

International Energy Agency

Implementing Agreement

on

**ELECTRICITY NETWORKS ANALYSIS, RESEARCH
AND DEVELOPMENT
(ENARD)**

STRATEGIC PLAN

**October 2006-September 2011
and
as extended to February 2012**

prepared by

J N Baker,
EA Technology.
Capenhurst Technology Park,
Capenhurst,
CHESTER,
UNITED KINGDOM.
CH1 6ES.

Tel. +44-151-347-2462

Fax. +44-151-347-2406

e:mail: john.baker@eatechnology.com

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1. Introduction

The present document represents the formulation of the Strategic Plan for the first five years¹ of the new International Energy Agency (IEA) Implementing Agreement on Electricity Networks Analysis, Research and Development (ENARD). It is intended to provide the necessary strategic vision and focus for ENARD's activities, over this initial five year term and covers the vision and mission of the new Implementing Agreement, its aims and objectives, operating structure, results and information protection and benefits. The Strategic Plan itself was developed via a process of detailed consultation and interaction with key stakeholders in the Implementing Agreement.

The Electricity Industry worldwide is operating in a period of unprecedented change, with it having to respond to a series of often quite disparate external drivers, whilst maintaining, if not improving, its overall service quality under ever more competitive market conditions. The successful development, design, configuration, operation and maintenance of its Transmission and Distribution (T&D) networks is an essential prerequisite of the Industry's ability to respond to and benefit from such changes in the external environment.

The IEA provides an appropriate forum for international collaboration in relation to energy technologies and systems, via its various Implementing Agreements. Whilst current Implementing Agreements address specific aspects of electricity networks, distributed generation, renewables, communications, network technologies and related, there has to date been no single Implementing Agreement addressing the subject of Electricity Networks at the integrated system level. The new ENARD Implementing Agreement has therefore been specifically developed to address the various issues involved in the development, design, operation and performance of electricity networks at the integrated system level.

ENARD has been developed over a period of some eighteen months, from November 2004 on, via a process of consultation and feedback from its key stakeholders, which has included the organisation and delivery of a Definition Workshop² at the IEA Office in Paris, November 2005, followed by the convening of the Inaugural Meeting of ENARD's Interim Executive Committee (ExCo) in London, February 2006³.

2. Vision

ENARD's vision is to facilitate the uptake of new operating procedures, architectures, methodologies and technologies in electricity T&D networks, such as to enhance their

¹ and as extended to February 2012, consequential of the CERT's approval of the ENARD ExCo's request for an Extension-of-Term

² Summary Proceedings of a Definition Workshop in relation to the proposed International Energy Agency Implementing Agreement on Electricity Networks Analysis, Research and Development (ENARD), held at the IEA Office, Paris, Thursday 24th-Friday 25th November 2005. J.N.Baker, EA Technology, December 2005.

³ IEA Implementing Agreement on Electricity Networks Analysis, Research & Development (ENARD). Minutes of Inaugural Interim Executive Committee (ExCo) Meeting, held DTI, London, 23rd-24th February 2006.

overall performance in relation to the developing challenges of network renewal, renewables integration and network resilience.

3. Mission

ENARD's mission is to provide a major international forum for information exchange, in-depth research and analysis and collaborative research and development (R&D) in relation to electricity T&D networks.

4. Geographical Scope and Participation

ENARD will initially focus its activities principally within the IEA member countries, but anticipates that its geographical reach will extend, as it delivers its initial work programme and outputs. In particular, ENARD will seek to develop relationships with the IEA "plus five" countries⁴, consistent with the objectives of the IEA's G8 Gleneagles Programme of Work.

As with other IEA Implementing Agreements, ENARD is open to participation by non-IEA member countries and to private sector and non-Governmental organisations.

5. Aim and Objectives

5.1 Aim

ENARD will develop as an authoritative, comprehensive and unbiased international source of information, data and advice, such as to inform Governmental officials, policymakers and key industry stakeholders of the pertinent issues relating to current and anticipated developments in electricity T&D networks. The development of ENARD will also contribute to fulfilment of the objectives of the IEA's G8 Gleneagles Programme of Work.

5.2 Core Objectives

ENARD's core objectives are as summarised below:-

- the collation, exchange and promulgation of information and data in relation to current and anticipated electricity T&D developments within the participating countries and associated programme activities.
- the in-depth review and analysis of the associated key R&D, design, operational and management issues in relation to electricity transmission networks.

