STRATEGIC BUSINESS PLAN (SBP)

IEC/TC OR SC:	SECRETARIAT:	DATE:
TC 114	**United Kingdom**	**2016-07**

Please ensure this form is annexed to the Report to the Standardization Management Board if it has been prepared during a meeting, or sent to the Central Office promptly after its contents have been agreed by the committee.

A. STATE TITLE AND SCOPE OF TC

TC 114: Marine Energy – Wave, tidal and other water current converters,

TC 114 was established by the IEC in 2007 and the inaugural plenary was held in Ottawa, Canada in May 2008. Since then, TC 114 annual plenaries have been held in Seoul, Republic of Korea (2009), Edinburgh, Scotland (2010), Boston, USA (2011), Oslo, Norway (2012), Tokyo, Japan (2013), Vancouver, Canada (2014) and Dublin, Ireland (2015).

The scope of TC 114 was established at the first plenary in 2008 and had not been modified since. An updated scope is provided here:

“To prepare international standards for marine energy conversion systems. The primary focus will be on conversion of wave, tidal and other water current energy into electrical energy, although other conversion methods, systems and products are included. Tidal barrage and dam installations, as covered by TC 4, are excluded. The standards produced by TC 114 will address:

- system definition
- performance measurement of wave, tidal and water current energy converters
- resource assessment requirements, design and survivability
- safety requirements
- power quality
- manufacturing and factory testing
- evaluation and mitigation of environmental impacts”

B. MANAGEMENT STRUCTURE OF THE TC

TC 114 is comprised of Project Teams, Maintenance Teams and ad-Hoc Groups.

As of April 1, 2016, the following countries were either participating (P) countries or observing (O) countries:

Participating (P) Countries: Canada, China, Denmark, France, Germany, Iran, Ireland, Israel, Japan, Republic of Korea, Netherlands, Norway, Spain, Sweden, United Kingdom, United States

Observing (O) Countries: Brazil, Czech Republic, Italy, Poland, Portugal, Romania, Russian Federation, Saudi Arabia, Singapore, Ukraine

Publications:

As of April 1, 2016, the following TC 114 publications have been issued:

IEC TS 62600-1:2011 Edition 1.0 (2011-12-07)

Marine energy - Wave, tidal and other water current converters - Part 1: Terminology

IEC TS 62600-10:2015 Edition 1.0 (2015-03-27)

Marine energy – Wave, tidal and other water current converters – Part 10: Assessment of mooring system for marine energy converters (MECs)

IEC TS 62600-100:2012 Edition 1.0 (2012-08-30)

Marine energy - Wave, tidal and other water current converters - Part 100: Electricity producing wave energy converters - Power performance assessment

IEC TS 62600-101:2015 Edition 1.0 (2015-06-05)

Marine energy - Wave, tidal and other water current converters - Part 101: Wave energy resource assessment and characterization

IEC TS 62600-200:2013 Edition 1.0 (2013-05-07)

Marine energy - Wave, tidal and other water current converters - Part 200: Electricity producing tidal energy converters - Power performance assessment

IEC TS 62600-201:2015 Edition 1.0 (2015-04-09)

Marine energy - Wave, tidal and other water current converters - Part 201: Tidal energy resource assessment and characterization

Liaisons:

As of April 1, 2016, TC 114 has established official liaisons with the following organizations:

IEC: TC 4 (Hydraulic Turbines); SC 8A (Grid Integration of Renewable Energy Generation); TC 88 (Wind Turbines);

ISO: TC 43 SC 3 (Underwater Acoustics); TC 108 SC5 (Condition monitoring and diagnostics of machines)

International Energy Agency – Ocean Energy Systems: Annex 1-5

C. Business Environment

Whilst investment in marine energy has continued there has been a slowdown of the rate of investment in some countries, partly due to the international economic situation. The wave sector continues to require research to solve a range of failures revealed by testing. Tidal stream devices have begun to undergo technology convergence and early commercial adoption of small arrays. Rejection of the nuclear power option by some nations has stimulated interest in marine energy with permanent ocean currents now becoming a focal point for nations which have proximity to them.

