

The logo for STANDARDS Australia features the word "STANDARDS" in a large, bold, white sans-serif font, with "Australia" in a smaller, white sans-serif font directly below it. To the right of the text is a stylized graphic consisting of several overlapping, curved shapes in shades of yellow and orange, resembling a sun or a stylized letter 'S'. The entire logo is set against a dark background.

STANDARDS
Australia

Standards and the Future of Distributed Electricity

Discussion Paper, 11 July 2016

Please send all responses by
Monday 7 August 2016 to:

National Sector Manager – Jessica Curtis

NSM@standards.org.au



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Standards Australia

Standards Australia is the nation's peak standards body and Australia's representative to the International Electrotechnical Commission (IEC) and International Organization for Standardization (ISO).

Australian Standards are developed and approved by technical committees, constituted of members representing national nominating organisations including

industry associations, government bodies, and universities.

Compliance with Australian Standards is voluntary, unless they are called up in local, state, or Commonwealth regulations. Standards Australia also publishes lower consensus documents, including Technical Specifications and Handbooks.

Introduction

The generation, distribution, and consumption of electricity is currently undergoing extensive change. Developments in electrical storage, new types of generation, the emergence of the 'Internet of Things,' consumer preferences, and other drivers are encouraging innovation and adaptation of existing infrastructure to support new demands and directions.

In the energy and electrotechnical sectors, standards play a key role in supporting interoperability between technologies, providing consistent frameworks for design and implementation, and ensuring safety. For example, the Australian and New Zealand Wiring Rules provide the foundation for the electrical installation industry, and the development of new standards supported the growth of the rooftop solar industry in Australia.

This paper has been developed to support future planning of Australian standardisation needs in the electricity sector, and is the result of extensive stakeholder consultations across industry, consumers and government, including through a broadly constituted reference group, the Standards Australia 'Innovation in the Grid' forum and the Australian National Committee to the IEC.

This discussion paper is publically available, and we ask you to provide your feedback on the questions included throughout the paper by **Monday, 7 August 2016**. During this time we also welcome discussions with any interested stakeholders. Following this month of collecting responses, Standards Australia will compile the feedback for further discussion, including at a workshop to be held in August.

Key Stakeholders

Key stakeholders will include consumers, industry, government, and academia. We encourage submissions from groups who can compile viewpoints, such as industry associations or consumer advocacy groups, but welcome submissions from anyone.

As there are many 'disruptive' players in this industry, we would be very interested in feedback from companies, research institutions, and others who are looking at new technologies or approaches, as supporting innovation is a key goal of Standards Australia.

Background

In support of, and as a result of, the current wave of change in the electrical industry and marketplace, Australian technical experts have been contributing significant effort to updating and creating new standards in Australia and on International Electrotechnical Commission (IEC) committees. In conducting initial research for this paper, we identified at least 35 Australian technical committees and 45 international committees working in this area, supported by many further subcommittees and working groups. While nominated experts play a vital role acting as liaisons across multiple committees, it has been noted by committee members that additional coordination across national committees and between national and international committees would be beneficial.

Stakeholders have also identified a lack of a clear path forward for standards on some specific technologies such as advanced metering and energy storage, and asked Standards Australia to facilitate roadmaps to enable this work to be undertaken. Previous work of this type has included the development of roadmaps for Electric Vehicles in 2010, and Smart Grids in 2012.

The intersection of these varied activities and rapid innovation in this area has signalled that broad coordination of current and future standardisation activities would provide significant benefits to Australian technical committees, consumers, and industry.



ELECTRICITY NETWORK TRANSFORMATION ROADMAP

Energy Networks Association Network Transformation Roadmap

In parallel with the stakeholder feedback outlined above, the Energy Networks Association (ENA) and CSIRO identified standards as a key technological enabler for the future of a fully transactive network, as part of their Network Transformation Roadmap (NTR).

The ENA describes the objectives for the NTR as follows:

"In this time of unprecedented change for global energy services, the Roadmap is designed to identify the preferred transition which the electricity network industry must make in the next decade, to be ready to support better customer outcomes under a diverse range of long-term energy scenarios.

By setting out a pathway for the transition of electricity networks by 2025, the Roadmap seeks to position network businesses and the whole energy supply chain for the future, to support the evolving needs of customers, innovate and develop new services that customers value and foster the long-term resilience and efficiency of Australia's energy system."¹

In the outcomes of Stage 1 of the NTR, Chapter 3 on **Technical challenges and opportunities of distributed energy resources** identified that "Standards are likely to be a critical issue in the integration of distributed energy resources."²

In order to determine the most appropriate path forward for standards to support network transformation, ENA asked Standards Australia to facilitate stakeholder feedback and create a possible workplan which will feed into the outcomes of Stage 2 of the NTR.

Standards and the Future of Distributed Electricity

The alignment of the NTR and the aforementioned interest in coordination of relevant standards work has made it clear that there are gaps in the current and future standardisation programs in this sector. In the coming months, Standards Australia will be undertaking stakeholder consultations on these topics to create a high level roadmap on Standards and the Future of Distributed Electricity. As a path forward for standards is key to ENA's NTR, they are co-resourcing this work.

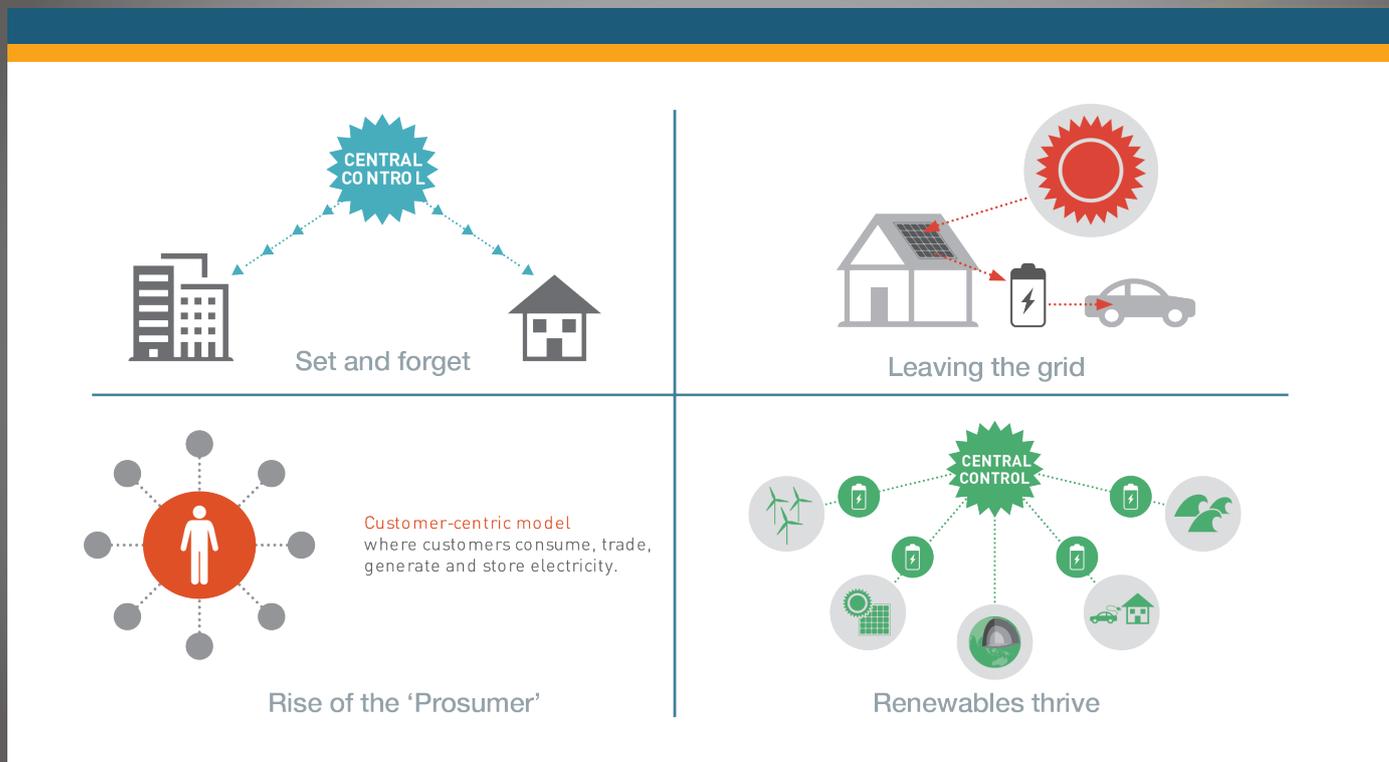
This discussion paper will provide stakeholders with a structure and background for consideration, and over the coming month we will collect feedback to feed in to a future workshop and report. This section will outline the starting assumptions, scope, and goals and outcomes. The following section will outline the layout and topics of this paper.

This initial report will both feed in to the ENA NTR work and provide an independent planning and coordination document for Standards Australia and its technical committees.

