MIRACLE

Micro-Request-Based Aggregation, Forecasting and Scheduling of Energy Demand, Supply and Distribution

Specific Targeted Research Project: 248195

D7.1 Standardisation Roadmap

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Author(s)	Jack P.C. Verhoosel, TNO, The Netherlands Roel E. Stap, TNO, The Netherlands
Reviewer(s)	Torben Bach Petersen, Aarhus University, Denmark

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1 Summary

This document presents a roadmap towards the standardisation of the MIRACLE specifications for the exchange of information around management of energy demand and supply. A long list of 15 potential standardisation organisations has been set-up and briefly described with respect to three criteria: type of standardisation organisation, its geographic scope and focus on energy management. From this list a short list of 4 different standardisation organisations has been selected. These are CEN/CENELEC, IEC, IEEE and the combination of ebIX and ENTSO-E. For these organisations, an additional four criteria have been described, namely openness of organisation, complexity of procedures, impact on the energy sector and potential success of standardisation of the MIRACLE specifications.

Based on this set of seven criteria in total, CEN/CENELEC has been selected as the target standardisation organisation. The MIRACLE project will strive to get a so-called CEN Workshop Agreement (CWA) as the standardisation product at the end of the project. The roadmap towards this CWA is worked-out in more detail and the coordination with CEN/CENELEC during the project is described. Thereby, the CWA process is aligned with the original planning of the WP7 deliverables of MIRACLE. The resulting CWA can be used after the lifetime of the MIRACLE project as a basis for further standardisation towards a European Norm (EN), which is the highest level of formal standardisation to be achieved within Europe.

The main conclusion and advice is that the MIRACLE project should adhere to the roadmap sketched in this document and try to align the WP7 activities during M18 and M36 with a CWA process at CEN/CENELEC.

2 Introduction

To secure the results of the MIRACLE project, the specifications developed by the project will be the basis for a standard in a formal European standardisation body. In addition, the specifications have to be supported by the main industry and government stakeholders in the area of smart grids and energy supply and demand. This document presents the roadmap for standardisation of the MIRACLE specifications.

MIRACLE will adhere to the definition of an open standard as described in the European Interoperability Framework adopted by the European Union[1]:

1. the standard has been published and is adopted on the basis of an open decision-making procedure (consensus or majority decision etc);
2. the costs for obtaining the specification are low and are not an obstacle to access to it;
3. the intellectual property rights to the standard are vested in a not-for-profit organisation, which operates a royalty-free access policy;
4. there are no constraints on the re-use of the standard.

[1] European Interoperability Framework for Pan-European eGovernment services, Version 1.0, European Commission. ISBN 92-894-8389-X

To realise the openness of the standardisation process, reviews by external stakeholders are vital to come with an appropriate standard. In this process, remarks and suggestions from relevant external stakeholders will be integrated into the final standard proposal. With this final proposal there is consensus between the stakeholders about the common specifications for the introduction of renewable energy sources in the smart grid environment. It has to be ensured that a standardisation body takes responsibility for our standards beyond the lifetime of the MIRACLE project. For this purpose, this document contains a concrete roadmap to help us organise both the preparation of our standardisation efforts and the actual standardisation activities after the end of the MIRACLE project.

This document is structured as follows. In chapter 3, the main steps of the roadmap to be taken during the project towards standardisation are briefly described. In chapter 4, a long list of potential standardisation bodies is presented and each organisation is briefly described. In chapter 5, a small set of criteria is described that is used to select a short list of standardisation bodies to focus on. In the same chapter the organisations in this short list are more extensively described along the lines of these criteria. In chapter 6, the final selection of a standardisation body is proposed and the next steps to be taken to achieve standardisation at that body are described. These steps conclude the roadmap described in this document.

3 Steps towards standardisation during MIRACLE

This chapter presents the actions to be done and steps to be taken to standardise the MIRACLE specifications. It contains a brief overview of the activities necessary to determine the appropriate standardisation body, to involve relevant stakeholders in the review process and to develop draft and approved standard documents. The timeline of the activities in the standardisation roadmap is also depicted in Figure 1 where M6 is June 2010.

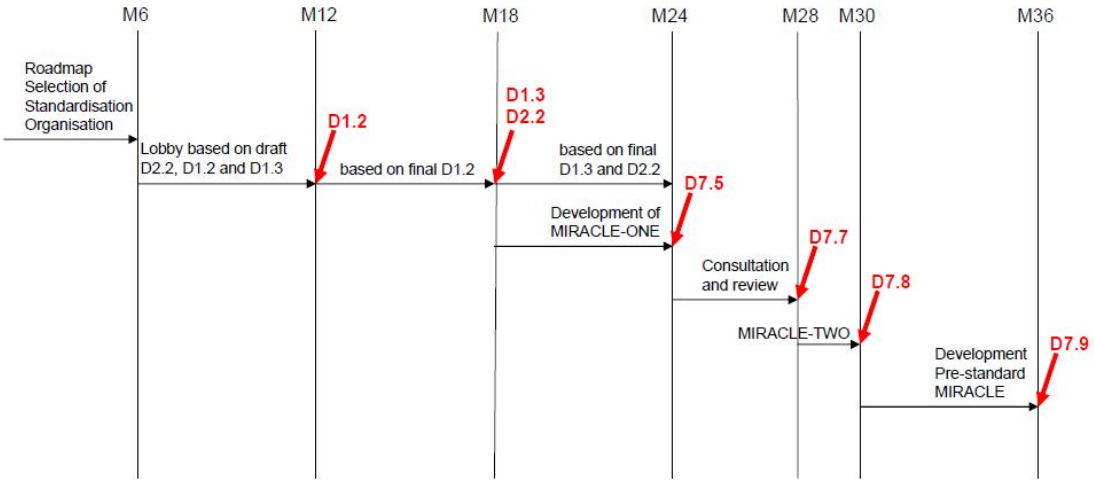

Figure 1: Timeline of activities in the standardisation roadmap.

3.1 Selection of a proper standardisation body

The first step in the standardisation roadmap is the selection of an appropriate standardisation body. The selection of such a standardisation body is based on a set of selection criteria that will be developed first. These selection criteria are determined based on the ambitions of the MIRACLE project and the European Commission and factors that influence the potential success of standardising the MIRACLE specifications.

Potential standardisation bodies are investigated by desk research activities and expert reviews to appropriate standardisation bodies involved in the energy demand and supply and/or smart grid sector. Based on this long list of potential bodies and the selection criteria, a short list of bodies is constructed that fit the best to realise the MIRACLE objectives. The bodies on this list and their standardisation procedures are examined in more detail to evaluate them with the developed criteria. Based on this evaluation a preference for the selected bodies is presented where the MIRACLE results can be standardised best.

This step will be executed in the time frame of month 1 to month 6 of the MIRACLE project and results in the standardisation roadmap that is described in this document.

3.2 Lobby towards selected standardisation body

The next step to be taken is to contact the selected standardisation bodies on the short list to collect the necessary information how these bodies can help in standardising the MIRACLE results. These bodies provide a variety of types of standards that needs to be examined to select the best products that fit the MIRACLE objectives. In addition, various relevant stakeholders are involved with the standardisation activities of the selected body. These stakeholders have to be informed about the objectives of the MIRACLE project and convinced about the usefulness of contents of the proposed deliverables. This is very important, since these organisations will play a vital role in the quality and openness of the future standard.

This step will actually have to be executed during the remainder of the project between month 6 and month 36. In the time frame between M6 and M12 this can be done based on draft documents of D2.2, D1.2 and D1.3. In the time frame between M12 and M24 based on the final versions of these deliverables. Between M24 and M30 the involvement will take place based on the MIRACLE-ONE specification in D7.5 and finally between M30 and M36 based on the MIRACLE-TWO specification in D7.8 and the draft/final D7.9 pre-standard document.

3.3 Development of specification MIRACLE-ONE

The next step to be taken is the development of a first draft specification, MIRACLE-ONE. This specification focuses on the information exchange of management and control of energy demand and supply. The specification is based on deliverables D2.2, D1.2 and D1.3 of work packages WP1 and WP2. Note that work packages 3, 4 and 5 will give input to deliverable D2.2 on the requirements on the information exchange from a point of view of data collection, aggregation, analysis, scheduling and forecasting of demand and supply of energy. Deliverables D2.2, D1.2 and D1.3 need to be transformed into a consistent set of documents that can be used to discuss the specification with the external stakeholders involved. Thereby, the focus is to select those parts that should

eventually form the formal standard and combine them into a complete, correct, compact and non-ambiguous standardisation proposal. Work package 7 will however not add any technical details to this specification. Instead, we organise a project-internal process of generating the MIRACLE-ONE specification such that there is consensus among the partners within the project. This initial version is then used as a basis for discussion with external stakeholders. This step will be done during months 18 and months 24 when deliverables D2.2, D2.1 and D1.3 are finished.

3.4 Consultation process with stakeholders in the sector

After the development of the MIRACLE-ONE specification, an open review procedure is started with the relevant and appropriate stakeholders in order to come to a specification that can be easily adopted as a standard after the lifetime of the MIRACLE project. During this review process the stakeholders are invited to participate in the review and bring in requests for change. Proper selection of procedures and decision criteria has to ensure equal access for all different kind of stakeholders. Depending on the selected standardisation body, means of interaction and review of this standardisation body can be used to organise the review process with relevant external stakeholders.

At the end of the review period, all requests for changes have been collected and decisions will be made on whether or not they will be accepted. Thereby, the technical know-how of partners involved in WP1 and WP2 is needed. The decision process has to uphold the principle of receiving consensus among all the involved stakeholders about the request for changes. Only if this is not possible to achieve, the MIRACLE project partners will have to make decisions about the acceptance/rejection of request for changes. This process is critical because it has influence on the consensus result for the standard in the future. This review step will be executed between month 24 and month 28 and will lead to deliverable D7.7 containing the change requests.

3.5 Development of specification MIRACLE-TWO

After the review period the requests for change in D7.7 are processed and a new version MIRACLE-TWO of the specification will be developed. This version is developed in cooperation with the MIRACLE project partners and is thus project internal. However, proper communication to the external stakeholders about the selected and rejected requests for change is crucial for success towards standardisation. This step is taken between month 28 and month 30 and will lead to deliverable D7.8 containing the MIRACLE-TWO specification.

3.6 Development of pre-standard documents for standardisation body

The final step to be taken during the project towards standardisation is the preparation of a pre-standard appropriate for further development within the selected standardisation body. This pre-standard is based on the MIRACLE-TWO specifications and have the adaptations made to the requests for change from the earlier review session. The pre-standard has to adhere to the procedures and process defined by the selected standardisation body and the proper document types have to be selected. Finally, a formal event will be organised to transfer the pre-standard results to the standardisation body. This will all be done between month 30 and month 36 and will lead to deliverable D7.9 containing the pre-standard of the MIRACLE project.

4 Potential standardisation bodies

This chapter presents a long list of potential standardisation bodies where the MIRACLE specification can be standardized. This list is assembled via a desk research quick scan of the web on energy standardisation. In addition, the partners within the MIRACLE project and a number of experts within TNO have been questioned about standardisation bodies within the energy sector. The result is a long list of potential interesting standardisation bodies. Within a quick scan, basic information about these bodies has been collected that is sufficient for a first selection. The criteria for this first selection process were:

- Is there a geographical European or worldwide focus?
- Does the body have impact on the energy sector and in particular on the stakeholders in demand and supply of energy?
- Is the body acknowledged as a formal or informal organisation that can produce standards or specifications to be standardized?

