

# Final report

## 1.1 Project details

<b>Project title</b>	ISGAN Annex 6 (IEA)
<b>Project identification (program abbrev. and file)</b>	EUDP J.nr. 64015-0609
<b>Name of the programme which has funded the project</b>	EUDP
<b>Project managing company/institution (name and address)</b>	Dansk Energi Vodroffsvej 59 1970 Frederiksberg C
<b>Project partners</b>	DTU elektro/CEE
<b>CVR</b> (central business register)	17156616
<b>Date for submission</b>	31-03-2017

## 1.2 Short description of project objective and results

The Danish participation in ISGAN Annex 6 have fed Danish experience and results regarding development of smart grid concepts and technology into the Annex 6 products. In addition, the Danish participation have provided insight into the experiences and know-how developed in smart grid projects performed at European and international level.

Den danske deltagelse I ISGAN Annex 6 har bidraget med dansk viden og resultater vedr. udvikling af smartgrid koncepter og teknologi til Annex 6' publikationer og arrangementer. Derudover har den danske deltagelse givet indsigt i den erfaring og viden som er udviklet i smartgrid projekter på europæisk og internationalt plan.

## 1.3 Executive summary

ISGAN is the short name for the International Energy Agency (IEA) Implementing Agreement for a Co-operative Program on Smart Grids. ISGAN creates a mechanism for multilateral government-to-government collaboration to advance the development and deployment of smarter electric grid technologies, practices, and systems.

ISGAN is organized in annexes, and this project has funded the Danish participation in Annex 6. The Annex 6 program of work are organized into five main tasks:

- Task1: Policy and Regulation
- Task 2: Expansion Planning and Market analysis
- Task 3: Technology Development and Demonstration
- Task 4: System Operation Management and Security
- Task 5: Transmission and Distribution System Interaction

Where the project mainly has contributed to task 4 and 5.

During the project period, Annex 6 has, arranged workshops and published several documents relating to smart grid development and demonstration. This includes the addition of a Danish case to the T&D Casebook ver. 2.0 "SPOTLIGHT ON SMART AND STRONG POWER T&D INFRASTRUCTURE".

The knowledge gained from the participation in ISGAN Annex 6, has been disseminated to the Danish industry through the "Danish Intelligent Energy Alliance".

#### **1.4 Project objectives**

The project objective is to disseminate know-how and results regarding smart grid development and demonstration projects through the ISGAN network and ISGAN Annex 6 products (papers and workshops). And to gather knowledge from European and international smart grid projects, and disseminate these through national network communities.

#### **1.5 Project results and dissemination of results**

During the project the project partners have delivered a Danish case to the Annex 6 T&D Casebook ver. 2.0: "SPOTLIGHT ON SMART AND STRONG POWER T&D INFRASTRUCTURE". The case "Smart Grid connected electrical boiler", describes how low-cost connection of electrical boilers, with control by the DSO, can utilize abundant wind energy in the system, when temporary free capacity in the distribution network is present. In this way electricity is converted to heat in hours with abundant wind energy, and electricity infeed is reduced by substituting heat production on CHP-units with heat production on electrical boilers, and reinforcement of the distribution grid is avoided. This leads to a better balance between production and demand in the market and aid the transition of a renewable based energy system.

During the project the project, partners has contributed to the Annex 6 publications (some of them not concluded yet):

- Storage and balancing as key elements for future planning and electricity markets
- Analysis of the Interaction between Expanding Centralized Grids and Microgrid
- Synchrophasor - Applications for Wide Area Monitoring and Control
- TSO-DSO interaction - a Single Marketplace for flexibility
- Tools for Power Balancing Assessments
- Network Integration of Electric Vehicles

and to the planning of workshops in conjunction with international venues.

On National level, information regarding the ISGAN work has been disseminated through the "Danish Intelligent Energy Alliance".

#### **1.6 Utilization of project results**

The participation in the project has been an opportunity to deliver Danish knowledge to the international communities, supporting a wide spread development and utilization of smart grid technologies and concepts.

The Danish Industry has the opportunity, through the ISGAN network, to gather information regarding smart grid projects worldwide, and get involved in smart grid demonstration and implementation.

#### **1.7 Project conclusion and perspective**

The project objective has been met, but the development of smart grid goes on. There is still a need to deliver Danish know-how to the ISGAN network, and valuable knowledge can be harvested from it.