¹ Electricity Network Transformation Roadmap Overview: http://www.ena.asn.au/sites/default/files/electricity_network_transformation_roadmap_overview.pdf, p. 2

² Electricity Network Transformation Roadmap - Interim Program Report December 2015 http://www.ena.asn.au/sites/default/files/roadmap_interim_report_final.pdf, p. 80

Four 2050 Scenarios from the Future Grid Forum



Provided by CSIRO's Future Grid Forum

More information available here: <http://www.csiro.au/en/Research/EF/Areas/Electricity-grids-and-systems/Economic-modelling/Future-Grid-Forum>

Starting Assumptions

From the first conversations on this topic, it was clear that there are multiple and diverse possible futures in the generation, distribution, and use of electricity. Standards need to be developed to provide technology neutral enablers for any and all of these futures.

The CSIRO's Future Grid Forum has done extensive work examining possible futures through the lens of consumer preferences. The picture above shows the four scenarios explored by the forum, and further information on each scenario can be found on CSIRO's website.³

These scenarios identify that it is likely that the invention and implementation of new technologies will enable these possible futures, and that technologies which we take for granted today – such as the grid – are not guaranteed to be central in the coming decades. Additionally, the role of a 'prosumer' may take on a central role in future trends in energy consumption and generation, as it takes into account the varied nature of technologies used by consumers who are already turning into

local generators and may wish to take more control of their usage or generation into the future. The term prosumer will be used throughout this paper to broadly cover the related technologies.

By considering these and other futures suggested by various stakeholders, we can focus on an approach which will 'future proof' standards as much as possible.

It was also identified early that this work would need to go beyond the 'smart grid,' especially as a smart grid implicitly locks in to one future wherein the grid, or network, continues to play a central role.



As you develop your responses to the questions in this paper, we ask you to keep the unknown factors of the future in mind and focus on how standards can be technical enablers for any future, wherever possible.

³ <http://www.csiro.au/en/Research/EF/Areas/Electricity-grids-and-systems/Economic-modelling/Future-Grid-Forum>

Scope

In order to address the need to support all possible futures and address the range of relevant technologies, Standards Australia is considering a broad range of subject areas and technologies as topics for inclusion in the roadmap (the full list can be found on page 9). The focus of this paper is the technology found throughout the electrical system, in addition to considering the data that is being and will continue to be created as these technologies advance.

As the image to the right emphasizes, consideration of the interaction between multiple technologies is as important a consideration as the standardisation of the technologies themselves.

This process will take into account work already underway on two roadmaps; advanced metering and energy storage, in addition to the longstanding work being done in numerous Australian and international standards committees, and place these into the larger context of the future of electricity.

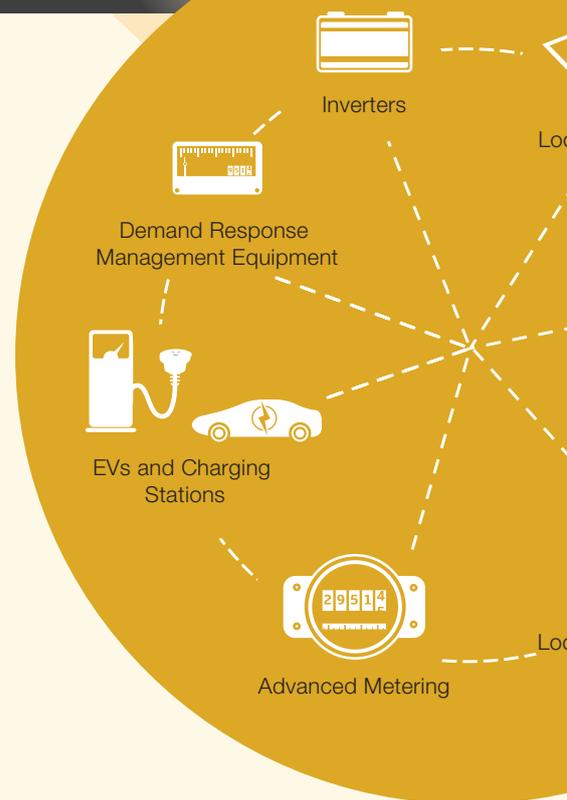
Despite the importance and connection of the 'Internet of Things' to the future of all technology, as a topic it was too large to be beneficially considered in this process. Additionally, while some management standards are relevant to consider when discussing the direct management of technical assets (for example, asset management or risk management), the management of energy efficiency processes as found in ISO 50001 is outside the scope.

Governance and Services including Security

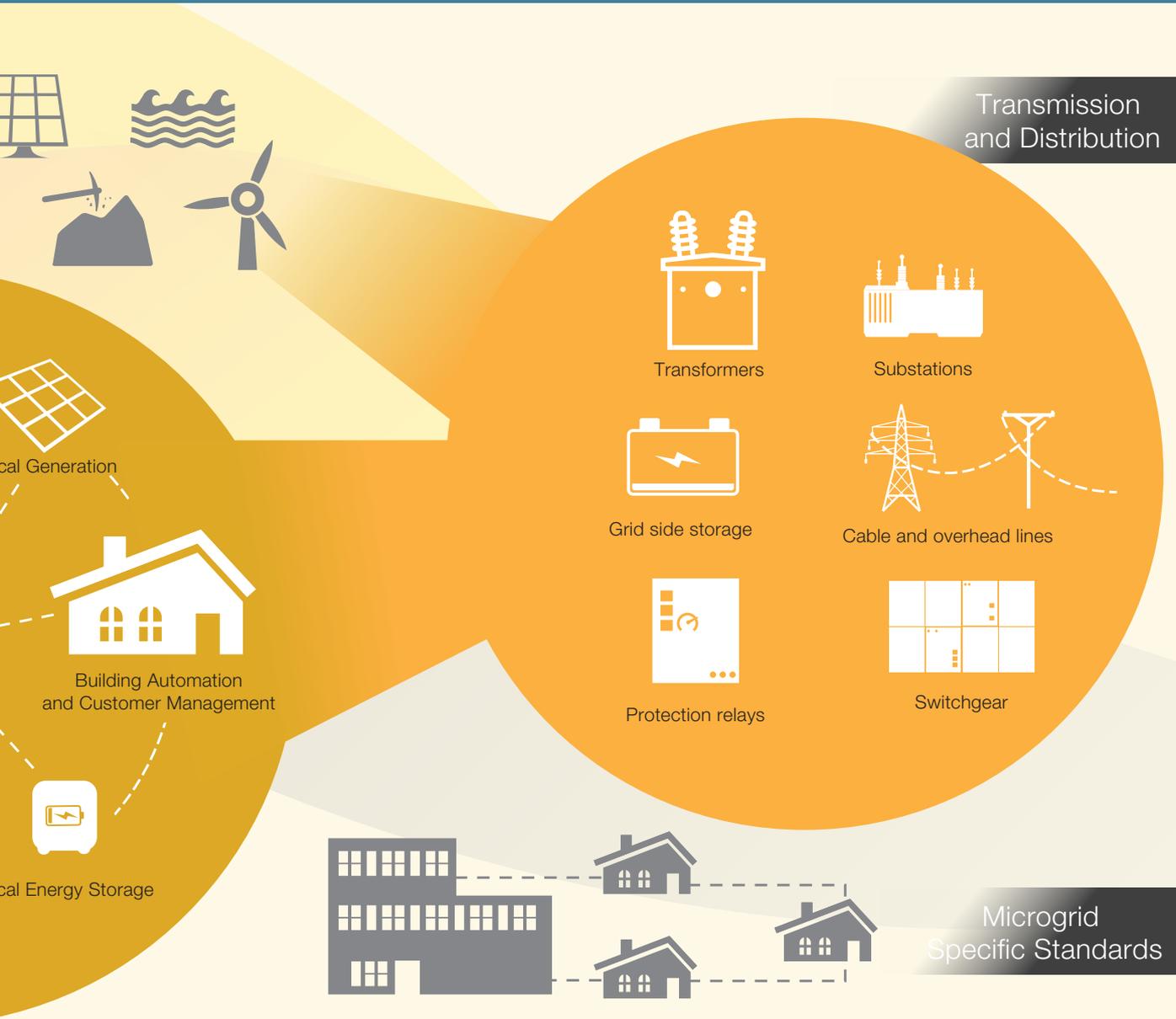
Market Systems and Operations

Generation

Prosumers and Distributed Energy Resources



Supporting Technologies Communications



Goals and Outcomes

The roadmap development process is focused on a high level overview of the various topics and technologies which relate to the future of electricity. Our goal is to review the state of standards and committees in each topic area, understand if there is consensus for any urgent work to be undertaken, and create a roadmap for future standards development over the coming years.

