.	Cost information is being revised for SOD by work with cross-cutting Chapter 10
Nielsen (Statoil)	6	-	-	-	-	-	-	-	During the revision of the report it would worthwhile to consider the two attached reports from ISSC, see SRREN_Draft1_Review_Nielsen_FinnG_Material02.pdf, SRREN_Draft1_Review_Nielsen_FinnG_Material03.pdf	Will check during general edit

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campbell (Ocean Renewable Energy Group)	6	-	-	-	-	-	-	-	Employment opportunies in ocean energy - http://www.scotland.gov.uk/Resource/Doc/281865/0085187.pdf	Will review cited reference and add some employment information into market development
BHUYAN (Powertech Labs Inc)	6	-	-	-	-	-	-	-	Further discussion (through case studies) on role of ocean renewable resources for non-electricity utilizations would strengthen the chapter	Executive Summary - tehcnology for mecahnical also
Gagnon (Hydro-Quebec)	6	-	-	-	-	-	-	-	Good document, already well reviewed (in Turquoise). A good high level overview of this commercially emerging field	Positive
Musial (National Renewable Energy Laboratory)	6	-	-	-	-	-	-	-	I suggest a single table in section 2 to summarize the global resource potential for all technologies.	Individual Technology Section editors must visit this to take account of individual resource numbers. Expand and edit Table 6.1
de Haan (Ernst Basler + Partner AG)	6	-	-	-	-	-	-	-	No comments from this expert to chapter 6 ocean energy	OK
Bonduelle (EE Consultant)	6	-	-	-	-	-	-	-	No mention in the whole chapter of biofuels from algae	In biomass chapter
Musial (National Renewable Energy Laboratory)	6	-	-	-	-	-	-	-	please see detail comments on track changes draft SRREN_draft0_Review_musial_walt_material01.doc	will check during general edit
Musial (National Renewable Energy Laboratory)	6	-	-	-	-	-	-	-	Section 7 should be reorganized. Tidal and wave should be combined and the present tidal section should be merged in to avoid repetition.	Walt will edit and include
Musial (National Renewable Energy Laboratory)	6	-	-	-	-	-	-	-	Section 8 on deployment needs to be written with better estimates. Few of the technologies have any deployment figures at all. I suggest a table with a short summary. Since the technology is very new I think the deployment estimates must be tied to the resource in section 2. Most of section 8 is a repeat of the market information on specific devices.	Will include in re-write of Section 6.8
contaldi (ISPRA, Institute for Environmental Protection and Research)	6	-	-	-	-	-	-	-	The chapter is interesting to read and illustrate a sector less known than others. In my view I woud not cut any of the informations reported, I do not see repetitions.	Positive
Bonduelle (EE Consultant)	6	-	-	-	-	-	-	-	The chapter lacks some orders of magnitude on the possible power or energy, and timescales for their use. This is of cours uncertain, but no more than many claims by CCS proposals. This is the main drawback of the chapter	Will be addressed in Chapter 6.8

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Musial (National Renewable Energy Laboratory)	6	-	-	-	-	-	-	-	There are several refernces in the chapter that make negative references to other renewable energy sources in order to make the case for marine energy. Hese should be deleted or changed to a positive statement. For example, if marine energy has a high capacity factor it should be stated but there is no need to highlight the fact that wind has a lower capacity factor. The the wind technology chapter does a good job explaining this.	will check during general edit
Branche (Electricit&#65533; de France (EDF))	6	-	-	-	-	-	-	-	Tidal energy is a mature technology. Indeed tide rise and fall is not a new technology at the difference of other ocean energy sources (example La Rance in France since 1967)	Don't we say that ??? To be checked
de Campos Barbosa (Petrobras)	6	-	-	-	-	6.1	-	-	Submarine Geothermal Energy is not commonly referred to as an OTEC resource. OTEC resource is the temperature gradient between ocean surface and deep cold layers, 1000 meters below the surface, as explained in section 6.2.5	Submarine geothermal energy is clearly defined as a subset of OTEC.
Nielsen (Statoil)	6	-	-	-	-	6.2.1	-	-	"I recommend that most of this section is reformulated. Relevant formulations may be found in: SRREN_Draft1_Review_Nielsen_FinnG_Material01.pdf (Falnes, 2007) SRREN_Draft1_Review_Nielsen_FinnG_Material02.pdf (ISSC2006) SRREN_Draft1_Review_Nielsen_FinnG_Material03.pdf (ISSC2009)"	Will incorporate into re-edit of Section 6.2.1
de Campos Barbosa (Petrobras)	6	-	-	-	-	6.2.4	-	-	It should be mentioned that energy from ocean currents are difficult to exploit, because they are variable in flow and position in the ocean	Will include additional comments
BHUYAN (Powertech Labs Inc)	6	-	-	-	-	6.3	-	-	Some further discussion on characteristics of wave, tidal current, OTEC , salinity conversion processes and their interaction with electrical network, particularly emphasizing potential advantages in comparison to other renewable power, would add value to the chapter	Will review section and add comments on electrical production
Nielsen (Statoil)	6	-	-	-	-	6.3.2	-	-	"I recommend that most of this section is reformulated. The section must convey the message that to extract wave energy is all about generating waves! It is about wave interaction (avoid reflected and transmitted waves). For a passive system it must operate at resonance to be effective, outside resonance phase control, e.g. by latching is needed. Include examples on maximum extractable energy for point absorbers and terminators (2D devices) as well as contraints related to the volume of the devices. See SRREN_Draft1_Review_Nielsen_FinnG_Material01.pdf (Falnes, 2007). Also introduce the term ""capture width"" that is essential to quantify the efficiency of a wave power device. "	Will review with author of original section and amend accordingly but the level of detail proposed is beyond the scope of this Report.

