NATURAL RESOURCES CANADA - INVENTIVE BY NATURE

Canadian Smart Grid Development and Demonstration

Clean Energy Fund
ecoENERGY Innovation Initiative
International Smart Grid Action Network

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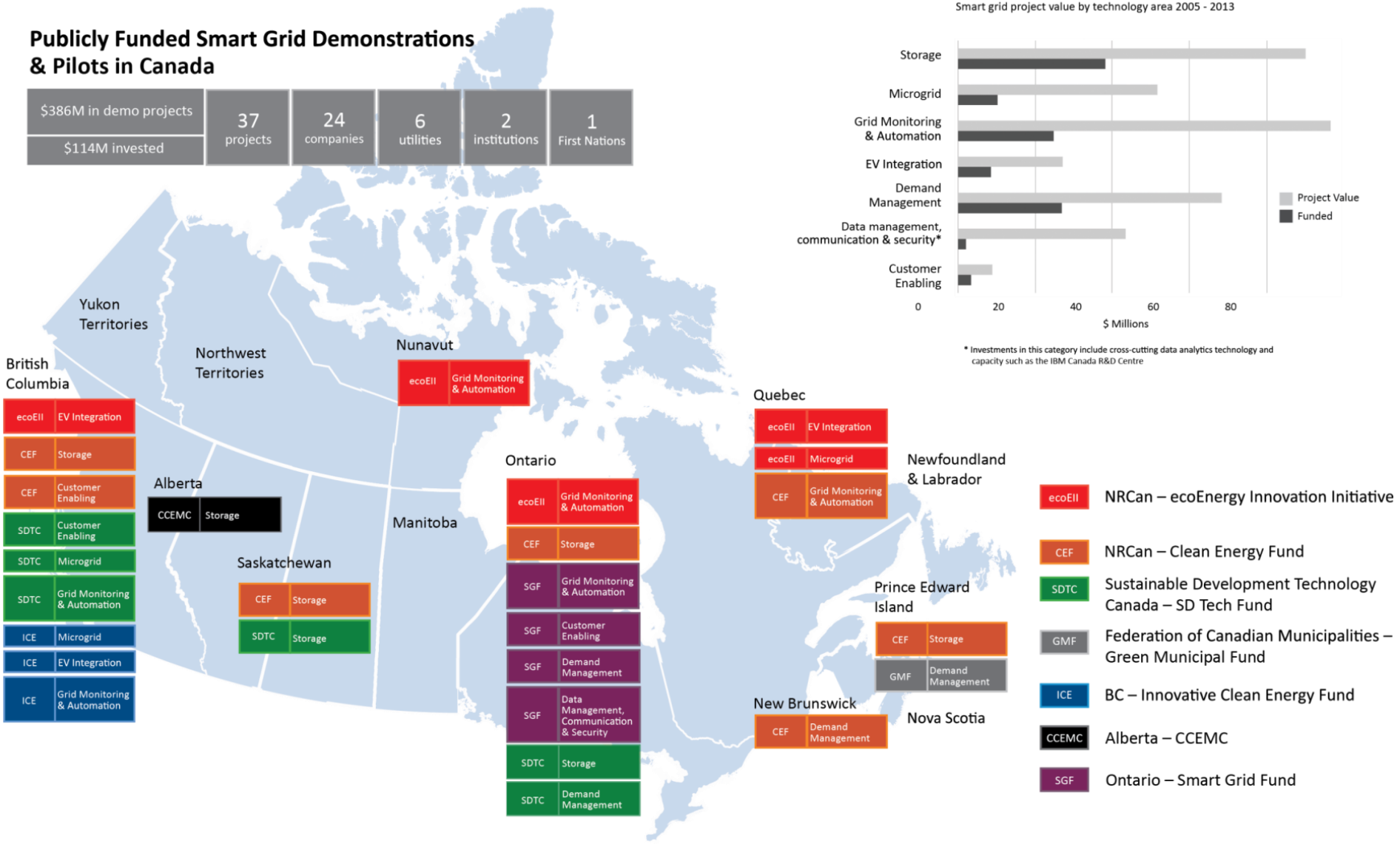
Publicly Funded Smart Grid Demonstrations & Pilots in Canada

$386M in demo projects	37 projects	24 companies	6 utilities	2 institutions	1 First Nations
$114M invested					