1. Provide a snapshot of the current state of Australian standardisation in the sector

To the right, we have outlined the topics under consideration. As an outcome of this work, we would like to code each area by colour for a quick reference overview of the current state of each area. This includes the relevancy and currency of existing suites of standards as well as future needs. Although we welcome feedback on specific standards, the focus of this work is to understand if the technology or topic as a whole is appropriately addressed by standards.

We would also like to identify if there are any topic areas where the development of Australian standards or participation in international committees is lacking or not currently being managed effectively by a Standards Australia technical committee. In areas where a need for new and/or updated standards is identified, it is vital to understand if there are current gaps in Standards Australia committees' scopes and work programs, or if inactive committees need to be reactivated.

2. Identify urgent priorities

This discussion paper and the resulting roadmap will be useful in identifying if there are topic areas in need of urgent consideration by a technical committee, either in drafting a new standard, revising a current one, or participating in international work. We are not looking to identify specific project needs at this stage, but instead to understand if there is an overall topic area for which standards are problematic in some way.

It is important to remember that consensus is a necessary part of the Standards Australia process, but if any topic areas are identified as being in need of urgent work, it will signal Standards Australia and stakeholders to consider appropriate next steps, which may include the development of project proposals.

3. Identify needs for further coordination

A key outcome of this process will be the identification of how work on various topic areas impact on each other. For example, we are currently undertaking work on advanced metering. Once this work is complete, will the creation of data by these meters necessitate a data framework for which standards are needed?

We would also like to identify any current overlap, where it is important to ensure that there is an effective liaison relationship between committees working on related topic areas.

4. Identify timeframes for standards development priorities

Finally, we are looking for this feedback to identify a time scale of when work will be needed on a topic area. As an example, it is possible that the standards in relation to the physical cables used to transmit electricity are currently relevant, but stakeholders may identify that new technology combining communications and electricity will require revisions of these standards in 4-5 years. This will be valuable in considering the long term work plans of Australian technical committees.

Overview of Topic Areas

Market Systems and Operations

Market Systems	Electrical System Operation
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Governance and Services

Asset management	Security	Cyber Security
Critical Infrastructure Resilience	Terminology	

Generation: Distributed and Centralised

General Generation	Solar	Marine
Wind	Hydro	Thermal Power Plants

Transmission and Distribution

Substations	Switchgear	Transformer	
Protection Relays	Cable and Overhead Lines	Grid Side Energy Storage	Distributed Energy Coordination

Prosumers and Distributed Energy Resources

Building Management System	Customer Energy Management	Process Automation Systems	Demand Response Management Equipment	
Advanced Metering	Local Energy Storage	Electric Vehicles	Inverters	Microgrids

Supporting Technologies

Communications	Electromagnetic Compatibility	Power Quality
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Data

Frameworks	Privacy
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An editable version of this overview is available on Standards Australia's website. If you would like to provide your views on the overall 'snapshot', you are welcome to download it, colour-code or edit as you see appropriate, and submit with your response to this paper.

Discussion Paper

The key to the development of the standards roadmap is considered input from stakeholders. In order to facilitate feedback, this discussion paper breaks down the 'big picture' into identified topic areas and provides background information on each of those topic areas to consider.

An early reference group discussed the complex and interconnected nature of electrical technologies and systems and their supporting standards, and worked to break this down into manageable areas for evaluation, laid out in the graphic on page 9.

As discussed in the section on outcomes, a key output of this work will be to collate a 'snapshot' of the current state of standards and technical committees for each topic area. Once the feedback has been compiled and verified through further consultation, this image will be updated to show the conclusions. It will also be useful into the future as a tracking tool for the electrical sector.

The following draft information has been compiled by Standards Australia as part of a high level review to assist your consideration of current and future standards needs. We also welcome your feedback on any additional information which we should include.

Feedback

Feedback from stakeholders will be used to inform the Standards Australia Future of Distributed Electricity Roadmap, which will be published in the 4th quarter of CY 2016. We welcome responses on any of the matters outlined in this discussion paper. However, in light of the tight timeframes for consultation and compilation, we have set out questions to help focus submissions, and would also request feedback on topic areas to be broken down into the areas identified in the overview on the right and following tables with background information.

When submitting your feedback, please identify the company or organisation you represent (if any), and consider compiling the responses from others within that organisation. Additionally, please inform us if we can publicise the name of your organisation/company as a participant in this process, and if we can publish your submission in its entirety.

The closing date for submissions is **Monday, 7 August 2016**.

Additional Resources

This paper is a start at providing background information on these topics, particularly as related to Australian and IEC standards and technical committees. However, there are a number of additional resources which may be helpful in your consideration.

Standards Development Public Portal

Full list of Standards Australia technical committees, including current projects, published standards, nominating organisations, and international relationships.

www.sdpp.standards.org.au

IEC Website

The IEC's website provides a full list of IEC Committees and sub-committees, including their work programs, current projects, and published documents. It also provides background and papers on various topics.

www.iec.ch

IEC Smart grid standards map

This is a map and list of all standards related to smart grids published by the IEC. Although a key resource, the structure itself was not used for this paper due to a different focus of work and the structure of our electrical distribution system. However, it is very useful for a deep dive into specific areas and understanding the relationships between them.

www.smartgridstandardsmap.com

Prior papers

A number of organisations, including Standards Australia, have undertaken studies on 'smart grid standards.' These were instrumental in developing this work (although their scopes were a bit narrower), and may be helpful to you.

- **Canadian Smart Grid Standards Roadmap (2012):**
www.scc.ca/en/about-scc/publications/roadmaps/canadian-smart-grid-standards-roadmap
- **Standards Australia Smart Grid Standards Roadmap (2012):**
www.standards.org.au/Documents/120904%20Smart%20Grids%20Standards%20Road%20Map%20Report.pdf
- **IEC Smart Grid Roadmap (2010):**
www.iec.ch/smartgrid/roadmap

The layout for each functional area is as follows:

Functional area	Overarching topic area we are asking for your feedback on	
Description	<ul style="list-style-type: none"> How we have defined this topic area <p><i>What other areas might be strongly impacted by development/revision of standards, or standards falling behind, in this area?</i></p>	
Sub Topics	<ul style="list-style-type: none"> Where possibly unclear, a list of possible topics which may fall into this area <p><i>If you identify any additional sub topics which could be considered a part of this area, please include this in your response.</i></p>	
Committees operating in this functional area	Standards Australia Committees	International Committees
	<ul style="list-style-type: none"> Relevant Standards Australia committees. (A) signals Active, (I) signals Inactive. 	<ul style="list-style-type: none"> Relevant IEC committees. If they are mirrored by a relevant Australian committee, they will be in the same row. (P) signals Participating Australian relationship, (O) signals Observing Australian relationship. If they are mirrored by an Australian committee which is not directly relevant to the topic area, that committee will not be shown.
	<ul style="list-style-type: none"> Full list of mirror relationships, subcommittees and other details available in the Appendix. <p><i>Australian Committees: Do you feel that the committees are operating well in managing this area, are appropriately representative, and are their areas of work/functional scopes clear.</i></p> <ul style="list-style-type: none"> If you would like further information, including the nominating organisations which sit on them, you can find that on our Standards Development Public Portal: www.sdpp.standards.org.au <p><i>IEC Committees: We ask you to provide your input on Australian participation on these committees – if we are currently contributors, do you feel we are active enough? If not, should stakeholders consider proposing that Australia should mirror that committee?</i></p> <ul style="list-style-type: none"> If you would like further information on the IEC committees, the IEC's website provides work programs and scopes: www.iec.ch. 	
Australian Standards in this functional area	<ul style="list-style-type: none"> Significant Australian or Australian/New Zealand specific standards which have been developed in this area, in addition to international standards which have been adopted here (either directly or modified for the Australian environment). <p><i>Are these standards current and appropriate? Do they allow for innovation?</i></p> <p><i>Please also consider if there are any additional standards which should be considered in the topic area.</i></p>	
IEC Standards in this functional area	<ul style="list-style-type: none"> Series of IEC standards which have been identified as being significant to this area. <p><i>Has Australia adopted sufficient IEC standards in this area?</i></p> <p><i>Please also consider if there are any additional standards which should be considered in the topic area.</i></p>	

In addition to the above questions in *italics*, this is an opportunity for stakeholders to apply certain lenses over all topic areas for future consideration.

What could be the unintended consequences of changes to the standards in each topic?

How might changes to the standards in each topic impact privacy or security?

How should this be considered when creating or revising these documents?