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de Campos Barbosa (Petrobras)	6	-	-	-	-	6.5	-	-	In general, this section is very well addressed, but lacks on references. One possible source is IEA Implementing Agreement on Ocean Energy Webpage: http://www.iea-oceans.org	Will seek and add references
Nielsen (Statoil)	6	-	-	-	-	6.5.1	-	-	"In discussion the environmental impacts the Lifecycle emissions should be considered, see Jacobsen, Mark Z. ""Review of solutions to global warming, air pollution, and energy security"", Energy & Environ. Sci. 2009, 2, 148 - 173"	Will add references to lifecycle emissions
de Campos Barbosa (Petrobras)	6	-	-	-	-	6.5.2	-	-	It may also mention possibly navigation routes conflicts	Will add reference to conflicts with navigation routes
SCOWCROFT (EURELECTRIC)	6	-	-	-	-	6.7.3	-	-	No costs are given for tidal range. Seems to be an omission as costs are given for others. Costs are available for schemes already built and also UK DECC has published reports with projected costs.	Will seek and add costs for Sihwa Lake development and historical costs from La Rance; estimates from Severn Estuary studies
Vahrenholt (RWE Innogy GmbH)	6	-	-	-	-	6.7.3	-	-	No costs are given for tidal range. Seems to be an omission as costs are given for others. Costs are available for schemes already built and also UK DECC has published reports with projected costs.	Will seek and add costs for Sihwa Lake development and historical costs from La Rance; estimates from Severn Estuary studies
de Campos Barbosa (Petrobras)	6	-	-	-	-	6.7.3	-	-	This section should bring some numbers for La Rance and other tidal range developments, as this is the only type of ocean energy that really has real economic information available	Will seek and add costs for Sihwa Lake development and historical costs from La Rance; estimates from Severn Estuary studies
Nielsen (Statoil)	6	-	-	-	-	-	6.1	-	I believe it is useful to distinguish between wave energy level, in kW/square meter, and flux of energy (kW/m). The last one is what we need to consider.	Will add text note on kW/m
Nielsen (Statoil)	6	-	-	-	-	-	6.17	-	Looks like left figure is a cross flow turbine.	Left figure is SeaGen - a horizontal axis twin-bladed rotor turbine
Nielsen (Statoil)	6	-	-	-	-	-	6.19	-	Define CEM and AEM	Will define CEM and AEM
Nielsen (Statoil)	6	-	-	-	-	-	6.2	-	Can be omitted.	Will reduce to one map but wave resource map should be included
campbell (Ocean Renewable Energy Group)	6	-	-	-	-	-	6.3	-	simplify caption to reference the tidal amplitude hot spots	Will simplify caption
campbell (Ocean Renewable Energy Group)	6	-	-	-	-	-	6.6	-	Not sure this adds enough to justify the space	Will review with original author and consider removal of diagram and simplification of section
Nielsen (Statoil)	6	-	-	-	-	-	-	6.1	Add a column giving yearly average power per m wavefront along the coastlines (kW/m)	Will seek wavepower estimates (kW/m) for various countres