Source: www.nrcan.gc.ca/smart-grid-in-canada-201213

Natural Resources Canada: Clean Energy Fund ecoENERGY Innovation Initiative

60 % of publicly funded smart grid projects in Canada

Clean Energy Fund (CEF)

- Demonstration projects
- 5 year funding 2010 – 2015
- $ 759 M in clean energy funding → $ 146 M for renewable energy projects
- 16 small-scale renewable energy demonstration projects → 8 are demonstrating smart grid applications, $ 61 M in smart grid funding
- 5 years of post-completion monitoring to 2020

http://www.nrcan.gc.ca/energy/funding/current-funding-programs/cef/4953

ecoENERGY Innovation Initiative (ecoEII)

- R&D and demonstration projects
- Funding announced in 2011
- 55 projects, over $ 82 M in funding → 5 demonstrations, 6 R&D projects and studies, over $ 21 M in smart grid project funding
- 5 years of post-completion monitoring

http://www.nrcan.gc.ca/energy/funding/current-funding-programs/eii/4985

Figures reflect all publicly announced projects as of 2013

Renewable Integration and Storage

CEF | ecoEII

BC Hydro

Energy Storage and Demand Response for improved reliability in an outage-prone community

$13.5M project, $6.5M fund

University of British Columbia

Advanced Biomass Gasification for Heat and Power Demonstration

$28M project, $10M fund

Cowessess First Nation

Wind and Storage Demonstration in a First Nations Community

$5.5M project, $2.7M fund

Electrovaya

Utility Scale Electricity Storage Demonstration Using New and Re-purposed Lithium Ion Automotive Batteries