In the following sections each of the bodies found is briefly described in random order. In the next chapter, this long list is reduced to a short list based on an extended list of selection criteria.

4.1 CEN

The European Committee for Standardization (CEN) is a business facilitator in Europe, removing trade barriers for European industry and consumers. Its mission is to foster the European economy in global trading, the welfare of European citizens and the environment. Through its services it provides a platform for the development of European Standards and other technical specifications.

CEN is a major provider of European Standards and technical specifications. It is the only recognized European organization according to Directive 98/34/EC for the planning, drafting and adoption of European Standards in all areas of economic activity with the exception of electro technology (CENELEC) and telecommunication (ETSI).

The 31 National Members of CEN cooperate to develop voluntary European Standards, of which the most well-known is the European Norm (EN). These standards have a unique status since they also are national standards in each of its 31 Member countries. With one common standard in all these countries and every conflicting national standard withdrawn, a product can reach a far wider market with much lower development and testing costs. More than 60.000 technical experts as well as business federations, consumer and other societal interest organizations are involved in the CEN network.

In a globalized world, the need for international standards simply makes sense. The Vienna Agreement − signed by CEN in 1991 with ISO (International Standardisation Organisation) its international counterpart − ensures technical cooperation by correspondence, mutual representation at meetings and coordination meetings, and adoption of the same text, as both an ISO Standard and a European Standard.

4.2 CENELEC

CENELEC, the European Committee for Electro Technical Standardization, was created in 1973 as a result of the merger of two previous European organizations: CENELCOM and CENEL. Nowadays, CENELEC is a non-profit technical organization set up under

Belgian law and composed of the National Electro Technical Committees of 31 European countries. In addition, 11 National Committees from neighbouring countries are participating in CENELEC work with an Affiliate status.

CENELEC members have been working together in the interests of European harmonization since the 1950s, creating both standards requested by the market and harmonized standards in support of European legislation and which have helped to shape the European Internal Market. CENELEC works with 15,000 technical experts from 31 European countries. Its work directly increases market potential, encourages technological development and guarantees the safety and health of consumers and workers.

The mission of CENELEC is to prepare voluntary electrotechnical standards that help develop the Single European Market/European Economic Area for electrical and electronic goods and services removing barriers to trade, creating new markets and cutting compliance costs.
For doing this, CENELEC is committed to:

- Satisfy the needs of the European industry and other stakeholders in the market place in the areas of standardisation and conformity assessment in the fields of electricity, electronics and associated technologies.
- Lead the improvement of all aspects of product quality, product safety, service quality and service safety in the fields of electricity, electronics and associated technologies, including protection of the environment, accessibility and innovation, and so to contribute to the welfare of society.
- Support IEC, the International Electrotechnical Commission, in achieving its mission: "To be globally recognised as the provider of standards and conformity assessment and related services needed to facilitate international trade in the fields of electricity, electronics and associated technologies.

A Resolution of 7th May 1985 of the European Council formally endorsed the principle of reference to European standards within the relevant European regulatory work (Directives), thereby paving the way to a new approach in the philosophy of regulations and standards in Europe. In the light of this approach, CENELEC is developing and achieving a coherent set of voluntary electrotechnical standards as a basis for the creation of the Single European Market/European Economic Area without internal frontiers for goods and services.

In addition to the traditional European standard deliverables, the dynamic Workshop (CWA: CENELEC Workshop Agreement) has been included in its portfolio, offering an open platform to foster the development of pre-standards for short lifetime products where time-to-market is critical.

4.3 ETSI

The European Telecommunications Standards Institute (ETSI) produces globally-applicable standards for Information and Communications Technologies (ICT), including fixed, mobile, radio, converged, broadcast and internet technologies.

ETSI is officially recognized by the European Union as a European Standards Organization. The quality of the work and the open approach to standardization has

helped to evolve into a European roots - global branches operation with a solid reputation for technical excellence. ETSI is a not-for-profit organization with more then 750 member organizations drawn from 63 countries across 5 continents world-wide.

In addition to producing world class standards that can be applicable at the global level, standardization also plays a central role to ensure the proper functioning of the internal market. This is achieved by the prompt and efficient production Harmonized European standards (ENs) that are referenced to support the implementation of EU legislation to ensure the free movement of goods within the single European market and allow enterprises in the EU to become more competitive.

4.4 IEEE

The Institute of Electrical and Electronics Engineers (IEEE) is globally oriented association advancing innovation and technological excellence for the benefit of humanity. IEEE and its members inspire a global community to innovate for a better future through its publications, conferences, technology standards, and professional and educational activities. IEEE is the trusted “voice” for engineering, computing and technology information around the globe.

IEEE provides a wide range of publications and standards that make the exchange of technical knowledge and information possible among technology professionals. With an active portfolio of nearly 1,300 standards and projects under development, IEEE is a developer of industry standards in a broad range of technologies.

Within IEEE, the standards association (IEEE-SA) is a major contributor to IEEE. The IEEE-SA promotes the engineering process by creating, developing, integrating, sharing, and applying knowledge about electro- and information technologies and sciences.
IEEE is working closely with NIST, which is developing a standards roadmap and conformance testing/certification framework for the smart grid in the US, and is collaborating with other standards bodies to effectively facilitate standards coordination and to ensure the intensifying smart grid movement’s success.

4.5 ISO

ISO (International Organization for Standardization) is a worldwide developer and publisher of International Standards. ISO is a network of the national standards institutes of 159 countries, one member per country, with a Central Secretariat in Geneva, Switzerland, that coordinates the system. ISO is a non-governmental organization that forms a bridge between the public and private sectors. On the one hand, many of its member institutes are part of the governmental structure of their countries, or are mandated by their government. On the other hand, other members have their roots uniquely in the private sector, having been set up by national partnerships of industry associations. With respect to the energy domain, there is a fairly young cooperation with the IEC since 2009. Also, the publication of standards in the energy domain is done jointly under ISO/IEC flag.

4.6 IEC

The International Electrotechnical Commission (IEC) is the leading global (worldwide) organization that prepares and publishes international standards for all electrical,

electronic and related technologies. These serve as a basis for national standardization and as references when drafting international tenders and contracts (www.iec.ch). Through its members, the IEC promotes international cooperation on all questions of electrotechnical standardization and related matters, such as the assessment of conformity to standards, in the fields of electricity, electronics and related technologies.

The IEC charter embraces all electrotechnologies including electronics, magnetics and electromagnetics, electroacoustics, multimedia, telecommunication, and energy production and distribution, as well as associated general disciplines such as terminology and symbols, electromagnetic compatibility, measurement and performance, dependability, design and development, safety and the environment.

IEC's standards are vital since they also represent the core of the World Trade Organization's Agreement on Technical Barriers to Trade (TBT), whose 100-plus central government members explicitly recognize that international standards play a critical role in improving industrial efficiency and developing world trade. The number of standardization bodies which have accepted the Code of Good Practice for the Preparation, Adoption and Application of Standards presented in Annex 3 to the WTO's TBT Agreement underlines the global importance and reach of this accord. IEC standards provide industry and users with the framework for economies of design, greater product and service quality, more inter-operability, and better production and delivery efficiency. At the same time, IEC's standards also encourage an improved quality of life by contributing to safety, human health and the protection of the environment.

The IEC works closely with its international standardization partners such as the International Organization for Standardization (ISO). An initial agreement was signed with ISO in 1976 and ten years later the two bodies established the ISO/IEC Joint Technical Committee 1 (ISO/IEC JTC 1) to cover the vast and expanding field of information technology. In the culmination of a process started in the early 90s when the importance of "electronic data interchange" (EDI) was becoming clear, IEC, ISO, ITU and UNECE in 2000 signed a Memorandum of Understanding on Electronic Business (E-business). The purpose is to coordinate standards work in the four organizations, as well as the needs of a number of associated user groups, so as to avoid divergent approaches and duplication in standards. A Management Group for the MoU, comprising technical groups involved in writing and in using e-business standards, meets twice a year, and has already contributed a lot to the harmonious development of e-business standards. Since 2009, there is also an ISO/IEC JTC2 on the common terminology for energy efficiency and renewable energy sources.

4.7 ANSI

The mission of ANSI is to enhance both the global competitiveness of U.S. business and the U.S. quality of life by promoting and facilitating voluntary consensus standards and conformity assessment systems, and safeguarding their integrity.

The U.S. National Committee of the International Electrotechnical Commission (USNC/IEC) serves as the focal point for U.S. parties who are interested in the development, promulgation and use of globally-relevant standards for the electotechnical industry. The Committee is also engaged in the assessment of conformance to standards, undertaking work in areas such as testing, certification and accreditation. The USNC/IEC is a totally integrated committee of the American National Standards Institute

(ANSI). In cooperation with IEC, ANSI develops standards for the energy efficiency and renewable energy sources. ANSI has no own technical commission or sub commission in the area of smart grids and renewable energy sources.

4.8 OMG

The Object Management Group (OMG) has been an international, open membership, not-for-profit computer industry consortium since 1989. Any organization may join OMG and participate in the standards-setting process. The one-organization-one-vote policy ensures that every organization, large and small, has an effective voice in the standard setting process.

In relation with energy efficiency and renewable energy sources, OMG is not primarily present in this domain; however, it's one of the new business domains for OMG. It supports some other initiatives and primarily the software and system engineering issues.

4.9 W3C

The W3C mission is to lead the World Wide Web to its full potential by developing protocols and guidelines that ensure the long-term growth of the Web. The World Wide Web Consortium (W3C) is an international community where Member organizations, a full-time staff, and the public work together to develop web standards.

W3C has no current activities in relation with the energy exchange of information within smart grid energy network. Although, technology, concepts, etc. developed and standardized within W3C may be used in standards for energy efficiency and renewable energy sources.

4.10 OSGi

The mission of the Open Services Gateway initiative (OSGi) alliance is to create a market for universal middleware (www.osgi.org). The OSGi Alliance, therefore, promotes widespread adoption of the OSGi Service Platform to assure interoperability of applications and services delivered and managed via networks. To realize this mission, the alliance provides specifications, reference implementations, test suites and certification to foster a valuable cross-industry ecosystem.

Within OSGi there is minor focus for standardization of the concept and the technology. Furthermore, OSGi has no special focus on the area of interest around smart grids, energy efficiency and renewable energy sources.

4.11 SmartGrids

SmartGrids is a European Technology Platform for the electricity networks of the future (www.smartgrids.eu). The mission of SmartGrids is to foster and support the deployment of smart grids in Europe advising and providing coordination to the various SmartGrids Forum stakeholders (European Commission, TSO, DSO, Energy System and Component vendors, Energy Research Centres, Smart Metering Industry, Energy Consumers, Utilities Telecom Providers, Grid Regulators) among projects and parallel related initiatives, to facilitate the smooth and efficient running of the European Technology Platform SmartGrids ensuring its strategic relevance and its consistency with EU policy. To link with relevant technology platforms dealing with energy matters that have an

impact both at the generation and the demand side, on the future of the grid. To provide relevant input to the EU initiatives such as SET-plan and its European Industrial Initiatives.

Although the SmartGrids ETP is focused on the innovation and development of the electricity networks of the future, there is no direct work on standardization of smart grids and energy efficiency. Presumably, this ETP will establish indirect standardisation by promoting research and development in the area of smart grids.

4.12 NIST

The mission of the National Institute of Standards and Technology (NIST, www.nist.gov) is to promote U.S.A. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhance economic security and improve our quality of life.