⁴ Brazil, China, India, Mexico and South Africa

- the complementary in-depth review and analysis of a range of key issues relating to the R&D, design, operation and management of electricity distribution networks.
- the in-depth review and analysis of prevalent and anticipated regulatory frameworks and their associated impact on the economic evaluation and optimisation of network asset portfolios.

6. Structure

ENARD will be executed and delivered as an Implementing Agreement within the IEA's Energy Technology and R&D framework. As such, it will have the following constituent elements:-

- An Executive Committee (ExCo), comprising Delegates from all the participating countries ("the participants"). The ExCo will be responsible for the ongoing development of an operational roadmap for ENARD, the identification, prioritisation and selection of particular work areas for analysis and review, the periodic review of the operational Annexes and the associated upward reporting to the End Use Working Party (EUWP) and the Committee on Energy Research and Technology (CERT), within the IEA's Energy Technology and R&D programme management structure. The ExCo Delegates will reflect and service the overall core objectives of ENARD, rather than the interests of any single Annex, or sub-groups of Annexes, per se.
- The ENARD Secretariat will support and facilitate the ExCo in the discharge of its duties.
- A series of specific operational Annexes, each with its own Operating Agent, to discharge the work programme activities in particular areas. Various subsets of the ENARD participant base will participate in one or more of the operational Annexes.

Figure 6.1 below illustrates ENARD's organisational and management structure, with Appendix 1 describing the roles and contributions of its various constituent elements and parties.

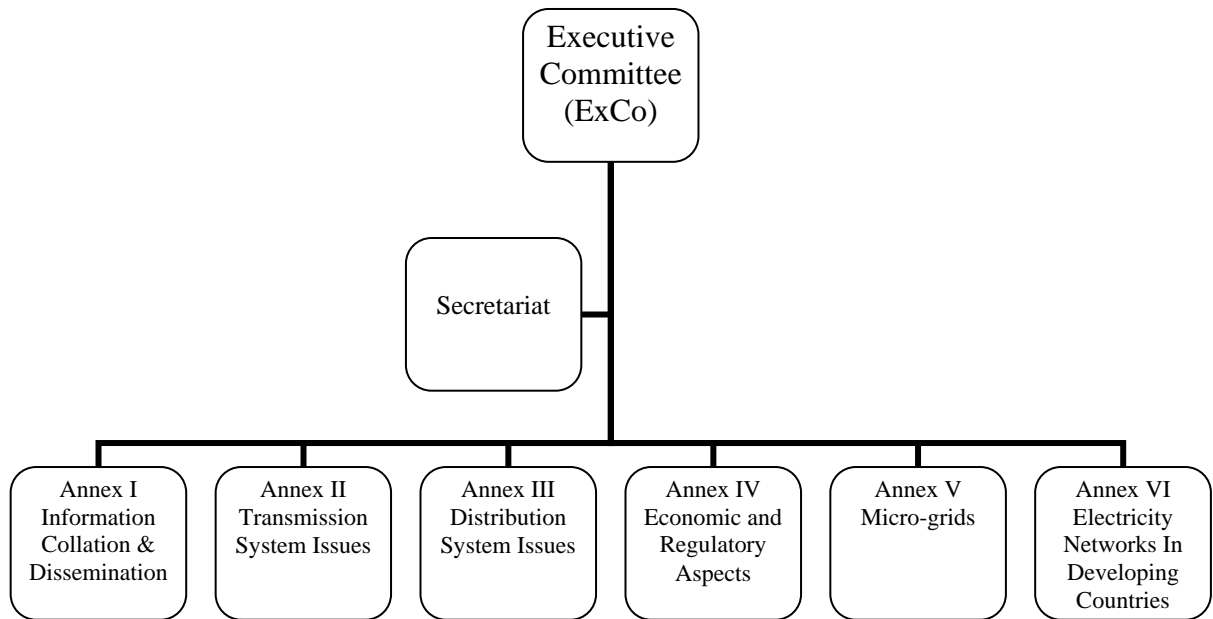


Figure 6.1:- Illustrative Organisational and Management Structure

7. Actions in Relation to Core Objectives

It is intended that ENARD will develop under the auspices of the IEA's Energy Technology and R&D programme as a truly international, authoritative, comprehensive and unbiased source of information, data and advice, such as to inform Governmental officials, policymakers and key industry stakeholders of the pertinent issues relating to current and anticipated developments in electricity T&D networks. ENARD will therefore initiate and develop a comprehensive and inclusive programme of work in order to deliver against its core objectives during its initial five year term. Examples of the anticipated actions to deliver against these core objectives are provided in the sub-sections below.