$7.6M project, $3.4M fund

Wind Energy Institute of Canada

Wind Energy R&D Park and Storage System for Innovation in Grid Integration

$24.8M project, $12M fund

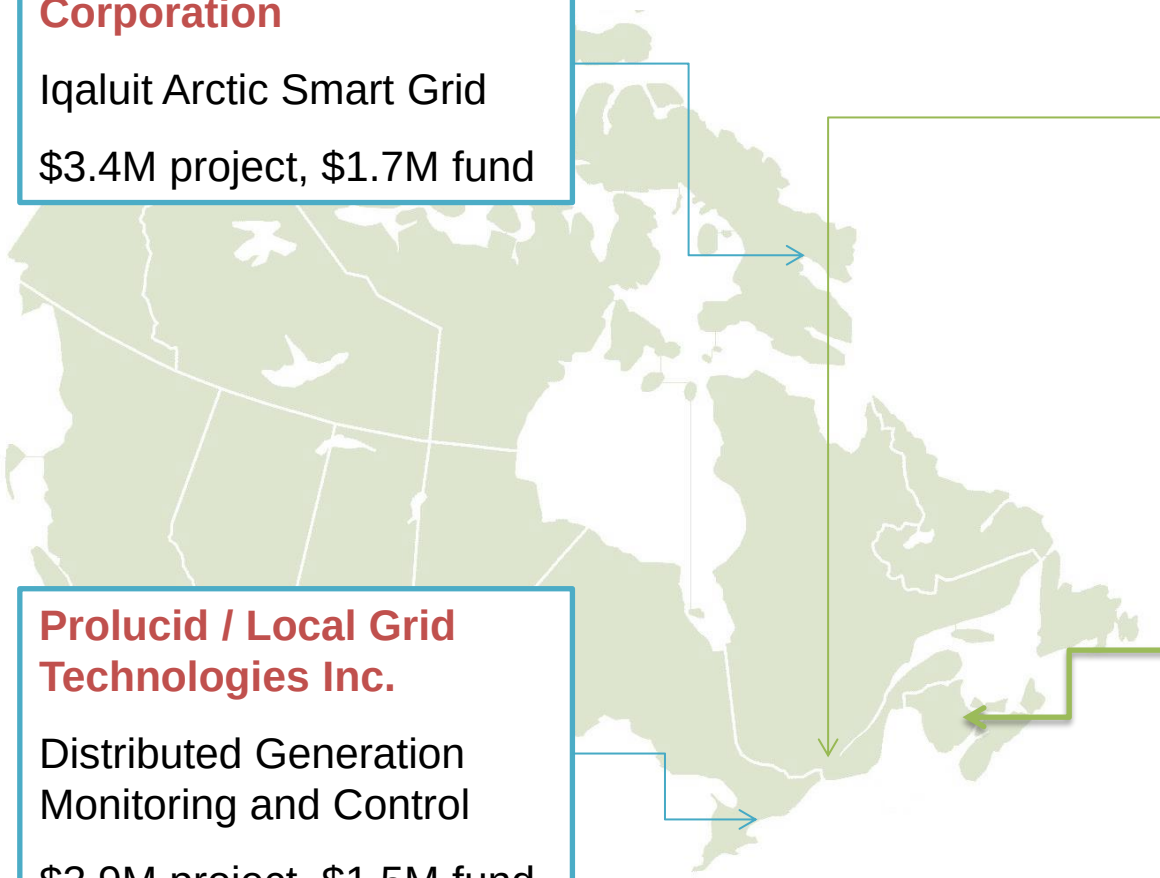
Opus One Solutions

Integrated Urban Community Energy Project

$12.7M project, $5.3M fund

Grid Automation and Virtual Power Plant

CEF | ecoEII



Qulliq Energy Corporation

Iqaluit Arctic Smart Grid

$3.4M project, $1.7M fund

Hydro Québec

Development of an interactive smart grid zone in Boucherville, with addition of integrated centralized Distribution Management System

$25.5M project, $7.5M fund

Prolucid / Local Grid Technologies Inc.

Distributed Generation Monitoring and Control

$3.9M project, $1.5M fund

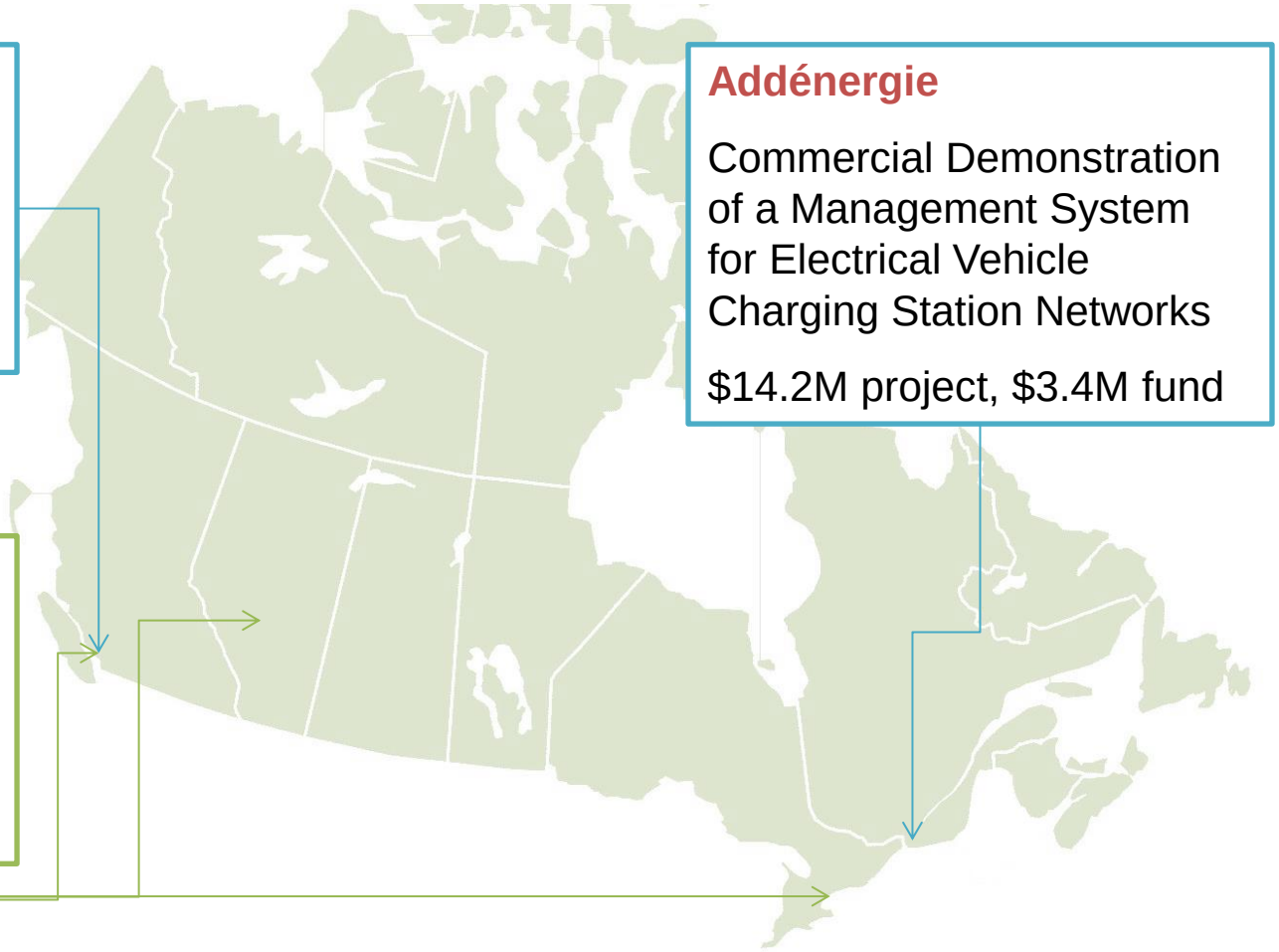
New Brunswick Power Corp.