Market Systems and Operations

Functional area	Market Systems	
Description	<ul style="list-style-type: none"> • High level systems for management of electricity markets, energy supply and billing to energy retailers 	
Sub Topics	<ul style="list-style-type: none"> • Registration • Settlement • Energy Market Management • Energy Trading Applications • Management, Monitoring and Control Systems • Meter Data Management System 	
Committees operating in this functional area	Standards Australia Committees	International Committees
	<ul style="list-style-type: none"> • EL-050 Power System Control and Communication (A) 	<ul style="list-style-type: none"> • IEC TC 57 Power systems management and associated information exchange (P)
Australian Standards in this functional area	<ul style="list-style-type: none"> • AS 60870 series Telecontrol equipment and systems 	
IEC committees operating in this functional area	<ul style="list-style-type: none"> • TC 57 Power systems management and associated information exchange 	
IEC Standards in this functional area	<ul style="list-style-type: none"> • IEC 61850 series Communication networks and systems for power utility automation • IEC 61968 series Application integration at electric utilities - System interfaces for distribution management • IEC 61970 series Energy management system application program interface • IEC 62056 series Electricity metering data exchange • IEC 62325 series Framework for energy market communications • IEC 62351 series Power systems management and associated information exchange - Data and communications security • IEC 62361 series Power systems management and associated information exchange - Interoperability in the long term 	

Functional area	Electrical System Operation	
Description	<ul style="list-style-type: none"> • Electrical System Operation covers the complete area of activities for the overall operation of electric power systems, including security, control and quality in terms of fixed technical standards, principles and procedures, but also the synchronous operation of interconnected power systems 	
Sub Topics		
Committees operating in this functional area	Standards Australia Committees	International Committees
	<ul style="list-style-type: none"> • EL-011 Electricity Metering Equipment (A) 	
	<ul style="list-style-type: none"> • EL-050 Power System Control and Communication (A) 	<ul style="list-style-type: none"> • TC 57 Power systems management and associated information exchange (P)
	<ul style="list-style-type: none"> • EL-052 Electrical Energy Networks, Construction and Operation (A) 	
	<ul style="list-style-type: none"> • EL-062 Smart Grids (A) 	
	<ul style="list-style-type: none"> • EN-004 Energy Network Safety Management Systems (I) 	
Australian Standards in this functional area	<ul style="list-style-type: none"> • AS 5577:2013 Electricity network safety management systems • AS 5711:2013 Smart grid vocabulary • AS 1284 series Electricity metering • AS 62052 series Electricity metering equipment (AC) - General requirements • AS 62053 series Electricity metering equipment (AC) - Particular requirements • AS 62054 series Electricity metering equipment (AC) - Tariff and load control • AS 62056 series Electricity metering - Data exchange for meter reading, tariff and load control 	
IEC Standards in this functional area	<ul style="list-style-type: none"> • IEC 61158 series Industrial communications networks - Fieldbus specifications • IEC 61334 series Distribution automation using distribution line carrier systems • IEC 61850 series Communication networks and systems for power utility automation • IEC 61968 series Application integration at electric utilities - System interfaces for distribution management • IEC 61970 series Energy management system application program interface • IEC 62056 series Electricity metering data exchange • IEC 62325 series Framework for energy market communications • IEC 62351 series Power systems management and associated information exchange - Data and communications security • IEC 62361 series Power systems management and associated information exchange - Interoperability in the long term • ISO 16484 series Building automation and control systems • ISO/IEC 14908 series Information technology - Control network protocol 	

Governance and Services

Functional area	Asset Management	
Description	<ul style="list-style-type: none"> The practice of managing assets to achieve the greatest return (particularly useful for productive assets such as plant and equipment), and the process of monitoring and maintaining facilities systems, with the objective of providing the best possible service to users. 	
Sub Topics		
Committees operating in this functional area	Standards Australia Committees	International Committees
	<ul style="list-style-type: none"> MB-019 Asset Management (A) MB-022 Facilities Management (A) 	<ul style="list-style-type: none"> ISO TC 251 Asset management (P) ISO TC 267 Facilities Management (P)
Australian Standards in this functional area	<ul style="list-style-type: none"> AS ISO 55000:2014 Asset management -- Overview, principles and terminology AS ISO 55001:2014 Asset management -- Management systems -- Requirements AS ISO 55002:2014 Asset management -- Management systems -- Guidelines for the application of ISO 55001 	
IEC Standards in this functional area	<ul style="list-style-type: none"> ISO 55000:2014 Asset management -- Overview, principles and terminology ISO 55001:2014 Asset management -- Management systems -- Requirements ISO 55002:2014 Asset management -- Management systems -- Guidelines for the application of ISO 55001 	

Functional area	Cyber Security	
Description	<ul style="list-style-type: none"> Cybersecurity is the body of technologies, processes and practices designed to protect networks, computers, programs and data from attack, damage or unauthorized access. 	
Sub Topics	<ul style="list-style-type: none"> Information security 	
Committees operating in this functional area	Standards Australia Committees	International Committees
	<ul style="list-style-type: none"> IT-012 Information Systems, Security and Identification Technology (A) EL-050 Power System Control and Communication (A) 	<ul style="list-style-type: none"> ISO/IEC JTC1 SC27 Information Technology Security Techniques (P) IEC TC 57 Power systems management and associated information exchange (P)
Australian Standards in this functional area	<ul style="list-style-type: none"> AS ISO/IEC 27001:2015 Information technology - Security techniques - Information security management systems 	
IEC Standards in this functional area	<ul style="list-style-type: none"> ISO/IEC 27000 series Information technology - Security techniques - Information security management systems IEC 62351 series Power systems management and associated information exchange - Data and communications security 	

Functional area	Security	
Description	<ul style="list-style-type: none"> Physical security is the protection of personnel, hardware, programs, networks, and data from physical circumstances and events that could cause serious losses or damage to an enterprise, agency, or institution. This includes protection from fire, natural disasters, burglary, theft, vandalism, and terrorism. 	
Sub Topics	<ul style="list-style-type: none"> Physical security 	
Committees operating in this functional area	Standards Australia Committees	International Committees
	<ul style="list-style-type: none"> MB-025 Security (A) 	<ul style="list-style-type: none"> ISO TC 292 Security and Resilience (P)
	<ul style="list-style-type: none"> OB-007 Risk Management (A) 	<ul style="list-style-type: none"> ISO TC 262 Risk Management
	<ul style="list-style-type: none"> CE-008 Chainlink Fabric Security Fences and Gates (I) 	
Australian Standards in this functional area	<ul style="list-style-type: none"> EL-031 Intruder Alarm Equipment and Installations (I) 	
	<ul style="list-style-type: none"> HB 167:2006 Security risk management AS 1725.1-2010 Chain link fabric fencing - Security fences and gates - General requirements AS/NZS 3016:2002 Electrical installations - Electric security fences AS/NZS 4421:2011 Guard and patrol security services 	
IEC Standards in this functional area	<ul style="list-style-type: none"> ISO 18788:2015 Management system for private security operations - Requirements with guidance for use 	

Governance and Services (Continued)

Functional area	Critical Infrastructure Resilience	
Description	<ul style="list-style-type: none"> The ability to provide a minimum level of service during interruptions, emergencies and disasters, and return to full operations quickly for physical facilities, supply chains, information technologies and communication networks which, if destroyed, degraded or rendered unavailable for an extended period, would significantly impact on the social or economic wellbeing of the nation or affect Australia's ability to conduct national defence and ensure national security. 	
Sub Topics		
Committees operating in this functional area	Standards Australia Committees	International Committees
	<ul style="list-style-type: none"> MB-025 Security (A) FP-017 Emergency Management Procedures (I) 	<ul style="list-style-type: none"> ISO TC 292 Security and Resilience (P)
Australian Standards in this functional area	<ul style="list-style-type: none"> AS 3745-2010 Planning for emergencies in facilities 	
IEC Standards in this functional area	<ul style="list-style-type: none"> ISO 22301:2012 Societal security - Business continuity management systems - Requirements ISO 22313:2012 Societal security - Business continuity management systems - Guidance ISO/TS 22317:2015 Societal security - Business continuity management systems - Guidelines for business impact analysis (BIA) ISO 22320:2011 Societal security - Emergency management - Requirements for incident response ISO 28000:2007 Specification for security management systems for the supply chain 	

Functional area	Terminology	
Description	<ul style="list-style-type: none"> Terms and definitions 	
Sub Topics	<ul style="list-style-type: none"> Vocabulary 	
Committees operating in this functional area	Standards Australia Committees	International Committees
	<ul style="list-style-type: none"> EL-062 Smart Grids (A) 	<ul style="list-style-type: none"> IEC TC 1 Terminology
Australian Standards in this functional area	<ul style="list-style-type: none"> AS 5711:2013 Smart grid vocabulary 	
IEC Standards in this functional area	<ul style="list-style-type: none"> IEC 60050 series International Electrotechnical Vocabulary 	

Generation: Distributed and Centralised

The IEC defines electricity generation as “the conversion of mechanical or thermal energy from primary sources such as fossil fuels, nuclear or renewable energies into electric energy” (<http://www.iec.ch/energy/generation.htm>). This section looks at facilities and technologies for this conversion, including centralised generation such as thermal power plants or solar farms and distributed generation such as rooftop PV panels.

