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Implementing Agreement of the International Energy Agency (IEA): Electricity Networks Analysis Research & Development (ENARD Annex I)

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Für den Inhalt und die Schlussfolgerungen ist ausschliesslich der Autor dieses Berichts verantwortlich.

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Abstract

The important role of electricity transmission and distribution (T&D) networks in the delivery of energy policy objectives was recognized by the International Energy Agency (IEA) via the establishment of ENARD (Implementing Agreement on Electricity Networks Analysis, research and Development), July 2006. Switzerland is represented in ENARD as one of currently 14 countries (Austria, Belgium, Denmark, Finland, France, Italy, Netherlands, Norway, South Africa, Spain, Sweden, Switzerland, United Kingdom, U.S.A.). This report describes the development of ENARD in the year 2009.

1. ENARD Scope

ENARD's vision is to facilitate the uptake of new operating procedures, architectures, methodologies and technologies in electricity Transmission and Distribution networks. The goal is to enhance their overall performance in relation to the developing challenges of network renewal, renewables integration and network resilience. As such, ENARD provides a major international forum for information exchange, research, analysis and collaborative research and development across a range of electricity transmission and distribution system issues.

2. ENARD organization

Overall management responsibility for the Implementing Agreement (IA) is by an Executive Committee (ExCo), comprising representatives from each of the participating countries. The ExCo is responsible for overseeing the work within individual operational Annexes and for the ongoing strategic development of the Implementing Agreement. The ExCo works within the terms of a 5 year Strategic Plan (currently: 2007-2011) and is also responsible for approving a Programme-of-Work, on a rolling annual basis. A dedicated Secretariat lead by the so-called Operating Agent supports the ExCo in the discharge of its duties. The ExCo reports to the IEA's management structure, via the End Use Working Party (EUWP), to the Committee on Energy Research and Technology (CERT). The EUWP and the CERT support the coordination of the activities of individual Implementing Agreements and, ultimately, via the IEA Secretariat, provide high level policy advice to OECD member countries and to the G8. ENARD was developed from the outset with the organizational and operational structure of a multiple Annex Implementing Agreement, figure 1.

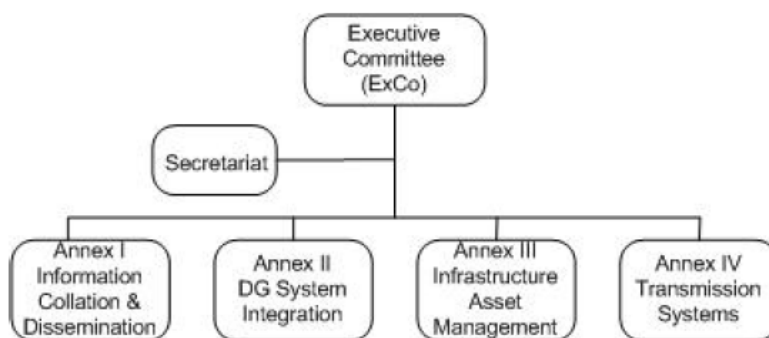


Figure 1: Organization IEA IA ENARD

By the end of 2009, ENARD has succeeded in establishing the bases for the three Sub-Annexes I, II and IV besides the main annex I which represents the original and ongoing Annex on Information Collation and Dissemination. The three Sub-Annexes are:

- Annex II: “DG System Integration” (Initiated: 2008; first phase goes until Mid 2010)
- Annex III : “Infrastructure Asset Management” (Initiated: 2007 ; first phase finished in 2009)
- Annex IV : “Transmission Systems” (Initiated: 2009; goes until March 2011)

3. ENARD Membership

Membership of the Implementing Agreement is on a national basis. Switzerland is currently member of Annex I. Each participating country is represented on the ExCo by a Delegate (Switzerland: Dr. Michael Moser, SFOE) and an Alternate (Switzerland: Dr. Rainer Bacher, BACHER ENERGY LTD), and with one voting right per participating country. At the end of

2009, 14 countries are members of ENARD, namely Austria, Belgium, Denmark, Finland, France, Italy, Netherlands, Norway, South Africa, Spain, Sweden, Switzerland, UK and USA.

4. Achievements

Annex I serves as the central information exchange forum and with all member countries participating. It also serves as the definition Annex for the development of the associated series of follow-on Sub-Annexes. The Annex I Operating Agent (EA Technology, UK) has overall responsibility for the delivery of the Annex I work program and works in close collaboration with the Annex I National Coordinators, as designated by the participating countries. The principal Annex I activities to date have comprised the collation and dissemination of Transmission and Distribution related information and data, the organization and delivery of a series of topical workshops, the provision of support to the definition and development of the small series of follow-on Sub-Annexes and a general program of representation and outreach activities.

Information collation and dissemination represents one of the core activities of Annex I. A major activity over the three years of the Implementing Agreement has involved the compilation of an authoritative digest of T&D developments, for the benefit of Annex I and the ExCo, and the complementary publication of a series of topical briefing sheets and workshop profiles.