World resource estimates are substantially unchanged and continue to represent a huge opportunity. The reduction of cost occupies a significant level of attention although this is difficult to realise until devices may be regarded as more proven in operation. The installation of a small number of pre-commercial arrays in some locations will build up the operational experience of technology developers. The industry continues to carry out testing at scale in tanks and sheltered sea areas as well as open sea and in- steam river testing of prototypes. Arrays represent a further opportunity for new performance standards for those situations. The introduction of a renewable energy Conformity Assessment System by the IEC (see B.2 below) will give rise to calls for new standards.

D. Market Demand

The customer base for the published and future standards remains: industry (device and project developers and manufacturers), utility companies, investors, national and local government bodies, test centres, certification bodies and regulators. The formation of a new Conformity Assessment System by the IEC for renewable energies (wind, solar PV and marine) entitled “IEC system for certification to standards relating to equipment for use in renewable energy” (IECRE), will also tend to give rise to further requests for standards. The installation of pre-commercial arrays represents a further potential area where new standards will be required.

E. Trends in Technology and in the Market

Testing of individual devices at both full and reduced scales remains the primary focus of industry activity. There is also a trend to continue the operation of test devices often with instrumentation enhancements to facilitate research programmes. The focus of these includes design or power capture verification, performance enhancements, acoustic characterization and visualisation of wildlife close to devices and modelling/measuring of turbulence, among other topics.

Several demonstration projects of single or multiple devices are in planning phase to improve technology acceptance and prepare for commercialization. Testing of arrays and examination of the resource reduction caused by small clusters of devices is likely to give rise to requirement for new standards.

Test facilities are emerging in more locations around the world and efforts will be made to harmonise and coordinate ways in which testing is conducted to assist in the opening up of international markets. Several nations are seeking to establish “centres of excellence” based on test facilities.

Market opportunities are beginning to arise for marine energy from supplying dedicated customers and isolated communities. In a number of cases, islands represent niche opportunities for the deployment of marine renewable energy devices. Other opportunities exist where a dedicated customer may exist for the purchase of renewable marine-generated power. In some locations, combining marine energy with batteries, hydrogen manufacturing systems, or other developing storage technologies to “smooth out” the production profiles is beginning to be considered.

Lack of grid infrastructure remains a challenge and in some jurisdictions physically prevents growth of marine energy. Very often the sources of demand on a larger scale are remote from the marine energy resources. For some regions this is a serious problem to continuing development of marine energy.

There is ongoing research on a range of environmental sensitivities in several countries. In addition, skills and techniques in environmental monitoring are being built up. Evidence to date is that there is negligible impact on the environment indicated due to single devices or a number of separate single devices in a given area. Similar studies will need to be carried out in the early or initial array locations to further verify this or otherwise. The committee will work to standardize measurement methodologies of physical parameters of the devices (e.g. vibration, noise, electromagnetic fields) to support these studies.

Sustainability has to remain at the heart of all marine energy developments; some standardisation of approach to environmental monitoring is frequently called for to ensure consistency on an international basis. It is accepted that any detailed guide to environmental impact assessment is problematic due to the varying legislative regimes that different countries may have. Significant international dialogue continues to try and harmonise approaches to sustainable development as far as practicable.