Installation of monitoring and control systems in over 1200 properties in New Brunswick, Prince Edward Island, and Nova Scotia. Control is driven by availability of regional wind power.

$32M project, $15.9M fund

Electric Vehicle Integration and Smart Building Integration

CEF | ecoEII



BC Hydro

British Columbia Electric Vehicle Smart Infrastructure Project

$8.8M project, $4.1M fund

Addénergie

Commercial Demonstration of a Management System for Electrical Vehicle Charging Station Networks

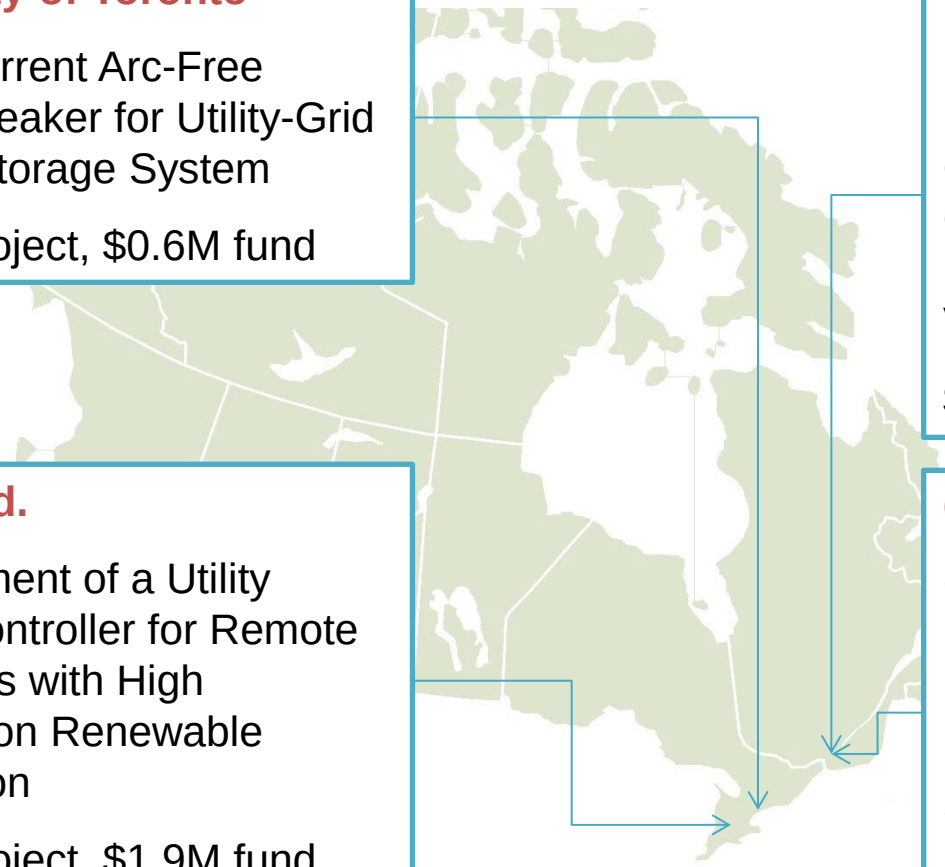
$14.2M project, $3.4M fund

Power Measurement Ltd.