Based on the mission statement and the scope of projects leaded by NIST, the main geographic focus is the US. One of the main roles of NIST is the coordinated tasks for the Energy Independent and Security Act (EISA) and the American Recovery and Reinvestment Act (ARRA).

Among others NIST has a special program for smart grids[2]. In this program NIST has the primary responsibility to coordinate development of a framework that includes protocols and model standards for information management to achieve interoperability of smart grid devices and systems. In this program a lot of interesting information is presented about the specification and realization of smart grids. However, NIST is not acting in the development and publication of standards for smart grids; it uses standards and provides input for new standards.

4.13 NETL

The National Energy Technology Laboratory (NETL), part of DoE's national laboratory system, is owned and operated by the U.S. Department of Energy (DoE). NETL supports DoE's mission to advance the national, economic, and energy security of the United States.

In addition to research conducted onsite, NETL's project portfolio includes R&D conducted through partnerships, cooperative research and development agreements, financial assistance, and contractual arrangements with universities and the private sector. Together, these efforts focus a wealth of scientific and engineering talent on creating commercially viable solutions to national energy and environmental problems.

Within NETL there is an initiative for smart grid implementation guide[3]. There is no focus on standards development and publication.

[2] http://www.nist.gov/smartgrid/
[3] http://www.netl.doe.gov/smartgrid/index.html

4.14 ebIX

The purpose of ebIX, the European forum for energy Business Information eXchange, is to advance, develop and standardise the use of electronic information exchange in the energy industry (www.ebix.org). The main focus is on interchanging administrative data for the internal European markets for electricity and gas. ebIX shall also cover the needs both for the wholesale market and the retail market.

ebIX is an organisation that facilitates in performing projects around customer switching, exchange of metered data and other electric business related information exchange items. ebIX is an organisation with European members operating in the national energy sector and involved in the exchange of electronic business information.

EbIX cooperates with other organizations such as ENTSO-E to contribute in structuring and standardizing the electronic business information exchange.

4.15 ENTSO-E

The European Network of Transport System Operators for Electricity consists of 42 TSO's in 34 countries. ENTSO-E's vision is to become and remain the focal point for all European, technical, market and policy issues related to Transmission System Operators (TSO), interfacing with the power system users, EU institutions, regulators and national governments (www.entsoe.eu). ENTSO-E's work products contribute to security of supply, a seamless, pan-European electricity market, a secure integration of renewable resources and a reliable future-oriented grid, adequate to energy policy goals.

ENTSO-E's mission is to promote important aspects of energy policy in the face of significant challenges:

- Security - it pursues coordinated, reliable and secure operations of the electricity transmission network.
- Adequacy - it promotes the development of the interconnected European grid and investments for a sustainable power system.
- Market - it offers a platform for the market by proposing and implementing standardized market integration and transparency frameworks that facilitate competitive and truly integrated continental-scale wholesale and retail markets.
- Sustainability - it facilitates secure integration of new generation sources, particularly growing amounts of renewable energy and thus the achievement of the EU's greenhouse gases reduction goals.

ENTSO-E is the relatively new overall representation of all European TSO organisations. Since July 2009 ENTSO-E is the new organisation of the former six regional TSO represented organisations: ATSOI, BALTSO, ETSO, NORDEL, UCTE, and UKTSOA.

Transmission System Operators are traditionally responsible for the bulk transmission of electric power on the main high voltage electricity networks. TSOs provide grid access to the electricity market players (i.e. generating companies, traders, suppliers, distributors and directly connected customers) according to non-discriminatory and transparent rules. In order to ensure the security of supply, they also guarantee the safe operation and maintenance of the system. In many countries, TSOs are in charge of the development of

the grid infrastructure too. TSOs in the European Union internal electricity market are entities operating independently from the other electricity market players.

5 Short list of interesting standardisation bodies

This chapter describes in more detail the selection of Standard Development Organisations (SDO's) mentioned in the long list in the previous chapter. The long list contains potential organisations involved in the electrotechnical sector or information technology methodology and construction area. This list is the result of desktop research, expert interviews and project partner knowledge. To compromise this list to a more appropriate and favourable short list of organisations, we compose some basic criteria applicable for the standardisation process within MIRACLE.

The first criterion covers the type of standardisation body. In this criterion we make a distinction between a full standard development organisation (SDO), a standard setting organisation (SSO) and standard publishing organisation (SPO). An SDO supports all activities and processes to initiate, develop and publish a standard. An SSO and a SPO concentrates on one of the phases *initiate and development* or *publishing*.

The second criterion handles the main geographic focus of the organisation. While the MIRACLE project concentrates on the European smart energy sector, it is logical to select organisations that have a European or Global focus for their standards. Nowadays, there are applicable organisations that however focus on the support of the recent US energy act. From our perspective, these organisations are not interesting from a MIRACLE standardisation point of view.

The third criterion contains the degree in which the SDO has focus on the (smart) energy sector. The results of the MIRACLE project will contribute to the development of the smart energy grid concept, and it will be vital to have a standards body involved in this subject.

Table 1: SDO selection table.

	TYPE OF STANDARD BODY (SSO, SPO, FULL SDO)	GEOGRAPHIC SCOPE	FOCUS ON ENERGY DEMAND & SUPPLY
ANSI	Full SDO	US	No
CEN	**Full SDO**	**Europe**	**No**
CENELEC	**SDO**	**Europe**	**Yes**
ebIX/ENTSO-E	**SSO/SPO**	**Europe**	**Yes**
ETSI	SDO	Europe	No
IEC	**Full SDO**	**Global**	**Yes**
IEEE	**Full SDO**	**Global**	**Yes**
ISO	Full SDO	Global	No
NETL	-	US	Yes
NIST	SSO	US	Yes

	TYPE OF STANDARD BODY (SSO, SPO, FULL SDO)	GEOGRAPHIC SCOPE	FOCUS ON ENERGY DEMAND & SUPPLY
OMG	SSO	Global	No
OSGi	-	US/Global	No
SmartGrids	-	Europe	Yes
W3C	Full SDO	Global	No

Based on the criteria we have only selected those standardisation organisations that have:

- standardisation as (one of the) objectives (SDO, SSO, SPO),
- a European or Global geographic scope, and
- a focus on energy demand and supply ("Yes" at focus).

This leads to CEN/CENELEC[4], ebIX/ENTSO-E[5], IEC and IEEE for the short list and further investigation. They are bold in Table 1.

5.1 Criteria for selection of a standardisation body from the short list

The short list of SDO's will be investigated and described in further detail. Based on this investigation we will make a prioritized selection of bodies applicable for standardisation of the MIRACLE results.

To make the bodies on the short list comparable, we use the above three criteria on type of body, geographic scope and focus on energy. The last one is more elaborated on and describes the more detailed activities on energy management of demand & supply. In addition, we use a number of additional criteria. These additional criteria will concentrate on the applicability, the complexity and chance of success to get the MIRACLE results standardised. All of the criteria will be explained in more detailed in this section.

5.1.1 Type of standardisation body

The first criterion covers the type of standardisation body. As mentioned before, we make a distinction between a full standard development organisation (SDO), a standard setting organisation (SSO) and standard publishing organisation (SPO).

5.1.2 General description and geographic scope of standardisation body

The second criterion to check the SDO is a general description and the geographic scope. The general description covers the type of organisation, its mission and members. It also considers the cooperation with other standardisation organisations. The products

[4] We will consider CEN and CENELEC as one harmonized organisation in the area of smart grids. There is a smart grid joint working group between both organisations.

[5] We will consider ebIX and ENTSO-E as one combined organisation. Both organisations cooperate in the area of standardisation and have published specifications in the area of smart grids in combination with the exchange of electronic business information.

of the SDO may have a particular geographic scope, and therefore are limited in use and applicability.

In general there are three geographic areas of interest: National, European and International (Global). MIRACLE's main scope is Europe; therefore the interesting SDO will have preferably a European or international scope.

5.1.3 Openness of the standardisation organisation and its standards

The openness of the standardisation organisation and its products is a major objective to realize a free European market. However, the term openness is rather difficult to define in relation to standards. In several countries definitions are made to define this term. Based on the European definition the word "open" is here meant in the sense of fulfilling the following requirements[6]:

- The standard is adopted and will be maintained by a not-for-profit organisation, and its ongoing development occurs on the basis of an open decision-making procedure available to all interested parties (consensus or majority decision etc.).
- The standard has been published and the standard specification document is available either freely or at a nominal charge. It must be permissible to all to copy, distribute and use it for no fee or at a nominal fee.
- The intellectual property - i.e. patents possibly present - of (parts of) the standard is made irrevocably available on a royalty-free basis.
- There are no constraints on the re-use of the standard.

5.1.4 Activities of standardisation body on management of energy demand and supply

This criterion focuses on the SDO and its activities on energy management for renewable energy sources. The specifications within MIRACLE will preferably relate and be harmonized to other specifications for energy management. In this case the MIRACLE specifications will not be stand alone, but will be part of a larger entity.

5.1.5 Complexity of the standardisation procedures

This criterion presents an indication about the complexity of the procedures to follow to get a specification standardized. The complexity of the standardization process encloses the number of process steps, the overall timeframe and the effort to be done to get the specification in the appropriate form for standardization. Furthermore, the number of interactions with external stakeholders and the level of consensus to achieve is an indication about the complexity of the procedure.

5.1.6 Impact of standardisation body on the sector

This criterion presents the degree of applicability of the SDO to the energy sector and the smart grid and energy management development. It is an indication of the impact of such standards to the energy management sector.

5.1.7 Potential success for standardizing our specs at the standardisation body

This criterion presents the potential success to get the MIRACLE specification standardized at the specific standardisation body. It relates to the third criterion about energy management activities of the SDO (see 5.1.4). Furthermore, the degree of

[6] Definition from: http://en.wikipedia.org/wiki/Open_standard#European_Union_definition

applicability of the MIRACLE specification to other published standards of this SDO specifies the potential success for standardization. It also encloses the degree of involvement of project partners in the standardization body

5.2 CEN/CENELEC

Type of standardisation body
The CENELEC organisation is a European standard development organisation (Full SDO). In cooperation with ETSI and CEN, CENELEC is responsible for definition, specification and publication of electrotechnical standards in Europe.

CENELEC has a global counterpart in IEC, where global electrotechnical standards are developed. In the figure below an overview is presented about the European and global organisations involved in this process.

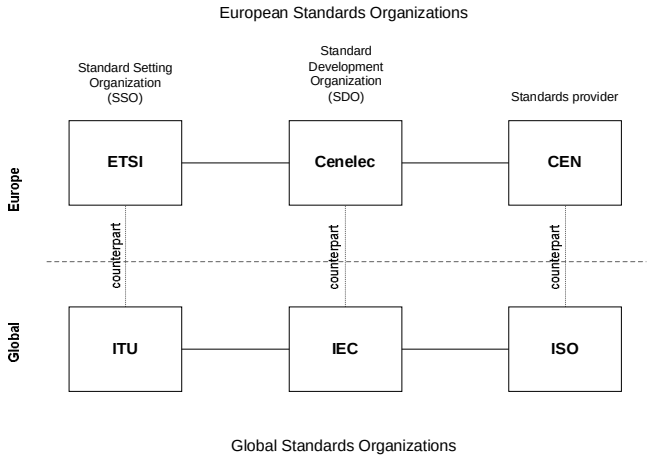

Figure 2: Overview European and global standardisation organisations.

Between CEN and CENELEC there is some overlap in the smart grid topic, while ETSI is from a telecommunication perspective involved. CENELEC concentrates on the electrotechnical aspects of this theme, while CEN focuses on the information technology aspect of smart grids. For this reason a joint workgroup between both organisations is coordinating the work of standards in smart grids. From now on, we will mention this workgroup when we refer to CEN/CENELEC.