F. SYSTEMS APPROACH ASPECTS

The principal objective is to deliver the required confidence to grow a marine energy sector. To achieve this, TC 114 will work closely with the IECRE to ensure that documents delivered will support the certification, financing, insurance and safety of marine energy converter types and associated projects, enhancing the commercial viability of the sector. In doing so, there is a need to draw on the experience of more established sectors which intersect or overlap with marine energy. Where possible, TC 114 will seek to adopt existing best practices as appropriate from adjacent sectors and standardise how this is applied to the novel marine energy sector. The table below details the current technical areas that are being addressed by TC 114 with adjacent external committee activities where liaisons will be actively sought:

Technical Area	**Foreground TC 114 Activity**	**Background Knowledge & External Liaison Opportunities**
Electrical Interface	62600-30 Power Quality	IEC TC 18 – Electrical Installations of Ships and of Mobile and Fixed Offshore Units IEC TC 88 – Wind Turbines (IEC 61400- 21:2008) IEC 61400-27 IEC TC 20 / SC 18A – Marine Cables IEC TC 8 / SC 8A – Grid Integration of Large Scale Renewables IEC TC 82 Solar PV (61724)
Marine Structures, Moorings and Foundations	62600-10 Moorings 62600-2 Design	IEC TC 88 – Wind Turbines (IEC 61400-1:2005/AMD1:2010, IEC 61400-3:2009) ISO TC 8 Ships and marine technology ISO TC 67 / SC 7 Offshore structures for petroleum and natural gas industries (ISO19900, ISO 19901, ISO 19903, ISO 19904 ISO 29400)
Renewable Energy Production	62600-100/102/200/300 Wave, Tidal and River Current Energy Production	IEC TC 8 / SC 8A Grid Integration of Large Scale Renewables IEC TC 88 – Wind Turbines (IEC 61400-12-2:2013, IEC 61400-12-1:2005) IEC TC 82 – Solar PV (IEC 61724:1998, IEC 61853-1:2011, IEC 62253:2011, IEC 62670-1:2013)
Environmental	62600-101/201/301 wave, tidal & river current resource characterisation 62600-40 Acoustic Characterisation	IEC TC 4 – Hydraulic Turbines IEC TC 88 – Wind Turbines (IEC 61400-11:2012) ISO TC 67 – Petroleum and natural gas industries - including Metocean ISO TC 8 – Ships and marine technology ISO TC 43/SC3 – Underwater Acoustics
Marine Scale Testing	62600-103/202 Scale marine energy converter testing	ISO TC 67 – Petroleum and natural gas industries - including Metocean ISO TC 8 – Ships and marine technology TC 88, IEC 61400-13 and IEC 61400-23
Electro-Mechanical Power Conversion Systems	62600-2 Design	IEC TC 2 – Rotating Machinery IEC TC 4 – Hydraulic Turbines IEC TC 18 – Electrical Installations of Ships and of Mobile and Fixed Offshore Units IEC TC 88 – Wind Turbines (IEC 61400- 4:2012) ISO TC 60 – Gears ISO TC 131 – Fluid Power Systems

G. CONFORMITY ASSESSMENT

TC 114 documents will be used to support the IECRE System.

H. 3-5 YEAR PROJECTED STRATEGIC OBJECTIVES, ACTIONS, TARGET DATES

The over-arching TC-114 objective is to support rapid, safe development and implementation of new marine energy converter technologies that drive progress towards the realization of commercial – scale projects and applications. During the next 3 to 5 years, TC 114 will: (1) complete a number of TSs currently under development, (2) initiate Project Teams to begin drafting new TSs, and (3) support Maintenance Teams and ad-Hoc Groups for several recently developed Technical Specifications (TSs), all geared toward the completion of first edition International Standards.

The Technical Specifications which are under development and those which are being maintained may be found on the home webpage for TC 114 as identified in Section F below. These specifications have been highlighted as being fundamental to the early stage development of marine energy converters. Future specifications will be undertaken as the needs of the marine energy sector dictate. To facilitate this strategy, TC 114 has established a priority list of specifications to be developed. This list may be rearranged and expanded as new information and understanding of the sector becomes available; however, it currently provides a baseline for the committee to use when deciding upon convening new Project Teams.