Load curtailment and peak shaving in large commercial buildings

$10M project, $3M fund

ecoEII Research and Development: Storage, Microgrid, Demand Response



University of Toronto

Direct-Current Arc-Free Circuit Breaker for Utility-Grid Battery Storage System

$1.1M project, $0.6M fund

L'école Polytechnique de Montréal

Managing Energy Storage Capacities Dispersed in an Electrical Grid to Reduce the Effects of Renewable Energy Source Variability

$1.4M project, $1.0M fund

Hatch Ltd.

Development of a Utility Grade Controller for Remote Microgrids with High Penetration Renewable Generation

$3.1M project, $1.9M fund

CanmetENERGY Varennes

- Performance Assessment and Optimization Tools for Remote Smart Microgrids with Renewable Energy Resources
- Real Node Environment for balancing renewable generation with flexible resources

ISGAN IN CONTEXT

2009

Major Economies Forum on Energy and Climate (MEF) in L'Aquila, Italy in July

The Clean Energy Ministerial was an outgrowth of the agreement at the Major Economies Forum on Energy and Climate (MEF) in L'Aquila, Italy in July 2009, where countries ***agreed to collaborate on advancing clean energy technologies.***

2010

Inaugural Clean Energy Ministerial (CEM)

As a result, ***ISGAN was launched at the first meeting of the Clean Energy Ministerial (CEM),*** which brought together government energy ministers (or their equivalents) and stakeholders from 23 countries and the European Union in Washington, D.C in July 2010. The CEM focused high level attention and commitment to concrete steps- both policies and programs- that can accelerate the global transition to clean energy.

2011

IEA Implementing Agreement(IA)

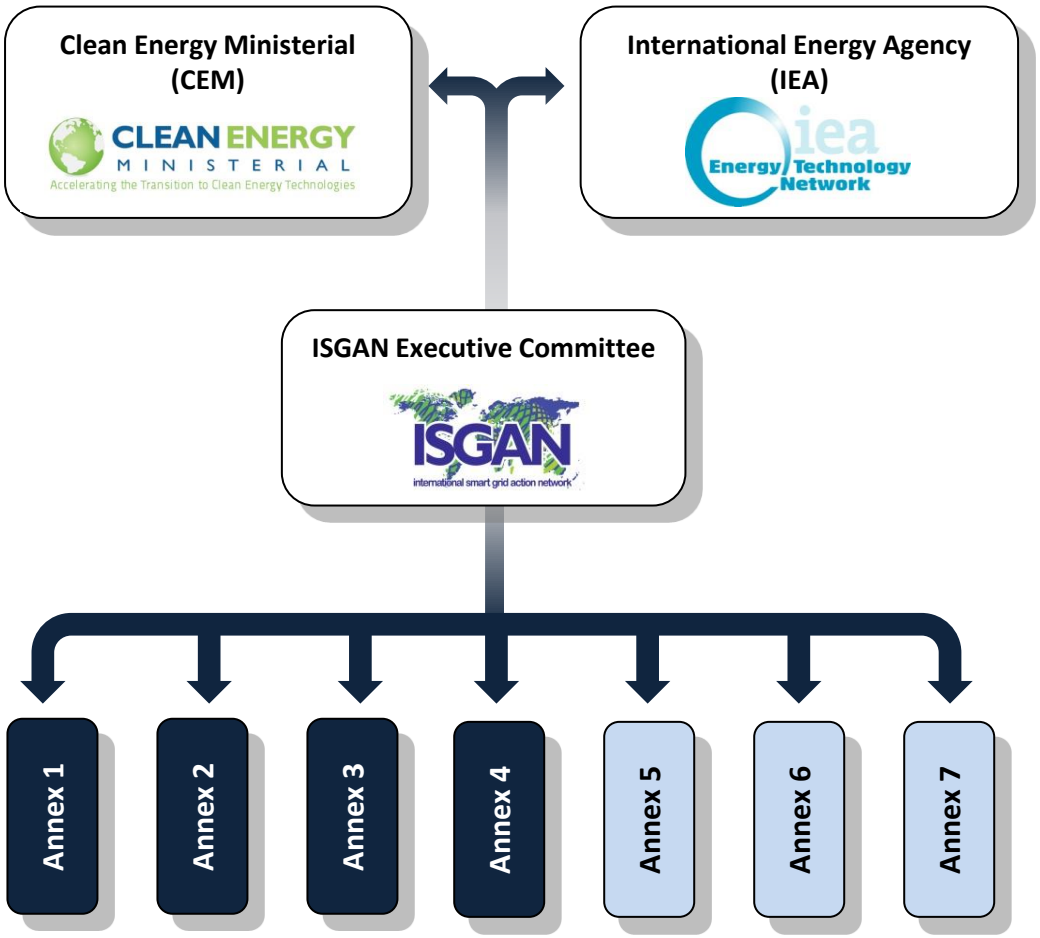
In April 2011, ISGAN was formally ***established as the IEA Implementing Agreement for a Co-operative Programme on Smart Grids (ISGAN),*** operating under the IEA Framework for International Energy Technology Co-operation.