General description and geographic scope of CEN/CENELEC
The mission of CENELEC is to prepare voluntary electrotechnical standards that help develop the Single European Market/European Economic Area for electrical and electronic goods and services removing barriers to trade, creating new markets and cutting compliance costs. For doing this, CENELEC is committed to:

- Satisfy the needs of the European industry and other stakeholders in the market place in the areas of standardisation and conformity assessment in the fields of electricity, electronics and associated technologies.
- Lead the improvement of all aspects of product quality, product safety, service quality and service safety in the fields of electricity, electronics and associated technologies, including protection of the environment, accessibility and innovation, and so to contribute to the welfare of society.

- Support IEC, the International Electrotechnical Commission, in achieving its mission: "To be globally recognised as the provider of standards and conformity assessment and related services needed to facilitate international trade in the fields of electricity, electronics and associated technologies".

In addition to the regular standardisation work achieved by CENELEC since its foundation, a European Council Resolution of 7th May 1985 gave a new dimension to CENELEC's mission by recognising it as the standardisation body able to provide harmonised standards for the electrotechnical field under the new approach.

The single European market/economic area is covered by the members of CENELEC[7], These members are countries from the EC as well as neighbouring countries.

CEN, the European Committee for Standardization, is an international non-profit organization set up under Belgian law. Through its services, it provides a platform for the development of European Standards (ENs) and other consensus documents. The 31 national members of CEN work together to develop these publications in a large number of sectors to help build the European internal market in goods and services.

CEN is one of the three (beside CENELEC and ETSI) European Standards Organizations (ESOs) whose main objective is to remove trade barriers for European industry and consumers.

Openness of the CEN/CENELEC organisation and its standards
Based on CEN/CENELEC's 2008 annual financial report, it can be concluded that CEN/CENELEC is a not-for-profit organisation. The total income covers the cost of the organisation's activities and there is no profit for the organisation. The income is mainly based on member's contribution, contractual income and interest.

Within CEN/CENELEC there are different types of standard products to be used to capture specifications. The most well known product is the European Norm (EN), while the CEN/CENELEC Workshop Agreement, Technical Reports (TR) and Technical Specifications are other examples of standard products. These products have different procedures to come up with these products. The CEN/CENELEC procedures are in general as open as possible.

To show a procedure example, the EN process is described in a bit more detail. The CEN/CENELEC's development process contains different stages: drafting, enquiry, voting and publication. In the drafting phase the standard is developed via IEC commissions, CEN/CENELEC technical bodies, CEN/CENELEC partners or National committees. The bodies deliver a draft standard document to the national committees for enquiry. After a period of 6 months the comments are incorporated in the final version of the standard. During the voting all CEN/CENELEC's members have a weighted vote corresponding to the size of the country. The larger countries like France, Germany, Italy and UK have 10 votes while the smaller ones have one or two weighted votes. The standard is approved when a majority of the nation committees are in favour of the document and at least 71%

7 http://www.cenelec.eu/CENELEC/About+CENELEC/Our+organization/CENELEC+Members/Default.htm

of the weighted votes are positive. After voting and adopting the standard, it is published. Within all members states this standard has the status of an obligation and all conflicting (national) standards have to be withdrawn.

The process to maintain and adapt a standard is as follows. During its lifetime, an EN may be updated, as necessary, by corrigenda, amendments and the issue of a new edition incorporating amendments. The responsible Technical Committee shall ensure that ENs are periodically reviewed. In CEN the periodical review shall occur at intervals not exceeding 5 years. If there is no Technical Committee, the responsibility for review shall rest with the Technical Board. In CENELEC the maintenance cycle as described in the IEC Supplement 2001 of the ISO/IEC Directives, clause 5, shall be agreed by the CENELEC technical body before submission of the draft to formal vote, and the information shall be included in the foreword of the final publication. As a result of the review the EN shall be confirmed, amended, revised as a new edition with a new date, or withdrawn. The resulting decision shall be communicated to all CEN/CENELEC national members for action to be taken with respect to their national implementation.

All CEN/CENELEC standards are published via local standard distributors for minimal costs (about €40,- to €100,-). CEN/CENELEC has a common harmonized IPR policy model[8]. The basic policy for standardization is intended to put ideas into the public domain, whereas protection of IPR makes them private property. Therefore, any use of IPR by a standard is an anomaly, sometimes an unavoidable one. The practice followed by CEN/CENELEC concerning references to patented items in European standards is closely aligned with the rules developed by ISO and IEC.
If *in exceptional cases*, technical reasons justify the preparation of a European Standard in terms which include the use of a patented item, there is no objection in principle to such a step, even if the terms are such that there are no alternative means of compliance. In such a case, the following procedures shall be complied with:

a) CEN and CENELEC cannot give authoritative or comprehensive information about evidence, validity and scope of patent and like rights but it is desirable that the fullest available information be disclosed. Therefore, the originator of a proposal of such a kind shall draw attention to any known patent and like rights on a worldwide basis or any known pending applications, although CEN and CENELEC are not in a position to guarantee the authority of any such information.

b) If the proposal is accepted on technical grounds, any known patent holder shall be asked for a statement that he would be willing to negotiate licences under patent and like rights with applicants throughout the world on reasonable terms and conditions. A record on a patent holder's statement shall be placed in the files of CEN or CENELEC (as appropriate) and shall be referred to in the relevant European Standard. If the patent holder does not provide such a statement, the technical body responsible shall not proceed with the inclusion of the patented item.

c) Should it be revealed after publication of the European Standard that licences under a patent and like rights cannot be obtained under reasonable terms and conditions, the European Standard shall be referred back to the technical body responsible for further consideration.

[8] http://www.cen.eu/boss/Production/Production%20processes%20-%20Index/Unique%20Acceptance%20Procedure/Documents/cclcgd008.pdf

Activities of CEN/CENELEC on management of energy demand and supply
In 2002, CEN and CENELEC decided to set up a joint workgroup, called the CEN/CENELEC BT/JWG "Energy Management"[9]. Its purpose was to give a proactive response to the upcoming requests from the legal field in respect of energy management and efficiency.

In its final report the joint workgroup advised 21 priorities for energy standardization. One of the priorities resulted in the taskforce 189, energy management and related services (Priority 9 (level A): Standardisation of energy systems for tomorrow). Within this taskforce there are four items identified:

- Energy Management Systems
- Energy Efficiency Services (Ex ESCO)
- Energy Managers and Experts
- Benchmarking Methodologies for industry

The priorities for these subjects are among others based on EC directives. There are two that are important to the energy management: Directive 2006/32/EC on energy efficiency and services and Directive 2009/28/EC on Renewable Energy Sources.

In addition, there is a focus group on standards for the smart grid.The Focus Group will be an informal joint WG of the ESOs, open to the relevant stakeholders. It will report to the Joint Presidents' Group. The Focus Group will advise on European requirements relating to Smart Grid standardization, and assess ways to address them. The group will rely on the CEN-CENELEC "Focus Group on European electric vehicle standardization" and the Smart Meter Co-ordination Group of CEN, CENELEC and ETSI to address the European requirements relating to smart grid standardization that specifically relate to electrical vehicles and smart meters, as well as on the ETSI Smart Grids "Champion Team".

These European requirements shall fit within the overall smart grid standardization philosophy as drafted by the Focus Group. The group will also receive inputs from the European Commission Task Force on Smart Grids. This group will not develop standards itself. The Focus Group's tasks are to:

- Refine its scope in order to ensure that the Focus Group complements and not duplicates the work already done under the smart meter and electrical vehicles activities, and other groups within Europe.
- Advise (through the ESOs nominated representatives) the European Commission Task Force on Smart Grids and its Expert Groups on the current standardization landscape, including work in progress, and support the nominated representatives in their task. The Group will receive reports by the nominated experts on the Expert Groups' discussions and will advise them when decisions in these Expert Groups are taken.
- Taking due account of the emerging Task Force recommendations prepare an overview of specific European standardization requirements concerning the Smart Grid.

[9] http://www.cen.eu/cen/Sectors/Sectors/UtilitiesAndEnergy/Forum/Pages/default.aspx

- Match these requirements against existing international standards and all relevant work in progress in standards bodies, and build on existing international and European standardization work.
- Make recommendations as to how missing issues should be covered by standardization, by whom and on what timescale.
- These recommendations will reflect the preference for global standards that also apply for Europe (e.g. via the IEC-CENELEC Dresden agreement).
- Propose to the European Standards Organizations how to respond to any European Commission mandate.
- Liaise with other European initiatives, including the Smart Grids ETP.

There is a prospect for the issuing of an EC mandate, a standardisation request. Standardisation requests are the mechanism by which the Commission requests the European Standards Organisations to develop and adopt European standards in support of European policies and legislation. The mandate on smart grids will boost the CEN/CENELEC activities on smart grids standardisation. This mandate is expected in 2010/2011. With this mandate extra resources might become available to initiate, develop and publish standards.

Complexity of the CEN/CENELEC standardisation procedures
The standardization procedure between CEN[10]/CENELEC[11] is very well harmonized. The following figure shows an overview of the standard procedure within CEN/CENELEC. This procedure defines different phases that results in a European standard (EN).

[10] http://www.cen.eu/cen/AboutUs/Pages/default.aspx
[11] http://www.cenelec.eu/CENELEC/About+CENELEC/Our+work/How+to+participate/Dafault.htm

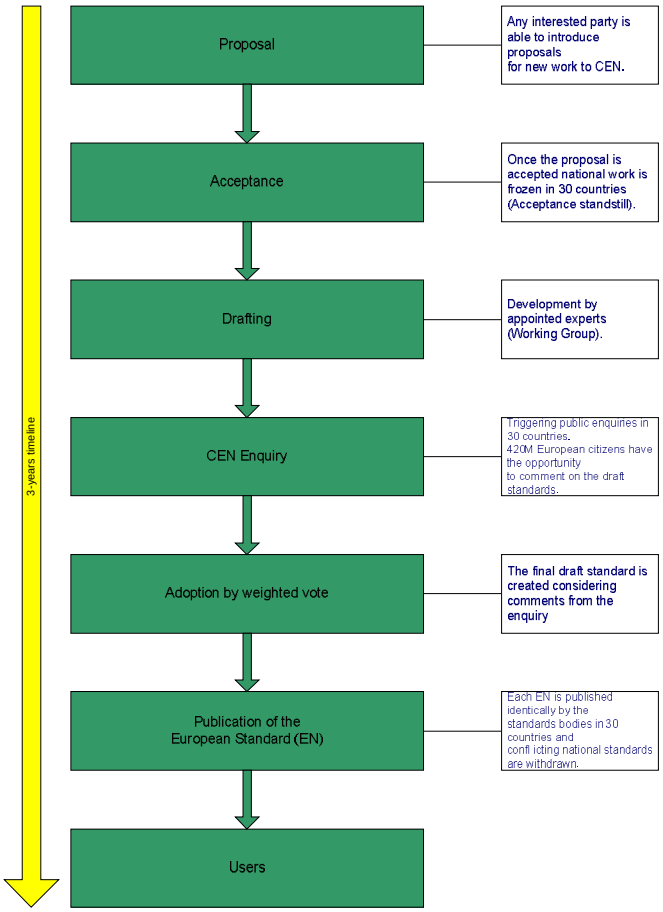

Figure 3: CEN/CENELEC standardisation procedure.