The organization and delivery of a series of topical workshops represents a second integral component of Annex I. Seven such workshops have been organized:

- Distribution systems and end-user issues;
- Distributed Generation (DG) system integration;
- Management of ageing infrastructures (jointly with CIRED 2007);
- Economic and regulatory issues;
- Transmission System issues;
- Intelligent distribution networks, micro-grids and active network management.
- Communications & Control (Visby, Sweden, May 2009)
- Balancing the Variability in Renewable Electricity Supplies (Fredericia, Denmark, Oct. 2009)

Workshop on “Communications & Control”: Experts and National Delegates from 12 countries met in the historic city of Visby, Gotland, Sweden, 5th - 7th May, for ENARD’s Spring 2009 meetings programme. This comprised a highly topical Workshop on the subject of Communications and Control, followed by the convening of the 6th ENARD ExCo meeting. The Annex I Workshop received a series of expert presentations covering ICT infrastructures, architectures and sensor requirements, emergency communications and with a final session addressing the application of such matters in practice. Extensive discussion and working group dialogue allowed for key messages to be abstracted from the Workshop

Workshop on “Balancing the Variability in Renewable Electricity Supplies”: Some fifty experts and national delegates from 13 countries met in the Fredericia (Denmark) Headquarters of energienet.dk, the Danish transmission system operator, on 20-21 Oct. 2009. The Workshop comprised a series of expert presentations, general discussion and dialogue, supplemented by more structured discussion via three Working Group sessions. The latter three Working Groups were tasked with reporting back to the Workshop with conclusions and recommendations for future action.

The one and a half days of presentations, discussion and dialogue succeeded in providing a wealth of information and data for consideration by the ExCo, in relation to the very considerable challenges which are increasingly to be addressed, in relation to network balancing in the context of projected future large scale penetrations on intermittent renewable energy sources.

Various specific solutions technologies and methodologies were discussed in detail, with a clear consensus emerged in terms of the requirement to adopt a truly holistic approach, embracing the most appropriate solutions mechanisms and fully exploiting the complementarities between supply side and demand side measures. In the latter context, in particular, it was recognised that various specific market and regulatory challenges are likely to require specific attention, in order to realise the full potentials of some of the solutions proposed, in practice.

The outcomes from these workshops have influenced the development of the series of follow-on Sub-Annexes.

Representation and outreach activities represent an important component of the Annex I work plan, consistent with ENARD's strategic objective to engage with and provide authoritative, comprehensive and unbiased international information, data and advice to its four key stakeholder communities, namely:

- Governments
- Policy makers
- Electricity T&D companies;
- Power engineering equipment suppliers.

Annex I has effectively represented ENARD at various IEA, governmental and industry forums. It has also maintained responsibility for the ENARD web-site, at www.iea-enard.org, which serves as the principal public domain dissemination medium for the Implementing Agreement.

Annex IV has been developed in response to the recommendations and outputs from ENARD's original transmission systems workshop, held September 2007. It aims to develop a long term vision for transmission system developments and to identify the most promising solutions and challenges in terms of expansion planning and market analysis, operational management and the introduction of new technologies. The Annex IV work programme will be delivered by the joint Operating Agent, SINTEF Energy Research (Norway) and ERSE SpA (Italy) (previously CESI Ricerca), working in co-operation with the individual Annex participants.

The work programme of Annex IV itself is to be delivered via two principal tasks: The principal focus of Task 1 "Transmission Expansion Planning and Market Analysis" is on the need for new methods and tools, integrating market modeling and network analysis, supported by underlying assessment and analysis work. The principal focus within Task 2 "Transmission System Operation, Management and Security" is on the need for new methods and solutions for the monitoring and control of power systems including, in particular, the provision of balancing and system services. Annex IV is scheduled to run over a 24 month period, through to March 2011. Seven countries are participating in the Annex from the outset, with its Inaugural Experts' Meeting being hosted by ERSE SpA in Milano, Italy, 28th-29th April 2009.

Annex II, addressing DG System Integration, continues its work programme via most recent Experts' Meetings, convened in Fredericia, Denmark, May 2009 and Zürich, Dec. 2009. Annex II is now assessing the information gathered from its eleven participating countries with a view to producing a set of guidelines documentation, to facilitate the

transition from today's passive distribution networks to the active distribution networks, that will increasingly be required in the future. Switzerland is task leader within this Annex II.

Annex III, addressing Infrastructure Asset Management (III), has finished its work programme, via their most recent Experts' Meetings, convened Alvkarleby, Sweden, April 2009 (Annex III). The Annex III Experts' Meeting reviewed the set of summary reports produced on the five asset groups identified for analysis and review (namely transformers; cables; overhead lines; switchgear; protection and control) and mapped out its programme-of-work, through to the completion of its present phase, December 2009. The work of Annex III is described in an internal report for members of this Annex III. A part of the report about Annex III has been made public.

5. Future Activities

At the end of 2009, ENARD Annex I is some 3½ years into its present 5 year Term. In this time, it has developed considerably, having now 14 participating countries and with it initiating three follow-on Sub-Annexes, each addressing highly topical and relevant subject areas.

Over the next 1½ years (until mid of 2011), ENARD will continue to develop its activities and work programs, including the ongoing delivery of the individual Annex work programs, the organization and delivery of selected further topical Annex I workshops and in contributing expert input and advice to the IEA Secretariat, in relation to the latter's policy considerations concerning electricity T&D networks.

ENARD Annex I is presently progressing the planning in relation to its Grid Policy Workshop "Electricity Grids — a key enabler in the delivery of a sustainable energy policy", to be delivered in conjunction with the EUWP's Electricity Co-ordination Group and the IEA Office, in Paris, UICP Congress Centre, Wednesday 28th April 2010.

In early 2010, the ExCo will also initiate discussion into the case for any renewal of ENARD's present 5 year Term, from July 2011 on, with a view to coming to a decision to request any such renewal (or otherwise), no later than the 8th ENARD ExCo Meeting, to be held Paris, France, April/May 2010. Consideration may also be given to the creation of new annexes.

6. Internet

<http://www.iea-enard.org>

7. References

- [1] Energy Technologies at the Cutting Edge. International Energy Technology Collaboration. IEA Implementing Agreements. IEA, Paris, 2007.