ISGAN PARTICIPANTS(25)

Contracting Parties (25)
Invited to Join the IA
Brazil, Denmark, Israel, Turkey, Mongolia

ISGAN IN CONTEXT

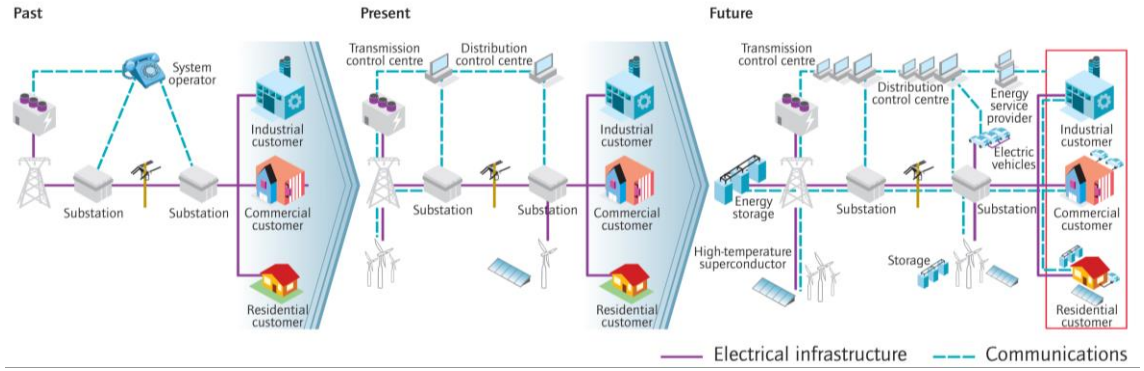
Organization

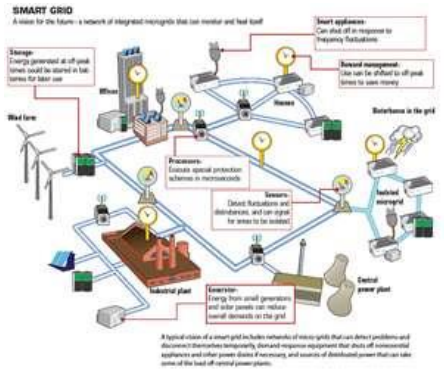


- *Annex 1: Global Smart Grid Inventory*
- *Annex 2: Smart Grid Case Studies*
- *Annex 3: Benefit & Cost Analyses And Toolkits*
- *Annex 4 : Synthesis of Insights for Decision Makers*
- *Annex 5: Smart Grid International Research Facility Network (SIRFN)*
- *Annex 6: Power T&D Systems*
- *Annex 7: Smart Grid Transitions*

CENTRAL QUESTION DRIVING THE ANNEXES

How do we move international collaboration on smarter grids from here…





Source: IEA, Technology Roadmap: Smart Grids (2011), www.iea.org/roadmaps

to here?…..Specific Applications & Policies

Feature Project: PowerShift Atlantic

- Flagship Canadian Project
- ISGAN Case Book: Spotlight on Demand Management
  http://www.iea-isgan.org/?c=5/112/367&uid=1300
- ISGAN Smart Grid Project Catalogue
  http://www.iea-isgan.org/?c=5/112/366&uid=1310