This figure shows the procedure and timeline to develop a European standard. Besides the European standards, CEN/CENELEC provides other standard products:

- *Draft standard (prEN)*: is a standard under development. It is drafted by a Technical Committee and submitted to CEN/CENELEC members for a public enquiry. When a draft becomes a European Standard, CEN/CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.
- *CEN/CENELEC Workshop Agreement (CWA)*: is a standardization document, developed in a CEN/CENELEC Workshop. The latter is open to the direct participation of anyone with an interest in the development of the agreement. There is no geographical limit on participation and hence participants may be from outside Europe. The development of a CWA is fast and flexible, on average between 10-12 months. A CWA does not have the status of a European Standard and there is no obligation for the National Standards Bodies to adopt it as national standards.
- *Technical Report (TR)*: is a document that provides information on the technical content of standardization work. Technical Reports may be prepared when it is considered urgent or advisable to provide additional information to the

CEN/CENELEC national members, the European Commission, the EFTA Secretariat or other governmental agencies or outside bodies. The information contained in a TR is different from that which is normally published as a European Standard (EN).

- *Technical Specification (TS)*: is a normative document produced and approved by a Technical Committee. A CEN/CENELEC TS can be developed by CEN/CENELEC Technical Committees as a pre-standard which contains technical requirements for innovative technology, or when various alternatives need to coexist in anticipation of future harmonization that would not gather enough as to allow agreement on a European Standard (EN). A TS does not have the status of an EN but may be adopted as national standard. Moreover there is no standstill, no public enquiry and no weighted vote. The lifetime of a TS is reduced to two or three years. A TS may not conflict with an EN. If a conflicting EN is subsequently published, the TS must be withdrawn.

The starting point for the process to come up with one of the standard products is one of the national standardisation bodies. These standardisation bodies will help in the process to get a first proposal ready and start the standard process within the appropriate technical committee or workgroup. Because the status of these product differs, the timeline to come up with one of these products is shorter compared to a European standard (EN).

Impact of CEN/CENELEC standardisation on the energy sector
The process by which European standardization items are offered to the IEC for possible international standardization as established in the *Dresden Agreement*. It comprises a chapter on the common planning of work, whereby each new work item identified at European level can be offered to IEC provided the work can be completed in a defined time period, and a chapter on parallel procedures, providing for simultaneous publication of identical standards. This agreement also guarantees that any *standard* already ratified by CENELEC will be automatically offered to the IEC for possible acceptance at international level. This procedure increases the impact of CEN/CENELEC standards in the energy sector or all other sectors.

The main difference between IEC standards and CENELEC standards is the requirement for the CENELEC members to implement the published standards. IEC does not require its members to implement the standard. For this reason there is a need for IEC standards to become a CENELEC standard. It guarantees that at European level no conflicting national standards exist.

Potential success for standardizing the MIRACLE specification at CEN/CENELEC
The chances of success for standardizing the MIRACLE specification at CEN/CENELEC seem to be high. The standardisation body is well targeted towards the energy sector and the management of demand and supply. On the other hand, the specific subtopic of the MIRACLE project is not yet covered. An important point is that currently none of the project partners are involved in standardisation in a CEN/CENELEC workgroup or technical committee. Thus, the relations with the national normalisation institutes of the countries of the project partners have to be used to get the MIRACLE topic on the agenda. In The Netherlands, various contacts and appointments to the Dutch national branch of the CEN (called the NEN: NEderlands Normalisatie instituut) have been

activated. With respect to the type of standard product, the CWA looks like a good intermediate product that can even be achieved during the lifetime of the MIRACLE project. Afterwards, the CWA can be the input towards further standardisation in the form of a European Norm (EN).

5.3 IEC

Type of standardisation body
The IEC is the international counterpart of CENELEC as described in the previous section. Also some of the relations between CENELEC and IEC have been described before. The IEC is thus a Full SDO.

General description and geographic scope of IEC
The International Electrotechnical Commission (IEC) is the leading global (worldwide) organization that prepares and publishes international standards for all electrical, electronic and related technologies. These serve as a basis for national standardization and as references when drafting international tenders and contracts (www.iec.ch).

Through its around 80 members, the IEC promotes international cooperation on all questions of electrotechnical standardization and related matters, such as the assessment of conformity to standards, in the fields of electricity, electronics and related technologies.

The IEC charter embraces all electrotechnologies including electronics, magnetics and electromagnetics, electroacoustics, multimedia, telecommunication, and energy production and distribution, as well as associated general disciplines such as terminology and symbols, electromagnetic compatibility, measurement and performance, dependability, design and development, safety and the environment.

IEC's international standards facilitate world trade by removing technical barriers to trade, leading to new markets and economic growth. Put simply, a component or system manufactured to IEC standards and manufactured in country A can be sold and used in countries B through to Z.

IEC's standards are vital since they also represent the core of the World Trade Organization's Agreement on Technical Barriers to Trade (TBT), whose 100-plus central government members explicitly recognize that international standards play a critical role in improving industrial efficiency and developing world trade. The number of standardization bodies which have accepted the Code of Good Practice for the Preparation, Adoption and Application of Standards presented in Annex 3 to the WTO's TBT Agreement underlines the global importance and reach of this accord.

IEC standards provide industry and users with the framework for economies of design, greater product and service quality, more inter-operability, and better production and delivery efficiency. At the same time, IEC's standards also encourage an improved quality of life by contributing to safety, human health and the protection of the environment.

Openness of IEC organisation and its standards
Each National Committee of the IEC handles the participation of experts from its country. Participation in the work of an IEC technical committee can be arranged via the National

Committee and for countries where the IEC does not have a National Committee via the IEC Central Office.

Some 179 technical committees (TCs) and subcommittees (SCs), and about 700 project teams / maintenance teams carry out the standards work of the IEC. These working groups are composed of people from all around the world who are experts in electrotechnology. The great majority of them come from industry, while others from commerce, government, test laboratories, research laboratories and academia and consumer groups also contribute to the work.

The technical committees prepare technical documents on specific subjects within their respective scopes, which are then submitted to the full member National Committees (IEC's members) for voting with a view to their approval as international standards. In all, some 10.000 experts worldwide participate in the technical work of the IEC. Distribution of documents for standards production is 100% electronic, thus improving efficiency and reducing costs.

All information on IEC publications can be found on the IEC Web site. IEC publications can be identified by their IEC number, through the International Classification for Standards (ICS) system, or by the respective TC/SC responsible for that publication.

All IEC publications are subject to a maintenance cycle appropriate to the technology in the publication. In the IEC Catalogue of publications, the next date for evaluation is given in the field MRD. When the publication is evaluated a decision is taken as to whether the publication will be:

- confirmed for a further period
- the subject of a complete revision
- the subject of an amendment
- withdrawn, as the publication is obsolete and of no further value

Activities of IEC in management of energy demand and supply
The most interesting technical committee for the area of management of energy demand and supply is TC57 called “Power Systems Management and Associated Information Exchange” (http://tc57.iec.ch/).

The scope of TC57 is to prepare international standards for power systems control equipment and systems including EMS (Energy Management Systems), SCADA (Supervisory Control And Data Acquisition), distribution automation, teleprotection, and associated information exchange for real-time and non-real-time information, used in the planning, operation and maintenance of power systems. Power systems management comprises control within control centres, substations and individual pieces of primary equipment including telecontrol and interfaces to equipment, systems and databases, which may be outside the scope of TC 57.

Within TC57, the following working groups have been formed
WG 3 - Telecontrol protocols
WG 10 - Power system IED communication and associated data models
WG 13 - Energy management system application program interface (EMS - API)
WG 14 - System interfaces for distribution management (SIDM)
WG 15 - Data and communication security

WG 16 - Deregulated energy market communications
WG 17 - Communications Systems for Distributed Energy Resources (DER)
WG 18 - Hydroelectric power plants - Communication for monitoring and control
WG 19 - Interoperability within TC 57 in the long term
WG 20 - Planning of (single-sideband) power line carrier systems (IEC 60495)

From these working groups, number 16 is the most interesting one for the MIRACLE objectives. This workgroup has defined the series of standards IEC 16970 that deal with the application program interfaces for energy management systems. The series provides a set of guideline and standards to facilitate:

- The integration of applications developed by different suppliers in the control centre environment
- The exchange of information to systems external to the control centre environment, including transmission, distribution and generation systems external to the control centre that need to exchange real-time data with the control centre, and
- The provision of suitable interface for data exchange across legacy and new systems

This standard is focused on the more electrical elements of an energy provisioning system and the management of it. It defines a common information model for the kind of information that is exchanged in this context between power systems and control centres. It is less focused on the information exchange around energy demand and supply.

More interesting is the series of draft standards IEC 62325 that set a framework for energy market communications. The different parts of this standard comprise:

- Common Information Model Extensions for Markets
- Modelling and messaging methodology
- CIM Market Model Exchange Profile
- UML Processes and Contextual Models for CIM Market Profiles

Obtaining more detailed documents of this standard in working progress requires an IEC usercode/password combination, which does not contribute to the openness of the organisation.

It thus looks like WG16 of TC57 is dealing with a scope that is similar or relates fairly well with the MIRACLE scope. This working group has also liaisons with ENTSO-E and ebIX and thus the relations the European TSO's are well covered.

A further investigation into the work programme of this working group is worthwhile. Another way to reach the international level of IEC is to start at European CENELEC level and upgrade a standard at European level to international level via the IEC.

Complexity of IEC standardisation procedures
The IEC has various types of publications.

- *International Standard*: as defined in IEC/ISO Guide 2, an International Standard is a document, established by consensus and approved by a recognized body, that provides, for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context. An international standard is a standard adopted by an international standardizing/standards organization and made available to the public. The definition given in all IEC standards reads: "A normative document, developed according to consensus procedures, which has been approved by the IEC National Committee members of the responsible committee in accordance

with Part 1 of the ISO/IEC Directives as a committee draft for vote and as a final draft International Standard and which has been published by the IEC Central Office." The word "consensus" is important since it represents a common viewpoint of those parties concerned with its provisions, namely producers, users, consumers and general interest groups. IEC's International Standards are reached by international consensus among the IEC's members (National Committees). Any member of the IEC may participate in the preparatory work of an International Standard, and any international, governmental and non-governmental organization liaising with the IEC also participates in this preparation. Another vital feature of a truly international standard is the fact that it can be submitted to public enquiry in any country. Thus, through the democratic tools of consensus and public enquiry, any interested party may speak up and have their say in the development and publication of an international standard. Adoption of IEC standards by any country, whether it is a member of the Commission or not, is entirely voluntary. The IEC is one of the bodies recognized by the World Trade Organization (WTO) and entrusted by it for monitoring the national and regional organizations agreeing to use the IEC's international standards as the basis for national or regional standards as part of the WTO's Technical Barriers to Trade Agreement.