Functional area	General Generation	
Description	<ul style="list-style-type: none"> Any topics, standards, or technical committees which apply across various generation technologies. 	
Sub Topics	<ul style="list-style-type: none"> Electrical Relays Diagrams 	
Committees operating in this functional area	Standards Australia Committees	International Committees
	<ul style="list-style-type: none"> ME-072 Technical Drawing (A) EL-028 Electrical Relays (I) 	<ul style="list-style-type: none"> ISO TC 10 Technical product documentation (P) IEC TC 95 Measuring relays and protection equipment (O)
Australian Standards in this functional area		
IEC Standards in this functional area	<ul style="list-style-type: none"> ISO 14084 series Process diagrams for power plants IEC 60255 Measuring relays and protection equipment 	

Functional area	Wind	
Description	<ul style="list-style-type: none"> The generation of electricity from wind and the connection of that energy to a grid or user. 	
Sub Topics		
Committees operating in this functional area	Standards Australia Committees	International Committees
	<ul style="list-style-type: none"> EL-042 Renewable Energy Power Supply Systems & Equipment (A) EL-048 Wind Turbine Systems (I) 	<ul style="list-style-type: none"> IEC TC 88 Wind energy generation systems (O)
Australian Standards in this functional area	<ul style="list-style-type: none"> AS/NZS 4777 series Grid connection of energy systems via inverters AS/NZS 4509 series Stand-alone power systems 	
IEC Standards in this functional area	<ul style="list-style-type: none"> IEC 61400 series Wind turbines 	

Generation: Distributed and Centralised (Continued)

Functional area	Thermal Power Plants	
Description	<ul style="list-style-type: none"> The IEC describes this area as follows: Steam and gas turbines dominate electricity generation in coal, gas and oil fuelled thermal power plants worldwide. Please note that although there are extensive standards on the various inputs to thermal plants (coal, gas, etc), this roadmap focuses on the generation of electricity from these sources. 	
Sub Topics	<ul style="list-style-type: none"> Coal Gas Biofuels Steam Turbines 	
Committees operating in this functional area	Standards Australia Committees	International Committees
	<ul style="list-style-type: none"> EL-001-24 Generating Sets (A) EL-043 High Voltage Installations (A) 	
		<ul style="list-style-type: none"> IEC TC 5 Steam Turbines
Australian Standards in this functional area	<ul style="list-style-type: none"> AS/NZS 3010:2005 Generating Sets 	
IEC Standards in this functional area	<ul style="list-style-type: none"> IEC 60045-1:1991 Steam Turbines: Specifications IEC 60953 series Rules for Steam Turbine Thermal Acceptance Tests IEC TS 91370:2001 Steam Turbines – Steam Purity 	

Functional area	Marine Energy	
Description	<ul style="list-style-type: none"> Generation of electricity from wave, tidal, and other marine energy (does not include hydro). 	
Sub Topics		
Committees operating in this functional area	Standards Australia Committees	International Committees
		<ul style="list-style-type: none"> IEC TC 114 Marine energy - Wave, tidal and other water current converters
Australian Standards in this functional area	<ul style="list-style-type: none"> AS/NZS 4777 series Grid connection of energy systems via inverters AS/NZS 4509 series Stand-alone power systems 	
IEC Standards in this functional area	<ul style="list-style-type: none"> ISO 14084 series Process diagrams for power plants IEC 62600 series Marine energy - Wave, tidal and other water current converters IEC 60255 Measuring relays and protection equipment 	

Functional area	Hydro	
Description	<ul style="list-style-type: none"> Hydroelectricity 	
Sub Topics	<ul style="list-style-type: none"> Hydraulic Turbines 	
Committees operating in this functional area	Standards Australia Committees	International Committees
		<ul style="list-style-type: none"> IEC TC 4 Hydraulic Turbines
Standards Australia committees operating in this functional area	<ul style="list-style-type: none"> EL-042 Renewable Energy Power Supply Systems & Equipment EL-048 Wind Turbine Systems 	
Australian Standards in this functional area		
IEC Standards in this functional area	<ul style="list-style-type: none"> IEC 62270 Hydroelectric power plant automation - Guide for Computer based control IEC 62006 Hydraulic Machines – Acceptance Tests of Small Hydroelectric Installations Note: Please see IEC TC 4's website for a full list of relevant standards 	

Functional area	Solar	
Description	<ul style="list-style-type: none"> Standards for all aspects of solar, including large scale solar farms, individual panels, and rooftop solar installations. 	
Sub Topics		
Committees operating in this functional area	Standards Australia Committees	International Committees
	<ul style="list-style-type: none"> EL-042 Renewable Energy Power Supply Systems & Equipment (A) 	<ul style="list-style-type: none"> IEC TC 82 Solar photovoltaic energy systems (P) IEC TC 117 Solar thermal electric plants
Australian Standards in this functional area	<ul style="list-style-type: none"> AS/NZS 4777 series Grid connection of energy systems via inverters AS/NZS 5033:2014 Installation and safety requirements for photovoltaic arrays AS/NZS 4509 series Stand-alone power systems 	
IEC Standards in this functional area	<ul style="list-style-type: none"> IEC 62862 series Solar thermal electric plants IEC 60904 series Photovoltaic devices IEC 62446-1 :2016 Photovoltaic (PV) systems - Requirements for testing, documentation and maintenance - Part 1: Grid connected systems - Documentation, commissioning tests and inspection 	

Transmission and Distribution

Functional area	Protection Relays	
Description	<ul style="list-style-type: none"> • A protection relay is a smart device that receives inputs, compares them to set points, and provides outputs. Inputs can be current, voltage, resistance, or temperature. Outputs can include visual feedback in the form of indicator lights and/or an alphanumeric display, communications, control warnings, alarms, and turning power off and on. 	
Sub Topics		
Committees operating in this functional area	Standards Australia Committees	International Committees
	<ul style="list-style-type: none"> • EL-028 Relays (I) • EL-028 Relays (I) 	<ul style="list-style-type: none"> • IEC TC 95 Measuring relays and protection equipment (O) • IEC TC 94 All-or-nothing electrical relays (O)
Australian Standards in this functional area		
IEC Standards in this functional area	<ul style="list-style-type: none"> • IEC 61810 series Electromechanical elementary relays • IEC 62314 Solid-state relays • IEC 61812 series Time relays for industrial and residential use • IEC 60255 Measuring relays and protection equipment 	

Functional area	Cable Overhead Lines	
Description	<ul style="list-style-type: none"> • Above ground suspended electric lines 	
Sub Topics		
Committees operating in this functional area	Standards Australia Committees	International Committees
	<ul style="list-style-type: none"> • EL-052 Electrical Energy Networks, Construction and Operation (A) • EL-010 Overhead Lines (A) • EL-003 Electric Wires and Cables (A) 	<ul style="list-style-type: none"> • IEC TC 7 Overhead electrical conductors (O)
Australian Standards in this functional area	<ul style="list-style-type: none"> • AS/NZS 7000;2016 Overhead line design 	
IEC Standards in this functional area	<ul style="list-style-type: none"> • IEC 60227 series Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V • IEC 60502 Power cables with extruded insulation and their accessories for rated voltages from 1 kV to 30kV • IEC 60811 Electrical and optical fibre cables - test methods for non-metallic materials • IEC 60840 Power cables with extruded insulation and their accessories for rated voltages above 30kV 	

Functional area	Substation	
Description	<ul style="list-style-type: none"> • An electrical substation is a subsidiary station of an electricity generation, transmission and distribution system where voltage is transformed from high to low or the reverse using transformers. Electric power may flow through several substations between generating plant and consumer, and may be changed in voltage in several steps. 	
Sub Topics		
Committees operating in this functional area	Standards Australia Committees	International Committees
	<ul style="list-style-type: none"> • EL-007 Power Switchgear (A) 	
	<ul style="list-style-type: none"> • EL-008 Power Transformers (A) 	
	<ul style="list-style-type: none"> • EL-043 High Voltage Installations (A) 	
		<ul style="list-style-type: none"> • IEC TC 57 Power systems management and associated information exchange (P)
Australian Standards in this functional area	<ul style="list-style-type: none"> • AS 62271 series High voltage switchgear and controlgear • AS 2067 Substations and high voltage installations exceeding 1 KV a.c. 	
IEC Standards in this functional area	<ul style="list-style-type: none"> • IEC 61850 series Communication networks and systems for power utility automation 	

Transmission and Distribution (Continued)

Functional area	Switchgear	
Description	<ul style="list-style-type: none"> Switchgear is the combination of electrical disconnect switches, fuses or circuit breakers used to control, protect and isolate electrical equipment. Switchgear is used both to de-energize equipment to allow work to be done and to clear faults downstream. This type of equipment is directly linked to the reliability of the electricity supply. 	
Sub Topics		
Committees operating in this functional area	Standards Australia Committees	International Committees
	<ul style="list-style-type: none"> EL-006 Industrial Switchgear And Controlgear (A) EL-007 Power Switchgear (A) 	<ul style="list-style-type: none"> IEC TC 17 Switchgear and controlgear (P) IEC TC 17 Switchgear and controlgear (P)
		<ul style="list-style-type: none"> IEC TC 121 Switchgear and controlgear and their assemblies for low voltage (P in 2 subcommittees, see Appendix)
Australian Standards in this functional area	<ul style="list-style-type: none"> AS 62271 series High voltage switchgear and controlgear 	
IEC Standards in this functional area	<ul style="list-style-type: none"> IEC 62271 series High-voltage switchgear and controlgear IEC/TS 63058 Environmental aspects for Low-Voltage Switchgear and Controlgear and their assemblies 	