In establishing the priority of standards, both those underway and those being planned, TC 114 has considered both the stage of development of marine energy converters and the criticality of impact that a standard will have on the progress of the sector. In doing so, the focus has been equally placed on facilitating the rational maturation of devices, and the criticality of the standards in providing risk mitigation of technological, economic and societal setbacks that could endanger both the individual device and the viability of the sector as a whole.

Regarding standards supporting the progress of devices along their design path, standards which are under development address the full range of engineering stages, including:

- Full- or Sub-scale testing
- Prototype deployment and testing
- Operational devices and arrays with a lifetime of several years.

In terms of the critical nature of the standards, consideration is given in the following priority (while not inflexible, the listing below represents an overall priority within this stage of the industry development):

- Load measurement and verification
- Performance of arrays
- Management plan for technology and project development (Process Management Plan)*
- Cable / pipeline lay guidelines and procedures
- Design guidelines for subsea cables / cable networks and performance / reliability of connectors
- Design guidelines for marine energy system connection to distribution level grids (small scale projects)
- Installation (deployment) and retrieval guides
- Operation and maintenance principles
- Commissioning and decommissioning procedures
- Data acquisition and communications
- Equipment design for deployment, maintenance and retrieval
- Mechanical designs for shallow water environments
- Measurement methodologies including physical parameters of the device

- Small (community scale) tidal, river and wave systems (small remote projects)

There may be circumstances where specialized components or assemblies of marine energy converters (e.g. power take of systems) would require the development of standards.

With the identification of the specifications to be taken up, in close collaboration with the IECRE, the committee hopes to avoid unneeded work being undertaken by members to develop new work item proposals which do not address the most urgently needed specifications. Instead, members can introduce the subject of new specifications to be added to the list above, and the committee can jointly decide on the prioritization of the specification based on the urgency with which it is needed. Of particular importance is to time the establishment of new Project Teams so as not to over-extend the availability of members to support the work. It is not desirable to dilute the efforts of members working on the current Project Teams by directing their attention to other specification development, resulting in inefficient efforts on both, and resulting delays to completing documents.

The establishment of the IECRE by the Conformity Assessment Board (CAB) of the IEC will provide input to TC 114 regarding Technical Specifications necessary to support certification of marine energy converters.

* The Management plan for technology and project development is a document that defines a step-wise method of developing a design basis, a technology assessment, and a risk assessment. The creation of these documents then leads to the development of a systematic qualification plan. The qualification plan often includes the following items: the design process, the process for fabrication and testing, the process for installation and commissioning, the process for operation, maintenance and decommissioning.

STRATEGIC OBJECTIVES 3-5 YEARS	ACTIONS TO SUPPORT THE STRATEGIC OBJECTIVES	TARGET DATE(S) TO COMPLETE THE ACTIONS
TS transition to IS	The committee intends to transition existing Technical Specifications into International Standards (3-5 years). The manning of these tasks is considerable due to the immaturity of the industry so there may be a need to sequence work in a prioritized manner.	3 – 5 years
Publish PT documents	TC 114 will make a concerted effort to publish all existing (in process) Project Team documents (1-3 years). During this time there will be a need to balance the original needs of the industry and the emerging need to support developing certification requirements.	1 – 3 years
ME-OMC input	Those members of TC 114 coordinating with the certification effort will request input from the IECRE Marine Energy Operational Management Committee (ME-OMC) on additional missing standards to be compared to listing in Section H (6-12 Months). This input combined with original needs of the industry will create the future work lists.	6 – 12 months
Review NWIP recommendations	The committee will carefully review recommendations for new work items in the next 12 months in order to assess priorities of Section H and input from the IECRE ME-OMC and industry. a. It would be appropriate to establish an integrated priority work list (12-18 months) b. Assess how many new work items can be supported as the existing work is completed and support to the certification scheme is emerging.	12 – 18 months
Receive information on TSs	Establish ad-Hoc groups to receive information from published Technical Specifications in order to more quickly turn around next editions or move to standards.	0 – 5 years
Note: The progress on the actions should be reported in the RSMB.		