- *Amendment:* a normative document developed according to consensus procedures. It is approved by the IEC membership and it changes the technical normative elements of a particular international standard.
- *Technical Specification*: similar to an IS in that it is normative in nature, developed according to consensus procedures and is approved by two/thirds of the Participating Members of an IEC technical committee or subcommittee. A TS is published when required support for an IS cannot be obtained, or when the subject is still under technical development, or when there is a future - but no immediate - possibility of an IS.
- *Technical Report*: more descriptive than normative, this is an informative document of a different kind from normative documents (e.g. collection of data). A TR is approved by simple majority of Participating Members of an IEC technical committee or subcommittee.
- *Technical Corrigendum*: corrects a technical error or ambiguity in an IS. It also corrects information that has become outdated, provided the modification has no effect on the technical normative elements of the document it corrects.
- *Guide*: document giving rules, orientation, advice or recommendations relating to international standardization.
- *Industry Technical Agreement*: a normative or informative document that specifies the parameters of a new product or service. It is developed outside the technical structures of the IEC and it helps to enable production and/or market launch of industry products to proceed. It is similar to an industrial de facto standard or specification. Fast moving technology sectors are the main potential users of ITAs, but the whole domain of electrical and electronic engineering (including ICT) may be covered. It does not cover horizontal aspects of safety, health, environmental protection and other similar subjects that are normally the province of regulation and consensus standards. ITAs offer a new and dynamic way of achieving market acceptance of a new technology with the IEC's intrinsic seal of approval because they offer:
    - quick development time, so costs are limited

  - participants have full control because they are sole arbiters of technical content
  - acceptance is achieved among participants
- *Publicly Available Specification (PAS)*: a normative document that represents a consensus among experts. A simple majority of the Participating Members of a technical committee or subcommittee approve the document. An IEC-PAS responds to an urgent market need for such a normative document and is designed to bring the work of industry consortia into the realm of the IEC.
- *Technology Trend Assessment*: highlights certain aspects of a technology that might conceivably become an area for standardization in the near-to-medium term. It responds to the need for global collaboration on standardization questions during the early stages of technical innovation. A TTA gives the state of the art or trend in emerging fields. It is typically the result of pre-standardization work or research.

The preparation of a new IEC standard takes place in the following principal stages (for further details, see the ISO/IEC Directives, Part 1). The revision of an existing standard starts at the committee draft stage.

1: Preliminary stage
This comprises projects envisaged for the future but not yet ripe for immediate development, or preliminary work, such as better definition of a project for new work, data collection or round-robin tests necessary to develop standards, which is not part of the standardization process. At this stage, a Publicly Available Specification (IEC-PAS) can be prepared and submitted to an approval process that takes two months.

2: Proposal stage
A proposal for new work generally originates from industry via a National Committee. It is communicated to the members of the appropriate TC or SC accompanied by a form. A simple majority vote of members on the interest of studying the proposal takes place within three months. If the result is positive and a minimum of four members or 25 % of the P-members, whichever is greater, undertake to participate actively in the work and nominate experts, it is included in the work programme together with a project plan including target dates.

3: Preparatory stage
During this phase a Working Draft (WD) is prepared, generally by a project leader within a project team.

4: Committee stage
At this point the document is submitted to the National Committees as a committee draft (CD) for comment.

5: Enquiry stage
Before passing to the approval stage, the bilingual Committee Draft for Vote (CDV) is submitted to all National Committees for a five-month voting period. It is the last stage at which technical comments can be taken into consideration. The CDV is considered as approved if:

- a majority of two thirds of the votes cast by P-members is in favour, and if*

- the number of negative votes cast by all National Committees does not exceed one quarter of all the votes cast.

When it is planned that the document will become a Technical Specification (and not an International Standard), only the first criterion concerning two thirds of the votes needs to be fulfilled and the revised version is then sent to Central Office to be published. A revised version is then sent by the secretary to the Central Office within four months for Final Draft International Standard (FDIS) processing. Note: If a CDV is approved by a 100% majority, the subsequent stage (FDIS) may be skipped.

6: Approval stage
The FDIS is then circulated to the National Committees for a two-month voting period. Each National Committee's vote must be explicit: positive, negative or abstention. An FDIS is approved if:

- a majority of two thirds of the votes cast by P-members is in favour, and if
- the number of negative votes cast by all National Committees does not exceed one quarter of all the votes cast.

If the document is approved, it is published. If the document is not approved, it is referred back to the TC or SC to be reconsidered.

7: Publication stage
This is entirely the responsibility of the Central Office and leads to publication of the international standard, normally within two months of approval of the FDIS.

Impact of IEC on the energy sector
The IEC is a formal standardisation body and thus once a standard is set there, it has a high status. However, a standard of IEC is not mandatory for countries to adopt in contrast to the status of CEN/CENELEC within Europe. The focus of IEC is on the electrical part of the energy sector and information exchange about electrical parts of the energy network. The focus is less on the requests for demand/supply of energy and the trading/balancing of these requests. However, this is changing and especially WG16 of TC57 is also changing target towards energy management and market communications.

Potential success for standardizing the MIRACLE specification at IEC
The chances of success for standardizing the MIRACLE specification at IEC seem to be medium and not as high as with CEN/CENELEC. The standardisation body is well targeted towards the energy sector and the management of demand and supply. Moreover, a specific working group in an existing technical committee can be targeted to achieve standardisation. The specific subtopic of the MIRACLE project is not yet covered there. An important point is that currently none of the project partners is involved in standardisation in an IEC workgroup or technical committee. Thus, the relations with the national normalisation institutes of the countries of the project partners have to be used to get the MIRACLE topic on the agenda. In The Netherlands, various contacts and appointments to the NEN have been activated. As with CEN/CENELEC, the IEC has similar types of standard products as the CWA. The Industry Technical Agreement and the Publicly Available Specification are similar standard products as the CWA. The path towards an EIC-ITA or EIC-PAS is however a more difficult one as with the CEN/CENELEC CWA because worldwide instead of European industry partners have to be involved.

5.4 IEEE

Type of standardisation body
The IEEE is a different kind of organisation than the CEN/CENELEC and IEC organisations and is coming from a different background. It can be considered as a Full SDO.

General description and geographic scope of IEEE
IEEE creates an environment where members collaborate on world‑changing technologies – from computing and sustainable energy systems, to aerospace, communications, robotics, healthcare, and more.

IEEE is led by a diverse body of elected and appointed volunteer members. The governance structure includes boards for operational areas as well as bodies representing members in the 45 societies and technical councils and ten worldwide geographic regions.

IEEE is divided into ten worldwide geographic regions. Within the regions, there are local sections, chapters and affinity groups. Members of IEEE automatically become members of their local IEEE sections, allowing them to participate in workshops, seminars, networking programs, and other programs at the local level.

Openness of the IEEE organisation and its standards
The membership of IEEE is open to individuals who by education or experience give evidence of competence in an IEEE designated field. The designated fields are: Engineering, Computer sciences and information technology, Physical sciences, Biological and medical sciences, Mathematics, Technical communications, education, management, law and policy.

The IEEE offers the following grades of membership: Student, Graduate Student, Associate, Member, Senior, and Fellow. The special categories of Life Member, GOLD Member, and Affiliate are also offered. As a member, you can join different IEEE societies. For interest in IEEE standards, the IEEE-Standard Association (IEEE-SA) is the main society.

Membership in the IEEE-SA connects members with a network of peers from other organizations. Members get connections for particular industry standards concerns, activities and actions, and a full range of standards services to support the standards development job work. The IEEE-SA membership is offered to individuals as well as corporate members.

The work on standardisation is done in working groups. IEEE working groups are open to anyone to participate and participants don't have to be IEEE-SA members. However, each sponsor has specific rules and procedures for determining the voting rights of the participants

Based on this information the openness of the IEEE is limited. The membership of the IEEE organisation is open to a select group of educated and/or experienced persons. Furthermore, the voting process for standards is a non-transparent process with weighted voting rights. The overall openness of this organisation is for this reason limited.

Activities of IEEE on management of energy demand and supply
Within IEEE there is a smart grid initiative. The smart grid initiative concentrates on the modernization and optimization of the power grid so that it is more reliable, efficient, secure, and environmentally neutral. For the smart grid initiative to be successful, it requires collaboration, integration, and interoperability between an array of disciplines, including computational and communications control systems for generation, transmission, distribution, customer, operations, markets, and service provider.

Complexity of the IEEE standardisation procedures
The IEEE Standards Association (IEEE-SA) is a globally recognized standards-setting body which develops consensus standards through a process that brings diverse parts of an industry together. Specifically, *consensus* means that the final results of the ballot and statements submitted by balloters who participated in the development of the standard indicate that consensus has been achieved and unresolved negative ballots have been properly considered, together with reasons why the comments could not be resolved. These standards set specifications and procedures will ensure that products and services are fit for their purpose and perform as intended.

The IEEE organisation provides an environment where members collaborate on world changing technologies. In this environment, IEEE Standards Development Online[12], a IEEE member is able to initiate, produce and manage a standard. The IEEE standards development process is open and voluntary and operates under a consensus process. The best way to participate in standards development is to attend Work Group (WG) meetings. All WG meetings are open meetings. There is no meeting cost, but individuals are requested to register. IEEE provides cost based services to support the standards development process[13].

The figure below shows a brief overview of the IEEE-SA standardisation process.

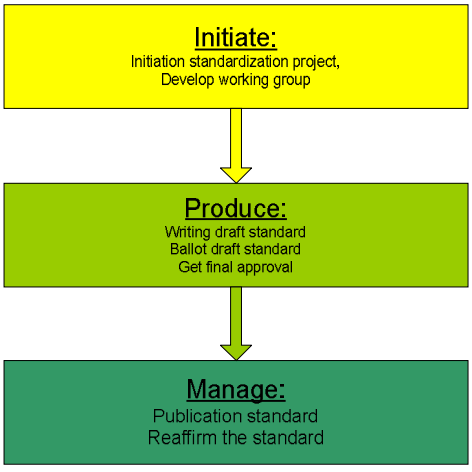

Figure 4: IEEE-SA standardisation process overview.

[12] http://standards.ieee.org/resources/development/index.html
[13] http://standards.ieee.org/sds/index.html

The first step in beginning a standards' development project in the IEEE-SA is the submittal of the Project Authorization Request (PAR). The PAR is a legal document and the means by which a working group assigns copyright to and indemnification from the IEEE. Every PAR that is submitted must have a sponsor to oversee the project. Once a PAR is approved, any work planned or underway for the proposed IEEE document will be officially sanctioned. Typically, a sponsor will assign a working group to prepare and develop the document.

The production phase starts with writing the draft standard. IEEE supports this process by providing templates and guidelines to get the outline of the standards document. The draft is ready for a sponsor ballot when it has completed its working group (or technical committee) development. After the sponsor ballot process is complete, the sponsor will move the project toward final review by review committee (the IEEE-SA Standards Board, Standards Review Committee) and approval by the IEEE-SA standards board before it is published. The committee acts in an advisory capacity to the IEEE-SA standards board by making recommendations on the approval or disapproval of standards submitted for IEEE-SA standards board approval or adoption. The IEEE-SA standards board is responsible for the final approval prior to publication and processes all necessary appeals.

After approval the standard is not yet complete. Publication, interpretations, and other future developments need to be considered. The standard will receive a thorough, detailed edit from a professional standards editor, focused on syntax and grammar. The standard has a validity period of five years from the date of approval by the IEEE-SA standards board. Before that validity period expires, the sponsor must initiate the reaffirmation process. This process affirms that the technical content of the standard is still valid and the document is reaffirmed for another five-year period. During this five year validity period, amendments and corrigenda may need to be developed that offer minor revisions to the standard. If there is a need to update the standard or any of its published amendments or corrigenda the sponsor may consider the revision process. After the five year validity period, one of three things has to happen: revision, reaffirmation, or withdrawal.