Functional area	Transformer	
Description	<ul style="list-style-type: none"> Electrical power transformer is a static device which transforms electrical energy from one circuit to another without any direct electrical connection and with the help of mutual induction between two windings. It transforms power from one circuit to another without changing its frequency but may be in different voltage level. 	
Sub Topics		
Committees operating in this functional area	Standards Australia Committees	International Committees
	<ul style="list-style-type: none"> EL-008 Power Transformers (A) 	<ul style="list-style-type: none"> IEC TC 14 Power transformers (P)
Australian Standards in this functional area	<ul style="list-style-type: none"> AS/NZS 60076 series Power transformers AS 60044 series Instrument transformers 	
IEC Standards in this functional area	<ul style="list-style-type: none"> IEC 60076 series Power transformers IEC 61378 series Converter transformers IEC 62032 Guide for the Application, Specification and Testing of Phase-Shifting Transformers 	

Functional area	Distributed Energy Coordination	
Description	<ul style="list-style-type: none"> Decentralized generation of electrical power, including devices designed to add information capabilities to electricity distribution infrastructure elements. 	
Sub Topics	<ul style="list-style-type: none"> Devices Metering Storage Management 	
Committees operating in this functional area	Standards Australia Committees	International Committees
	<ul style="list-style-type: none"> EL-034 Power Quality (A) 	<ul style="list-style-type: none"> IEC TC 8 Systems aspects for electrical energy supply (P)
Australian Standards in this functional area		
IEC Standards in this functional area	<ul style="list-style-type: none"> IEC/TS 62786 Distributed Energy Resources Interconnection with the Grid 	

Functional area	Grid Side Energy Storage	
Description	<ul style="list-style-type: none"> Grid-size energy storage batteries in front of the meter, to enable the removal of peak loads in the distribution system due to high amounts of production and compensating for variable production. 	
Sub Topics		
Committees operating in this functional area	Standards Australia Committees	International Committees
	<ul style="list-style-type: none"> EL-061 Electrical Energy Storage (A) 	<ul style="list-style-type: none"> IEC TC 120 Electrical Energy Storage (EES) Systems (P) IEC TC 105 Fuel cell technologies
Australian Standards in this functional area	<ul style="list-style-type: none"> AS 4777 series Grid connection of energy systems via inverters 	
IEC Standards in this functional area	<ul style="list-style-type: none"> IEC 62282 Fuel cell technologies IEC 62933 Electrical Energy Storage (EES) system (Currently under drafting by IEC TC 120) 	

Prosumers and Distributed Energy Resources

As discussed earlier in this paper, 'prosumers' is a term used by CSIRO's Future Grid Forum, which identifies that traditional consumers of electricity and the technologies which they use will likely see significant change in coming years. Distributed Energy Resources, or DER, are a key part of this area.

Functional area	Building Management Systems	
Description	<ul style="list-style-type: none"> • Building automation and control refers to the instrumentation, control and management technology for all building structures, plant, outdoor facilities and • other equipment capable of automation. 	
Sub Topics		
Committees operating in this functional area	Standards Australia Committees	International Committees
	<ul style="list-style-type: none"> • CT-001 Communications Cabling (A) 	<ul style="list-style-type: none"> • ISO TC 205 Building Environment Design (P)
Australian Standards in this functional area	<ul style="list-style-type: none"> • AS/NZS 3080:2013 Information technology - Generic cabling for customer premises 	
IEC Standards in this functional area	<ul style="list-style-type: none"> • ISO 16484 series Building automation and control systems (BACS) • IEC 60870 series Telecontrol equipment and systems • IEC 60904 series Photovoltaic devices • IEC 61158 series Industrial communications networks - Fieldbus specifications • IEC 62056 series Electricity metering - Data exchange • IEC 62351 series Power systems management and associated information exchange - Data and communications security • ISO/IEC 14543 series Information technology - Home electronic system architecture • ISO 16484 series Building automation and control systems • ISO/IEC 14908 series Information technology - Control network protocol 	

Functional area	Process Automation Systems	
Description	<ul style="list-style-type: none"> • A process automation or automation system (PAS) is used to automatically control a process such as chemical, oil refineries, paper and pulp factories. The PAS often uses a network to interconnect sensors, controllers, operator terminals and actuators. 	
Sub Topics		
Committees operating in this functional area	Standards Australia Committees	International Committees
	<ul style="list-style-type: none"> • IT-006 Industrial Process Measurement, Control and Automation (A) 	<ul style="list-style-type: none"> • IEC TC 65 Industrial-process measurement and control (P)
		<ul style="list-style-type: none"> • ISO TC 184 Automation systems and integration
Australian Standards in this functional area	<ul style="list-style-type: none"> • AS 61508 series Functional safety of electrical/electronic/programmable electronic safety-related systems • AS ISO 14649.1:2004 Industrial automation systems and integration 	
IEC Standards in this functional area	<ul style="list-style-type: none"> • IEC 61508 series Functional safety of electrical/electronic/programmable electronic safety-related systems • ISO 14649 Industrial automation systems and integration 	

Prosumers and Distributed Energy Resources (Continued)

Functional area	Customer Energy Management	
Description	<ul style="list-style-type: none"> A Customer Energy Management System (CEMS) is an application service or device that communicates with devices in the home. The application service or device may have interfaces to the meter to read usage data or to the operations domain to get pricing or other information to make automated or manual decisions to control energy consumption more efficiently. 	
Sub Topics		
Committees operating in this functional area	Standards Australia Committees	International Committees
	<ul style="list-style-type: none"> EL-050 Power System Control and Communication (A) 	<ul style="list-style-type: none"> TC 57 Power systems management and associated information exchange (P)
Australian Standards in this functional area		
IEC Standards in this functional area	<ul style="list-style-type: none"> IEC TR 62746 series Systems interface between customer energy management system and the power management system 	

Functional area	Demand Response Management Equipment	
Description	<ul style="list-style-type: none"> Demand Response Management Equipment can be installed to reduce peak power demand and time-shift the load to reduce demand charges from utility companies. 	
Sub Topics		
Committees operating in this functional area	Standards Australia Committees	International Committees
	<ul style="list-style-type: none"> EL-042 Renewable Energy Power Supply Systems and Equipment (A) 	
	<ul style="list-style-type: none"> EL-054 Remote Demand Management of Electrical Products (A) 	<ul style="list-style-type: none"> ISO/IEC JTC 1/SC 25 Interconnection of information technology equipment (P)
Australian Standards in this functional area	<ul style="list-style-type: none"> AS/NZS 4755 series Demand response capabilities and supporting technologies for electrical products 	
IEC Standards in this functional area	<ul style="list-style-type: none"> ISO/IEC 15067-3 Information technology - Home Electronic System (HES) application model -Part 3: Model of a demand-response energy management system for HES 	

Functional area	Electric vehicles	
Description	<ul style="list-style-type: none"> • Electric powered road vehicles and Electric and hybrid vehicle charging infrastructure incorporating information exchange. • Standards Australia previously published a workplan on this topic (see here: http://www.standards.org.au/OurOrganisation/News/Documents/EV%20Standards%20Workplan%2029%20October%20final.pdf) which may provide some useful background information. This is an opportunity to check in with stakeholders on the priority of continuing this work and the possible need to update the workplan. 	
Sub Topics	<ul style="list-style-type: none"> • Design • Occupant safety - electrical • Battery safety and handling • EV vocabulary • Energy efficiency • System efficiency • Battery recycling • Energy feed to the grid • Charging arrangements and infrastructure • Safety 	
Committees operating in this functional area	Standards Australia Committees	International Committees
	<ul style="list-style-type: none"> • EM-001 Electric Vehicle Operations (A) • EM-001 Electric Vehicle Operations (A) 	<ul style="list-style-type: none"> • IEC TC 69 Electric road vehicles and electric industrial trucks (P) • ISO TC 22 SC37 Electrically propelled vehicles (O)
Australian Standards in this functional area	<ul style="list-style-type: none"> • AS 5732:2015 Electric Vehicle Operation: Electric Vehicle Maintenance and Repair • AS ISO 6469 series Electrically propelled road vehicles - Safety specifications • AS IEC 61851 series Electric vehicle conductive charging system • SA TR IEC 60783:2014 Wiring and connectors for electric road vehicles • SA TR ISO 8713:2014 Electrically propelled road vehicles - Vocabulary 	
IEC Standards in this functional area	<ul style="list-style-type: none"> • ISO 6469 series Electrically propelled road vehicles - Safety specifications • ISO TR 8713 Electrically propelled road vehicles - Vocabulary • ISO 8714 Electric road vehicles -- Reference energy consumption and range • ISO 8715 Electric road vehicles -- Road operating characteristics • ISO 12405 series Electrically propelled road vehicles - Test specification for lithium-ion traction battery packs and • ISO 17409 Electrically propelled road vehicles -- Connection to an external electric power supply 	