Core Objective 1: The collation, exchange and promulgation of information and data in relation to current and anticipated electricity T&D developments within the participating countries and associated programme activities.

The ExCo will pursue the delivery of this core objective via the initiation and discharge of activities within the operational structure of ENARD including, but not limited to:-

- the development and maintenance of an authoritative information digest/database in relation to electricity T&D network related developments, trends and activities;
- the provision of country specific information inputs and contributions to this information digest/database;
- the facilitation of information exchange activities with complementary international T&D programme activities and initiatives;

- the collation and exchange of such country specific and associated information within the ENARD participant base;
- the organisation and delivery of a series of topical workshops, to both facilitate the information exchange activities and to facilitate future ENARD work programme priorities;
- the development and maintenance of a fully functional web-site, providing readily accessible information of ENARD's activities;
- the facilitation of information and R&D exchange mechanisms with developing countries and, in particular, the "plus five" countries;
- the provision of authoritative information to Governmental officials, policymakers and key industry stakeholders;
- the general promotion of the importance of electricity T&D networks within the energy infra-structure.

Core Objective 2: The in-depth review and analysis of the associated key R&D, design, operational and management issues in relation to electricity transmission networks.

The ExCo will seek to initiate activities in relation to this objective including, but not limited to:-

- the identification of a range of key issues and challenges, in relation to the resilience of the transmission system infrastructure, its renewal and expansion, the strategic integration of large concentrations of renewable energy sources and associated operational aspects;
- the in-depth analysis of a targeted range of issues, drawn from the above, with a view to identifying solutions requirements in terms of R&D activities, design practices and operational and management issues;
- the initiation and development of international collaborative R&D activities, solutions mechanisms, methodologies and recommendations in relation to the issues above;
- the promulgation of the outcomes and recommendations from these activities, such as to inform policy makers and Transmission System Operators (TSOs) in relation to their considerations regarding future transmission system operational strategies, investments and upgrades.

Core Objective 3: The in-depth review and analysis of key issues relating to the R&D, design, operation and management of electricity distribution networks.

ENARD's activities in relation to this objective shall include, but not be limited to:-

- the identification of a range of key issues and challenges in relation to the development and operation of distribution networks against the background of increasing customer demands in terms of power quality, security of supply and increasing penetrations of intermittent renewables and other distributed generation resources;

- the complementary identification of the key market, business and technology drivers, their required information and data management inputs and a range of technological and other solutions;
- the identification, categorisation and ranking of specific solutions technologies and systems, including actual and emerging technologies, the application of demand side management techniques, smart sensors and systems and advances in power electronics capabilities⁵;
- the initiation of international collaborative R&D activities in relation to distribution technology development and applied research, such as to contribute to the cost effective development of technologies, methodologies and other solutions mechanisms, in response to the range of issues, challenges and business drivers identified;
- the promulgation of the outcomes and recommendations from these activities, such as to inform policy makers and Distribution Network Operators (DNOs) in relation to the future development of power distribution networks.

Core Objective 4: The in-depth review and analysis of prevalent and anticipated regulatory frameworks and their associated impact on the economic evaluation and optimisation of network asset portfolios.

The ExCo will aim to initiate activities in response to this objective which may include, but not be limited to:-

- the in-depth analysis, review and assessment of specific economic and regulatory measures on the strategic development of power systems, asset renewal strategies, innovation, access arrangements and performance delivery;
- the reconciliation of the above with developing trends in relation to network renewal, renewables integration and network resilience;
- the encapsulation of the above via the delivery of recommendations and advice to Governmental officials, policy makers, regulatory organisations and key T&D industry management personnel.