Impact of IEEE on the energy sector

The global activities of IEEE on the energy sector and in particular the smart grid activities is mainly focused on the US region[14]. In the US region IEEE supports and facilitates the support of the P2030 standard[15], a guide to knowledge base addressing terminology, characteristics, functional performance and evaluation criteria, and the application of engineering principles for smart grid interoperability of the electric power system with end-use applications and loads. The guide discusses alternate approaches to good practices for the smart grid. Based on the information provided by the European section of IEEE[16], the European energy sector is not part of these activities. We may

[14] http://grouper.ieee.org/groups/scc21/dr_shared/2030/

[15] http://grouper.ieee.org/groups/scc21/2030/2030_index.html

[16] http://www.ewh.ieee.org/reg/8/cms/index.php?option=com_content&view=article&id=20&Itemid=36

http://www.ewh.ieee.org/reg/8/news/

conclude that for the European region, IEEE has less impact on the energy sector than for the US region.

Potential success for standardizing the MIRACLE specification at IEEE
The chances of success for standardizing the MIRACLE specification at IEEE seem to be low. The IEEE is targeted towards the US with respect to the energy sector and the management of demand and supply. Although the standardisation process is very open, the level of status of the standard is not as formal as with CEN/CENELEC and IEC. This would be an advantage if the standard setting procedure would be very much shorter or less complex. However, with the CEN/CENELEC CWA a short and simple procedure can be followed to reach a first level of standardisation at European level.

5.5 EbIX /ENTSO-E

Type of standardisation body
EbIX/ENTSO-E is a two-party organisation responsible for a joined publication about among others the harmonized role model. This role model is an important source for the MIRACLE project to identify the scope of processes, functions and business objects applicable for the MIRACLE concept. This organisation can be considered as an SSO/SPO.

General description and geographic scope of ebIX/ENTSO-E
EbIX is a small and compact organisation without an established organisation with defined rules and procedures. The objectives and goals for ebIX are:

- Development of usage of electronic information exchange in the energy market
- Standardize the information exchanges, irrespective of which syntax or data communication means are used or needed
- The information exchange will cover the interchange of administrative data between the participants in the European energy market
- The energy market covers the processes in the whole-sale market (both gas and electricity) and the processes on retail level. Especially the multi-utility suppliers and distributors/grid companies are involved in all these sub-markets
- To promote and advance the process of defining and using standards in the European energy market
- Keep close contact and coordination with other EDI/XML and standardization organizations
- Following the rules of the European Union

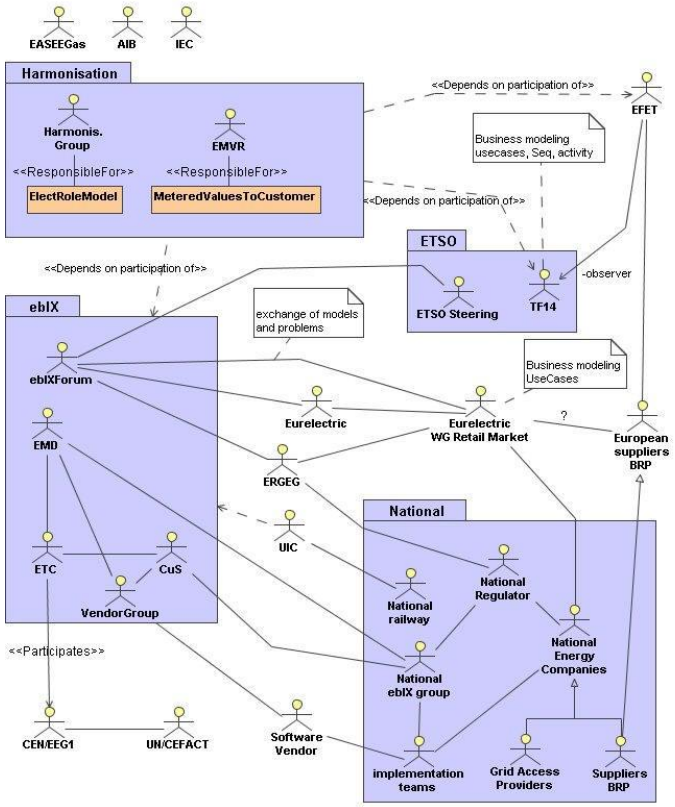

Figure 5: Rolemodel ebIX-ENTSO-E and national energy market roles.[17]

The purpose of ebIX is to advance, develop and standardise the use of electronic information exchange in the energy industry. The main focus is on interchanging administrative data for the internal European markets for electricity and gas. ebIX shall also cover the needs both for the wholesale market and the retail market.

ENTSOE-E is the single European representative of the transmission system operators. ENTSO-E's vision is to become and remain the focal point for all European, technical, market and policy issues related to TSOs, interfacing with the power system users, EU institutions, regulators and national governments.

Openness of the ebIX/ENTSO-E organisation and its standards
ebIX as well as ENTSO-E are organisations with members representing European countries. In both organisations, members are representing the national TSO organisation(s). In ebIX there are additional members representing national organisation supporting the electronic exchange of administrative data within the country between stakeholders as well as cross border exchange. Thus, all interaction to get towards specifications can be done only between these organisations with a specific role in the energy role model. The specifications they produce are however fairly open to the public via their website.

[17] See http://www.ebix.org/content.aspx?ContentId=991&SelectedMenu=2

Within ebIX there are two permanent organisations: the ebIX Forum and the ebIX Technical committee (ETC). The ETC is a permanent working group managed by ebIX Forum. The group is responsible for the technical part of the standards and ebIX Forum can authorise it to approve modifications to the standards. The tasks of the ETC are:

- Maintain the ebIX technical documents, which includes:
  - A methodology based on international standards, such as UMM (UN/CEFACT Modelling Methodology)
  - Tools and rules for helping ebIX working groups work
  - Registries/repositories for core components, code lists, templates, etc.
- Harmonise information interchange principles with other standardisation bodies, such as ETSO and EFET
- Participate in international standardisation organisations, such as UN/CEFACT
- Administrate Data Maintenance Requests (DMRs) to international standardisation organisations, such as UN/CEFACT
- Be responsible for publication of its activities and results as ebIX information.
- Organise implementation support for the ebIX standards.

Activities of ebIX/ENTSO-E on management of energy demand and supply
Being the body of transmission system operators of electricity at European level, ENTSO-E's mission is to promote important aspects of energy policy in the face of significant challenges:

- Security - it pursues coordinated, reliable and secure operations of the electricity transmission network.
- Adequacy - it promotes the development of the interconnected European grid and investments for a sustainable power system.
- Market - it offers a platform for the market by proposing and implementing standardized market integration and transparency frameworks that facilitate competitive and truly integrated continental-scale wholesale and retail markets.
- Sustainability - it facilitates secure integration of new generation sources, particularly growing amounts of renewable energy and thus the achievement of the EU's greenhouse gases reduction goals.

The ENTSO-E focus on energy demand and supply is combined via the aspects *adequacy* and *sustainability*. The implementation of these aspects is performed via the realisation of information exchange between TSO organisations. This information exchange contributes to support the managements of demand and supply and the integration of renewable energy sources. ebIX focuses on the specification of the exchanged information between the TSO organisations involved.

Complexity of the ebIX/ENTSO-E standardisation procedures
There is currently no information published about standardisation procedures within ebIX/ENTSO-E. This combination of organisations is not primarily intended to develop and publish standards like official standardisation bodies. The documents published on the ebIX website shows a form of formalisation like e.g. status and maintenance management. However, this process is not detailed in a document or standard process description.

Impact of ebIX/ENTSO-E on the sector

The impact of a standard or specification set by the ebIX/ENTSO-E organisations seem to be high. Because the great and leading electricity companies and transmission system operators are part of the organisation, the strength and status is large. However, the number of TSO's that are member is not as large as it could be. Although, the website mentions that 42 TSO's are a member, only some 10 are active in for instance the ebIX forum.

Potential success for standardizing the MIRACLE specification at ebIX/ENTSO-E
Based on the information so far, ebIX/ENTSO-E is not primarily a body to standardise specifications. However, because of the reuse of ebIXs' role model in the MIRACLE project, this organisation might play a role in selecting an official standardisation body. When the members of this organisation show interest in the MIRACLE approach and results, they might play a important role in accepting the results in a SDO. Finally, one of the project partners of MIRACLE is a TSO and can thus become a member of ebIX/ENTSO-E and bring in the MIRACLE specification fairly easily. Thus, the chances of success for standardizing the MIRACLE specification via a strong support of the ebIX/ENTSO-E organisation seem to be medium.

6 Selection of standardisation bodies

This chapter discusses the selection of standardisation bodies for standardisation of the MIRACLE results. Based on the elaborated study of the potential standardisation bodies in the short list, this chapter is used to describe the strategy on which SDO should be selected for transferring the MIRACLE results to.

6.1 Scoring matrix of identified potential standardisation bodies

In the previous chapter an extensive study is presented about the four potential organisations to standardise the MIRACLE results. This study presents information about the set of criteria defined. These criteria are used to compare the selected organisations and define the applicability to MIRACLE's objectives. These objectives are mentioned in the introduction of this deliverable and focus on the openness of the standard organisation and its products, be a thorough basis for formal specification of a European standardisation body and provide support to the main industry and government stakeholders.

In Table 2, a summary result is presented on how the investigated organisations fit to the defined criteria. The short list of selected organisations contains organisations with a focus on the energy demand and supply. This does not necessarily mean a focus on the smart grid subject as well. Furthermore, there are different types of organisations with respect to their standardisation activities. CEN/CENELEC, IEC and IEEE offer products and services to support standards development. ebIX/ENTSO-E does not offer this type of support, but is concentrating on the initiation and development of content for a (potential) standard. Because MIRACLE is using content from ebIX/ENTSO-E, this body may be of interest to setup a joined activity to support the standardisation of the MIRACLE results, e.g as a sponsor.

As mentioned before, the main geographic focus for MIRACLE is the European region. However, in other geographic regions in the world interesting developments in the area of

smart grids are going on. To increase the impact of the MIRACLE result, we may consider how these results can have global impact as well.

The openness of the organisation is of importance to increase the impact of a standard. The openness of the CEN/CENELEC and IEC processes are guaranteed. In all processes other stakeholders are invited to participate in the process of standardisation, and voting rights are equal or based on the representation of the voter (e.g. country votes based on their citizens).

Table 2 Overview of applicability SDOs to MIRACLE's criteria

	TYPE OF STANDARD BODY (SSO, SPO, FULL SDO)	GEOGRAPHIC SCOPE	OPENNESS OF STANDARD BODY	ACTIVITIES ON ENERGY DEMAND & SUPPLY	COMPLEXITY OF STANDARDISATION PROCEDURES [18]	IMPACT OF STANDARD BODY ON ELECTRO TECHNICAL SECTOR	POTENTIAL SUCCESS FOR MIRACLE SPECS
CEN/ CENELEC	Full SDO	Europe	+	Yes[19]	defined	++	high
ebIX/ENTSO-E	SSO/SPO	Europe	-	Yes	-[20]	++	medium
IEC	Full SDO	Global	+	Yes	defined	+	medium
IEEE	Full SDO	Global	-/+	Yes	defined	-/+	low

+ = good; +/- = moderate; - = fail; na = not applicable

Another criterion covers the complexity of the standardisation process. Except ebIX/ENTSO-E, all organisations have procedures in place to support the standardisation process. It depends on the type of standard product how complex the procedures are. In general, the full SDO organisation provides support for different standard products which have different periods of time to realise the standard product and different interactions with stakeholders during this process.

The impact on the electrotechnical sector gives an indication about the applicability of standards from that organisation. IEC in particular is spending a lot of effort to the smart grid development. CEN/CENELEC's efforts to smart grids are currently limited, but once a standard is set, the impact is large. In addition, CEN/CENELEC will receive soon from the European Commission a directive to develop a smart grid standards framework[21]. This directive will probably boost the impact of CEN/CENELEC to the smart grid development.