Prosumers and Distributed Energy Resources (Continued)

Functional area	Advanced Metering	
Description	<ul style="list-style-type: none"> Advanced Metering Infrastructure refers to systems that measure, collect, analyze and control energy distribution and usage. This infrastructure includes hardware, software, communications, energy distribution-associated systems, customer-associated systems and meter data management (MDM) software. Standards Australia has recently undertaken a roadmapping process for this area which is currently being actioned by committee EL-011. For information on this process, see January's announcement here: http://enews.standards.org.au/enews-2016-01.html#item7, and for our comes and updates, please see Standards Australia's website. 	
Sub Topics	<ul style="list-style-type: none"> Smart Meters 	
Committees operating in this functional area	Standards Australia Committees	International Committees
	<ul style="list-style-type: none"> EL-011 Electricity Metering Equipment (A) 	<ul style="list-style-type: none"> IEC TC 13 Electrical energy measurement, tariff and load control (P)
		<ul style="list-style-type: none"> IEC TC 57 Power systems management and associated information exchange (P)
		<ul style="list-style-type: none"> IEC TC 65 Industrial-process measurement, control and automation (P)
Australian Standards in this functional area	<ul style="list-style-type: none"> AS 1284 series Electricity metering AS 62052 series Electricity metering equipment (AC) - General requirements AS 62053 series Electricity metering equipment (AC) - Particular requirements AS 62054 series Electricity metering equipment (AC) - Tariff and load control AS 62056 series Electricity metering - Data exchange for meter reading, tariff and load control 	
IEC Standards in this functional area	<ul style="list-style-type: none"> IEC 60870 series Telecontrol equipment and system IEC 60904 series Photovoltaic devices IEC 61158 series Industrial communication networks - Fieldbus specifications IEC 61334 series Distribution automation using distribution line carrier systems IEC 62056 series Electricity metering data exchange IEC 62325 series Framework for energy market communications IEC 62351 series Power systems management and associated information exchange IEC 62443 series Industrial communication networks - Network and system security IEC 62541 series OPC Unified Architecture 	

Functional area	Inverters	
Description	<ul style="list-style-type: none"> A power inverter, or inverter, is an electronic device or circuitry that changes direct current (DC) to alternating current (AC). In this case the focus is on behind-the-meter inverters. 	
Sub Topics		
Committees operating in this functional area	Standards Australia Committees	International Committees
	<ul style="list-style-type: none"> EL-042 Renewable Energy Power Supply Systems & Equipment (A) 	<ul style="list-style-type: none"> IEC TC 82 Solar photovoltaic energy systems (P)
Australian Standards in this functional area	<ul style="list-style-type: none"> AS/NZS 4777 series Grid connection of energy systems via inverters 	
IEC Standards in this functional area	<ul style="list-style-type: none"> IEC 62109 Safety of power converters for use in photovoltaic power systems 	

Functional area	Microgrids	
Description	<ul style="list-style-type: none"> A microgrid is a group of interconnected loads and distributed energy resources (DERs) within clearly defined electrical boundaries that acts as a single controllable entity with respect to the grid. A microgrid can connect and disconnect from the grid to enable it to operate in both grid-connected or island-mode. The IEC published a white paper on Microgrids, including suggestions for standardisation, in 2014. It can be found here: http://www.iec.ch/whitepaper/microgrids/ 	
Sub Topics		
Committees operating in this functional area	Standards Australia Committees	International Committees
	<ul style="list-style-type: none"> Participation in SEGs at the IEC are through nominated experts instead of Technical Committees. Australia is participating in SEG 6. 	<ul style="list-style-type: none"> IEC Systems Evaluation Group (SEG) 6 - Non-conventional Distribution Networks / Microgrids TC 8 Systems aspects for electrical energy supply, Working Group 7 General Planning, Design, Operation and Control of Microgrids
Australian Standards in this functional area		
IEC Standards in this functional area	<ul style="list-style-type: none"> IEC/TS 62898-1 Guidelines for general planning and design of microgrids IEC/TS 62898-2 Technical Requirements for Operation and Control of Microgrids 	

Prosumers and Distributed Energy Resources (Continued)

Functional area	Local Energy Storage	
Description	<ul style="list-style-type: none"> • An electrical energy storage which is installed behind the meter point and operated by the energy consumer/producer and not by the utility. • This area is currently being discussed in Standards Australia Energy Storage Roadmap. Please see the first consultation paper here: http://www.standards.org.au/OurOrganisation/News/Pages/Energy-Storage-Consultation-Paper.aspx, and for updates and the second round consultation paper, please see Standards Australia's website. 	
Sub Topics	<ul style="list-style-type: none"> • Safety and Installation • Product and measurement • Grid connection and remote demand management • Transport and handling • Recycling 	
Committees operating in this functional area	Standards Australia Committees	International Committees
	<ul style="list-style-type: none"> • EL-042 Renewable Energy Power Supply Systems & Equipment (A) • EL-061 Electrical Energy Storage (A) 	<ul style="list-style-type: none"> • IEC TC 120 Electrical Energy Storage (EES) Systems (P)
Australian Standards in this functional area	<ul style="list-style-type: none"> • AS/NZS 4777 series Grid connection of energy systems via inverters • AS/NZS 4755.3.5: 2016 Demand response capabilities and supporting technologies for electrical products, Part 3.5: Interaction of demand response enabling devices and electrical products—Operational instructions and connections for grid connected electrical energy storage (EES) systems • AS/NZS 5139, currently being drafted: Safety of Battery Systems for use in Inverter Energy Systems 	
IEC Standards in this functional area	<ul style="list-style-type: none"> • IEC 62933 Electrical Energy Storage (EES) system (Currently under drafting by IEC TC 120) • See full list of documents being drafted by IEC TC 120 on www.iec.ch 	

Supporting Technologies

Functional area	Communications	
Description	<ul style="list-style-type: none"> Physical and logical network components providing communication channels for data. In the context of this work, there has been some discussion of a possible future where electrical and communications channels combine. <i>We would like to understand how this possibility may fit into a future workplan on electrical related standards – at what time horizon should we start considering a possible overlap?</i> <i>This is in addition to any considerations which need to be made now for overlaps between electricity and communications.</i> 	
Sub Topics	<ul style="list-style-type: none"> Telecommunications Communications Protocols Interconnection Protocols Internet Public Networks Private Networks 	
Committees operating in this functional area	Standards Australia Committees	International Committees
	<ul style="list-style-type: none"> EL-050 Power System Control and Communication (A) 	<ul style="list-style-type: none"> IEC TC 57 Power systems management and associated information exchange (P)
		<ul style="list-style-type: none"> ISO/IEC JTC1 SC6 Telecommunications and information exchange International Telecommunication Union
Australian Standards in this functional area	<ul style="list-style-type: none"> AS 60870 series Telecontrol equipment and systems 	
IEC Standards in this functional area	<ul style="list-style-type: none"> IPv6 ISO/IEC/IEEE 8802 Information technology - Telecommunications and information exchange between systems -Local and metropolitan area networks ISO/IEC 29181 series Future Network - Problem statement and requirements IEC 61158 series Industrial communications networks IEC 61850 series Communications networks and systems for power utility automation 	

Supporting Technologies (Continued)

Functional area	Electromagnetic Capability	
Description	<ul style="list-style-type: none"> The ability of an equipment or system to function satisfactorily in its electromagnetic environment without introducing intolerable electromagnetic disturbances to anything in that environment 	
Sub Topics		
Committees operating in this functional area	Standards Australia Committees	International Committees
	<ul style="list-style-type: none"> TE-003 Electromagnetic Interference (A) 	<ul style="list-style-type: none"> IEC TC 77 Electromagnetic compatibility (P)
Australian Standards in this functional area	<ul style="list-style-type: none"> AS/NZS 61000 series Electromagnetic compatibility 	
IEC Standards in this functional area	<ul style="list-style-type: none"> IEC 61000 series Electromagnetic compatibility 	

Functional area	Power Quality	
Description	<ul style="list-style-type: none"> Characteristics of the electric current, voltage and frequencies at a given point in an electric power system, evaluated against a set of reference technical parameters 	
Sub Topics		
Committees operating in this functional area	Standards Australia Committees	International Committees
	<ul style="list-style-type: none"> EL-034 Power Quality (A) 	<ul style="list-style-type: none"> IEC TC 8 Systems aspects for electrical energy supply (P)
Australian Standards in this functional area	<ul style="list-style-type: none"> AS/NZS 61000 series Electromagnetic compatibility 	
IEC Standards in this functional area	<ul style="list-style-type: none"> IEC 62856 series Power quality measurement in power supply systems 	