8. Work Programme (actual and anticipated Annexes)

ENARD's principal delivery mechanism in relation to the actions and objectives described above will be via the initiation and execution of a series of specific Annexes, as agreed by the ExCo. Annexes which may be expected to be initiated during ENARD's initial five year term include:-

Annex I: Information Collation and Dissemination

Annex II: Transmission System Issues

Annex III: Distribution System Issues

⁵ Close interaction and co-operation with other IEA Implementing Agreements is envisaged in relation to these particular aspects, as described in the accompanying ENARD Programme of Work

Annex IV: Economic and Regulatory Aspects

Consideration will also be given to the development of further Annexes, including:-

Annex V: Micro-grids

Annex VI: Electricity Networks in Developing Countries

All ENARD participants will participate in Annex I (Information Collation and Dissemination) and with sub-sets of the participants having the option to participate in one or more of the further Annexes. The ExCo and individual Annex Operating Agents will aim to develop close working relationships and exchange mechanisms with the complementary activities of other T&D network related collaborative R&D programmes and information exchange frameworks, including those of IEA, CIRED, CIGRE, the European Commission and Eurelectric.

The phasing of the various Annexes will be decided by the ExCo and will be strongly influenced by the support for such Annexes. However, their anticipated phasing and contributions to each of ENARD’s four core objectives is as shown in figures 8.1 and 8.2 below.

Annex	Year															
	06	2007			2008			2009			2010			2011		
I																
II																
III																
IV																
V																
VI																

Figure 8.1:- Anticipated Phasing of Annexes

	Annex I	Annex II	Annex III	Annex IV	Annex V	Annex VI
Objective 1:	√					
Objective 2:	√	√		√		√
Objective 3:	√		√	√	√	√
Objective 4:	√	√	√	√		

Figure 8.2: Individual Annex Contributions to ENARD Core Objectives

Further details on the individual Annexes are contained in the complementary Programme of Work for ENARD⁶.

9. Results and Information Protection

The principal results and outputs from the Implementing Agreement will essentially comprise a series of reports, databases, analyses and methodologies, developed on Annex specific bases and by agreement with the memberships of the respective Annexes.

In general terms, such results and outputs would remain confidential to the individual Annex participants for a period of not less than two years after the completion of the respective Annexes, unless all the relevant participants agree to an earlier release of information.

The various Annexes will also be required to produce annual executive overview reports of their activities, for consideration by the ExCo. These confidential executive overview reports will be complemented by the preparation of a series of non-confidential overview reports, which will not contain any sensitive information or data, which may be published in the public domain, via the ENARD web-site.

10. Benefits

The principal benefits arising from ENARD are likely to include:-

- Access on an international collaborative information exchange basis to detailed and in-depth knowledge, analysis and understanding of key electricity network issues and developments.
- Extensive opportunities to participate in peer group information exchange forums and networks, both on formal and informal bases.
- The provision of authoritative information, analysis and guidance, suitable for informing Governmental representatives and policymakers in relation to key electricity network related issues.
- The systematic identification and analysis on an international collaborative basis of a range of key transmission and distribution issues and the consequential formulation of solution mechanisms, collaborative R&D activities, authoritative advice, publications and workshops.
- The systematic and in-depth analysis of a series of strategic economic and regulatory issues, with the consequential publication of authoritative information and recommendations for Governmental representatives, policymakers, regulatory bodies and key industry stakeholders.

⁶ ENARD Programme of Work, Issue 1.0, 30th March 2006.

Appendix 1 : Illustrative Roles and Contributions of the Different Parties in ENARD's Organisational Structure

ExCo Chair, Vice Chair(s):

- Manage ExCo meetings
- Liaison with the IEA Secretariat
- Manage reporting (mainly with the IEA: performance assessment, Annual Report, End-of-Term Report, Strategy etc)
- Manage various marketing actions
- Represent ENARD in various meetings and conferences
- Enhance participation in ENARD
- Promote networking

ExCo Members:

- Participate actively in the determination of the ENARD work programme
- Liaison with national government and bodies
- Solicit national resources for co-operative R&D
- Reporting on country specific activities
- Ensure national dissemination of ENARD information

ENARD Secretariat:

- Day-to-day administration of the Implementing Agreement
- Liaison with the IEA Secretariat
- Liaison with Annex Operating Agents
- Provide general assistance to the ExCo and the Chairman
- Arrange meetings
- Assist in reporting

ENARD Web-site

- Marketing tool
- Information on individual Annexes
- Listing of publicity available reports
- Members Only area to facilitate information exchange within the ExCo