6.2 Final selection

Finally, the question is what the opportunities are to get the MIRACLE results standardised in one of the studied organisations. Based on the information so far, the

[18] The complexity of the standard process depends on the type of standard product. The EN procedure is more extensive and complex than e.g. a Workshop Agreement.
[19] The European Commission will come up soon with a Mandate to CEN/CENELEC to develop standards in the area of Smart Grids. When this mandate is ready, more supporting resources will be available to develop standards in this field.
[20] No standardization process available
[21] Forecast is 2010/2011

CEN/CENELEC SDO seems the most appropriate organisation for standardisation because of their focus, impact and offered standard products. Especially when the European mandate is issued to CEN/CENELEC additional resources might become available for smart grid standardisation effort.

The objective of MIRACLE is to develop a formal standard of a European standardisation body. CEN/CENELEC satisfies this requirement by offering different types of formal standard products. When the final objective is to develop a European Norm (EN), the first step can be the development of CEN/CENELEC Workshop Agreement. This agreement aims to bridge the gap between the activities of e.g. consortia and the formal process of standardization represented by CEN/CENELEC and its national members. A CWA offers a fast and flexible way to develop a standard with some formal impact in the European region. When needed, the CWA can be followed by a second phase leading to a European Norm that provides the standstill feature.

Within the CWA process, interaction is organised between interested stakeholders outside the MIRACLE consortium. These stakeholders will be interested via the CEN/CENELEC member network. However, other applicable stakeholders could be interested via MIRACLE network partner and organisations like ebIX/ENTSO-E.

The IEC is nowadays probably the SDO with the highest global impact on the smart grids development. However, IECs' focus is heavily affected by the US/NIST input. To offer the MIRACLE results to IEC, it should fit into the current IEC smart grid framework, otherwise there will be an additional obstacle to get it standardised within IEC. This sounds like a more difficult way to pursue as with the European CEN/CENELEC CWA.

IEEE activities on smart grid and the information technology development, is primarily driven by the US initiatives by NIST. Though IEEE is globally oriented, the smart grid activities in other regions are marginal. In conclusion we can say that IEEE will require extra effort to come to a formal European oriented standard. For that reason IEEE will not help to achieve the MIRACLE objectives for standardisation.

Summarizing, the preference for standardisation of the MIRACLE specification is on the CWA standard product of CEN/CENELEC as a first step. In the meantime, however, the lobby activities towards ebIX/ENTSO-E should also be continued as the partners in that organisation have large impact on the sector and a specification from their hand based on the MIRACLE specification would be supporting the standardisation activities. After a CWA the next step to be taken after the MIRACLE project is to upgrade it to a European Norm.

6.3 Steps to be taken for standardisation

In the next couple of sections, a path is sketched about when and how to start a CWA process and what the interaction with the MIRACLE activities is. The main conclusion is that the MIRACLE project should adhere to the roadmap sketched in this document and try to align the WP7 activities during M18 and M36 with a CWA process at CEN/CENELEC.

6.3.1 Starting CWA standardisation process

The standardisation process with CEN/CENELEC can be started with the internal MIRACLE specification as input for the CWA process. With the help of the local Dutch standardisation representative, the CWA will be announced within CEN/CENELEC. When the CWA process is started, some necessary information has to be produced[22]. The first step in the process is the development of a project plan. This project plan covers the following items:

- Objectives in terms of overall goals (e.g. to identify requirements and prepare specifications in a particular field; to raise awareness and promote the use of particular specifications or practices; to identify and seek wider consensus on a set of best practices)
- Deliverables and timescales - including date of kick-off meeting, type of deliverable, (e.g. one or more CENELEC Workshop Agreements (CWAs), website, Memorandum of Understanding)
- Resources required (e.g. the costs of running the Workshop Secretariat). The plan should identify those willing to participate in the funding. CENELEC would normally provide the meeting support for the kick-off meeting and will provide the infrastructure necessary for electronic working - exploders etc. The MIRACLE project can provide funds for the support of these resources. The exact amount should be considered in the next phase.

After the finalisation of the project plan, CENELEC will distribute it to all associated national peer organisations. In this process step the plan is checked if it fits in the current CENELEC programme of work. After agreement, the project plan is published and participants are invited to contribute. In this phase, a chairman and secretariat to support the CWA have to be appointed.

Workshops can do much of their consensus building electronically. a kick-off meeting may be the only "physical" meeting necessary. Approval of a deliverable is possible without the organization of a physical meeting for that purpose. Typically, workshops do however meet regularly i.e. every 3-4 months, with often many electronic exchanges between the participants in between. In case of a MIRACLE CWA process, the meetings have to be synchronised with the internal delivery schedule.
At the kick-off meeting, the Workshop will:

- approve the project plan
- appoint the chairman and secretariat
- start the work on the CWA

6.3.2 Lobby for appropriate CWA participants

The openness is a main objective for the CWA. The role of the participants in the workshop process is essentially to obtain the openness. The openness should prevent agreement results that are applicable to a limited group of stakeholders.

[22] For overall procedural description of the workshop:

http://www.cenelec.eu/Cenelec/Technical+work/CENELEC+Workshop/Procedural+description/default.htm

For this reason it is important to get contact with a variety of stakeholders that show interest in the objectives of MIRACLE. A part of the interested stakeholders will be contacted via the CENELEC network of participants in the applicable technical committees. These participants are informed when the CWA start-up is published by CENELEC.

Another group of participants may be interested via European associations involved in the smart energy demand and supply, e.g. the ENTSO-E and ebIX associations. These associations have members from national organisations who should be informed about MIRACLE and its objectives. In the step to set up the CWA it will be essential to get in contact with these groups of participants. During the workshop interaction, comments and suggestion will be interchanged and resolutions have to be made to find consensus. There is a MIRACLE interest to have participants available in the workshop that shows interest in the approach and objectives to get the renewable energy resources integrated in the smart grid approach.

6.3.3 Coordination between MIRACLE deliverables and CWA process

The CWA standardisation process has to be aligned with the MIRACLE time plan. This timeline is added to the timeline of the roadmap depicted in Figure 1. This aligned timeline is depicted in Figure 6.

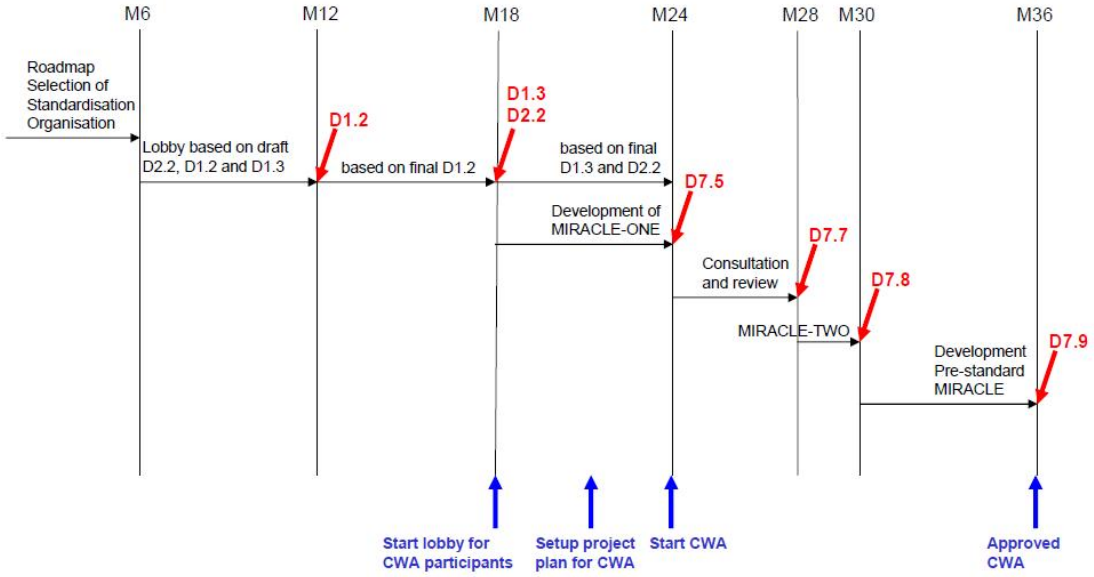

Figure 6: Timeline roadmap activities aligned with CEN/CENELEC CWA.

The lobby process by CEN/CENELEC can really be started at M18 when deliverables D1.2, D1.3 and D2.2 are finished. After a couple of months when enough participants are gathered and a more clear picture is formed about what exactly to standardise a project plan for a CWA can be set-up at M21.

Within the CENELEC CWA process, interaction with participants in the sector is organised within workshops. In the MIRACLE project plan there is a two step deliverable

process specified. The first draft deliverable (D7.5) contains the proposed draft specification MIRACLE-ONE (M24). After finishing D7.5 and an agreement about the project plan for a CWA, the actual CWA process can be started at M24. Then, the consultations and reviews within the CENELEC CWA are started and final review comments are collected from the participants.

In the period between D7.5 and D7.9 these comments are processed and adaptations are made to the MIRACLE specifications where applicable. Deliverable D7.9 should be the version with consensus between the workshop participants. This version is agreed and will be officially adopted by CENELEC as the approved CWA in M36. Then the workshop secretariat submits the approved CWA to the CENELEC secretariat. After adding the CENELEC foreword to the text and the allocation of a reference, it will be circulated to the CENELEC national members for publication. When circulated, the CENELEC national members notify the CENELEC secretariat on whether and how they will make the CWA available in their country.

The main conclusion and advice is that the MIRACLE project should adhere to the roadmap sketched in this document and try to align the WP7 activities during M18 and M36 with a CWA process at CEN/CENELEC.

Appendix A: Definitions

SDO	Standards Developing Organization (SDO) generally refers to the thousands of industry or sector based standards organizations which develop and publish industry specific standards. In some cases, international industry-based SDOs such as the IEEE may have direct liaisons with international standards organizations, having input to international standards without going through a national standards body. SDOs are differentiated from Standards Setting Organizations (SSO) in that SDOs may be accredited to develop standards using open and transparent processes[23].
SSO	Standard Setting Organisation is an SDO without defined open and transparent standard development processes.
SPO	Standard Publishing Organization (SPO) is that part of a SDO that focus their activities on publishing and marketing the different standards for a particular region or industry sector.

Appendix B: Main abbreviations

ANSI	American National Standards Institute
CEN	Comité Européen de Normalisation
CENELEC	Comité Européen de Normalisation Electrotechnique
CIM	Common Information Model
CWA	CEN/CENELEC Workshop Agreement
ebIX	European forum for energy Business Information eXchange
EC	European Commission
EISA	Energy Independent and Security Act
EN	European Norm
ENTSO-E	European Network of Transport System Operators for Electricity
ESO	European Standardisation Organisation
ETP	European Technology Platform
ETSI	European Telecommunications Standards Institute
ICS	International Classification for Standards
ICT	Information and Communication Technology
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IPR	Intellectual Property Rights
ISO	International Standardisation Organisation
ITU	International Telecommunication Union
JTC	Joint Technical Committee
JWG	Joint Working Group
NETL	National Energy Technology Laboratory
NIST	National Institute for Standards and Technology
OMG	Object Management Group
OSGi	Open Services Gateway initiative

[23] http://en.wikipedia.org/wiki/Standards_organisation

SDO	Standards Developing Organisation
SSO	Standards Setting Organisation
SPO	Standards Publishing Organisation
TC	Technical Committee
TSO	Transmission System Operator
WGC	Working Group Committee
W3C	World Wide Web Consortium