Data

Functional area	Frameworks	
Description	<ul style="list-style-type: none"> • Definitions, structures and protocols to enable the interchange of data across systems. 	
Sub Topics	<ul style="list-style-type: none"> • User Interface • Industry Interface 	
Committees operating in this functional area	Standards Australia Committees	International Committees
	<ul style="list-style-type: none"> • JTC 1 SAC (Strategic Advisory Committee) (A) 	<ul style="list-style-type: none"> • IEC PC 118 Smart grid user interface (P) • ISO/IEC JTC1 Information Technology (P)
Australian Standards in this functional area	<ul style="list-style-type: none"> • AS 5711:2013 Smart grid vocabulary 	
IEC committees operating in this functional area	<ul style="list-style-type: none"> • IEC PC 118 Smart grid user interface • ISO/IEC JTC1 Information Technology 	
IEC Standards in this functional area	<ul style="list-style-type: none"> • IEC 62939-3 Smart grid user interface - Part 3: Energy interoperation services 	

Functional area	Privacy	
Description	<ul style="list-style-type: none"> • Protection of personal and commercial data in relation to the electricity network 	
Sub Topics	<ul style="list-style-type: none"> • Billing • Payments • Usage • Privacy 	
Committees operating in this functional area	Standards Australia Committees	International Committees
	<ul style="list-style-type: none"> • IT-012 Information Systems, Security and Identification Technology (P) 	<ul style="list-style-type: none"> • ISO/IEC JTC1 SC27 Information Technology Security Techniques
Australian Standards in this functional area		
IEC Standards in this functional area	<ul style="list-style-type: none"> • ISO/IEC 29100:2011 Information technology - Security techniques - Privacy framework • ISO/IEC 27018:2014 Information technology - Security techniques - Code of practice for protection of personally identifiable information (PII) in public clouds acting as PII processors 	

Appendix

Relevant Australian and International Committees

IEC Committee	Subcommittee	Committee Title	IEC Participation	Australian Committee	Committee Title	Status
TC 1		Terminology				
TC 4		Hydraulic Turbines				
TC 5		Steam Turbines				
TC 7		Overhead electrical conductors	O	EL-003	Electric Wires And Cables	Active
TC 8		Systems aspects for electrical energy supply	P	EL-034	Power Quality	Active
	SC 8A	Grid Integration of Renewable Energy Generation	P	EL-034	Power Quality	Active
TC 11		Overhead lines	P	EL-052	Electrical Energy Networks, Construction and Operation	Active
TC 13		Electrical energy measurement and control	P	EL-011	Electricity Metering Equipment	Active
TC 14		Power transformers	P	EL-008	Power Transformers	Active
TC 17		High-voltage switchgear and controlgear	P	EL-007	Power Switchgear	Active
			P	EL-006	Industrial Switchgear And Controlgear	Active
	SC 17A	Switching devices	P	EL-007	Power Switchgear	Active
	SC 17C	Assemblies	P	EL-007	Power Switchgear	Active
TC 21		Secondary cells and batteries	P	EM-001	Electric Vehicle Operations	Active
TC 22		Power electronic systems and equipment	O	EL-027	Power Electronics	Active
	SC 22E	Stabilized power supplies	O	EL-027	Power Electronics	Active
	SC 22F	Power electronics for electrical transmission and distribution systems	O	EL-027	Power Electronics	Active
	SC 22G	Adjustable speed electric drive systems incorporating semiconductor power converters	O	EL-027	Power Electronics	Active
	SC 22H	Uninterruptible power systems (UPS)	O	EL-027	Power Electronics	Active
TC 23		Electrical accessories	P	EL-004	Electrical Accessories	Active
TC 33		Power capacitors and their applications				
TC 35		Primary cells and batteries	O	EL-022	Primary Cells And Batteries	Active
TC 37		Surge arresters	P	EL-007	Power Switchgear	Active
	SC 37A	Low-voltage surge protective devices	P	EL-007	Power Switchgear	Active
	SC 37B	Components for low-voltage surge protection	P	EL-007	Power Switchgear	Active
TC 38		Instrument transformers	P	EL-013	Measurement And Protection Transformers	Active
TC 40		Capacitors and resistors for electronic equipment				
TC 57		Power systems management and associated information exchange	P	EL-050	Power System Control and Communication	Active
TC 65		Industrial-process measurement, control and automation	P	IT-006	Industrial Process Measurement, Control and Automation	Active
	SC 65A	System aspects	P	IT-006	Industrial Process Measurement, Control and Automation	Active
	SC 65B	Measurement and control devices				
	SC 65C	Industrial networks	O	IT-006	Industrial Process Measurement, Control and Automation	Active
	SC 65E	Devices and integration in enterprise systems				
TC 69		Electric road vehicles and electric industrial trucks	P	EM-001	Electric Vehicle Operations	Active
TC 77		Electromagnetic compatibility	P	TE-003	Electromagnetic compatibility	Active
	SC 77A	EMC - Low frequency phenomena	P	EL-034	Power Quality	Active
	SC 77B	High frequency phenomena	P	TE-003	Electromagnetic compatibility	Active
	SC 77C	High power transient phenomena				
TC 82		Solar photovoltaic energy systems	P	EL-042	Renewable Energy Power Supply Systems & Equipment	Active
TC 86		Fibre optics	O	CT-001	Communications Cabling	Active

IEC Committee	Subcommittee	Committee Title	IEC Participation	Australian Committee	Committee Title	Status
	SC 86A	Fibres and cables	O	CT-001	Communications Cabling	Active
	SC 86B	Fibre optic interconnecting devices and passive components	P	CT-001	Communications Cabling	Active
	SC 86C	Fibre optic systems and active devices	O	CT-001	Communications Cabling	Active
TC 88		Wind energy generation systems	O	EL-048	Wind Turbine Systems	Inactive
TC 94		All-or-nothing electrical relays	O	EL-028	Electrical Relays	Inactive
TC 95		Measuring relays and protection equipment	O	EL-028	Electrical Relays	Inactive
TC 96		Transformers, reactors, power supply units, and combinations thereof	O	EL-002	Safety of Household and Similar Electrical Appliances and Small Power Transformers and Power Supplies	Active
TC 99		System engineering and erection of electrical power installations in systems with nominal voltages above 1kv a.c. and 1.5kV d.c., particularly concerning safety aspects	Secretariat	EL-043	High Voltage Installations	Active
TC 105		Fuel cell technologies				
TC 111		Environmental standardization for electrical and electronic products and systems	P	EL-063	Environmental standardization for electrical and electronic products and systems	Active
TC 114		Marine energy - Wave, tidal and other water current converters				
TC 115		High Voltage Direct Current (HVDC) transmission for DC voltages above 100 kV				
TC 117		Solar thermal electric plants				
PC 118 (Project Committee)		Smart grid user interface	P	EL-062	Smart Grids	Active
TC 120		Electrical Energy Storage (EES) Systems	P	EL-061	Electrical Energy Storage	Active
TC 121		Switchgear and controlgear and their assemblies for low voltage				
	SC 121A	Low-voltage switchgear and controlgear	P	EL-006	Industrial Switchgear And Controlgear	Active
	SC 121B	Low-voltage switchgear and controlgear assemblies	P	EL-006	Industrial Switchgear And Controlgear	Active
TC 122		UHV AC transmission systems	O	EL-027	Power Electronics	Active
			O	EL-034	Power Quality	Active
ISO/IEC JPC 2		Energy efficiency and renewable energy sources - Common international terminology				
ISO/IEC JTC 1/SC 6		Telecommunications and information exchange between systems				
ISO/IEC JTC 1/SC 25		Interconnection of information technology equipment	P	CT-001	Communications Cabling	Active
ISO/IEC JTC 1/SC 27		IT security techniques	P	IT-012	Information Systems, Security and Identification Technology	Active
ISO TC 10		Technical Product Documentation	P	ME-072	Technical Drawing	Active
ISO TC 205		Building Environment Design	P	ME-062	Ventilation and Air Conditioning	Active
ISO TC 251		Asset Management	P	MB-019	Asset Management	Active
CISPR		International Special Committee on Radio Interference	P	TE-003	Electromagnetic compatibility	Active
				CE-019	Utility Service Poles	Active
				EL-001	Wiring Rules	Active
				EL-001-024	Generating Sets	Active
				EL-005	Secondary Batteries	Inactive
				EL-010	Overhead Lines	Active
				EL-052	Electrical Energy Networks, Construction and Operation	Active
				EL-054	Remote Demand Management of Electrical Products	Active
				EN-004	Energy Network Safety Management Systems	Inactive

Please send all responses by
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