15th IAEE European Conference 2017, Vienna

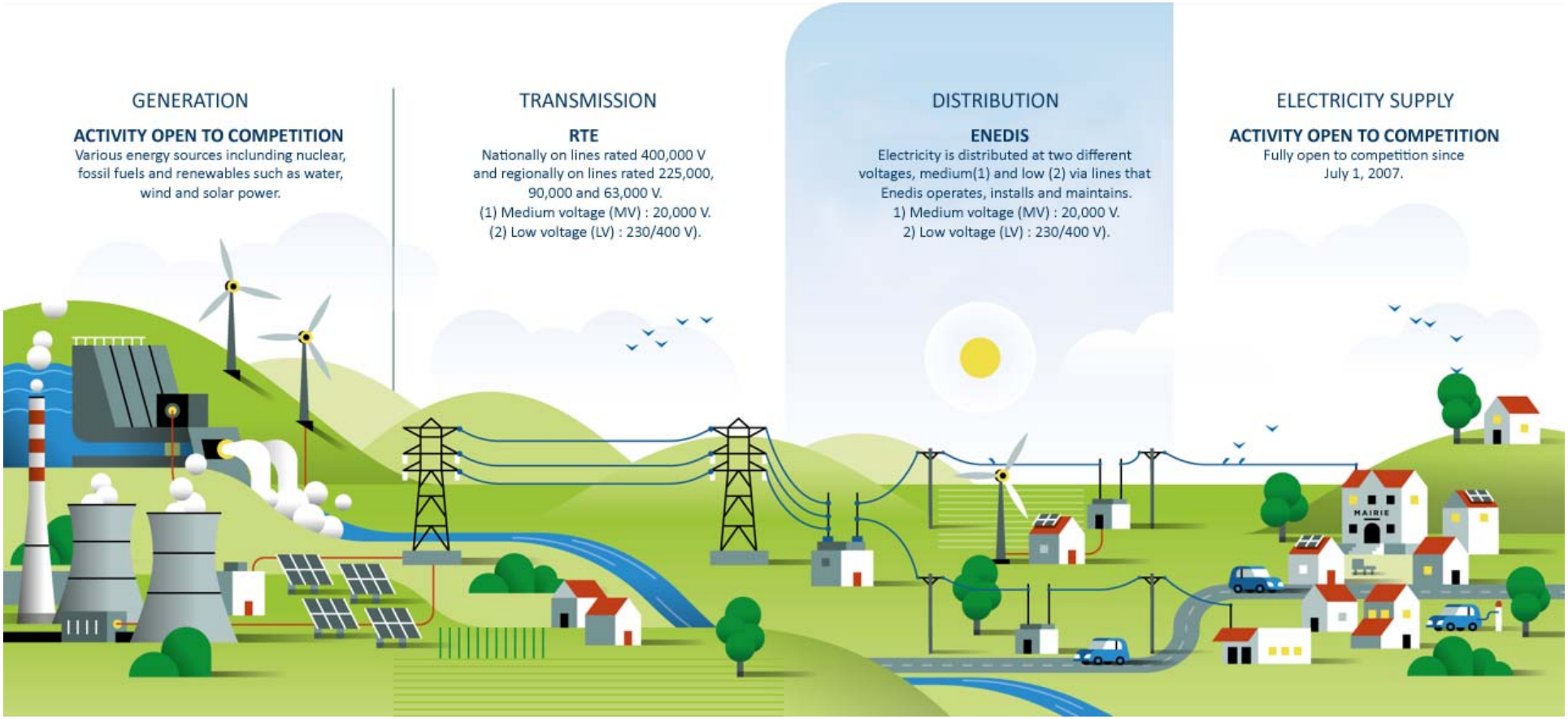
Smart energy future … whatever that means?

Smart systems: The view of a distribution system operator, Enedis

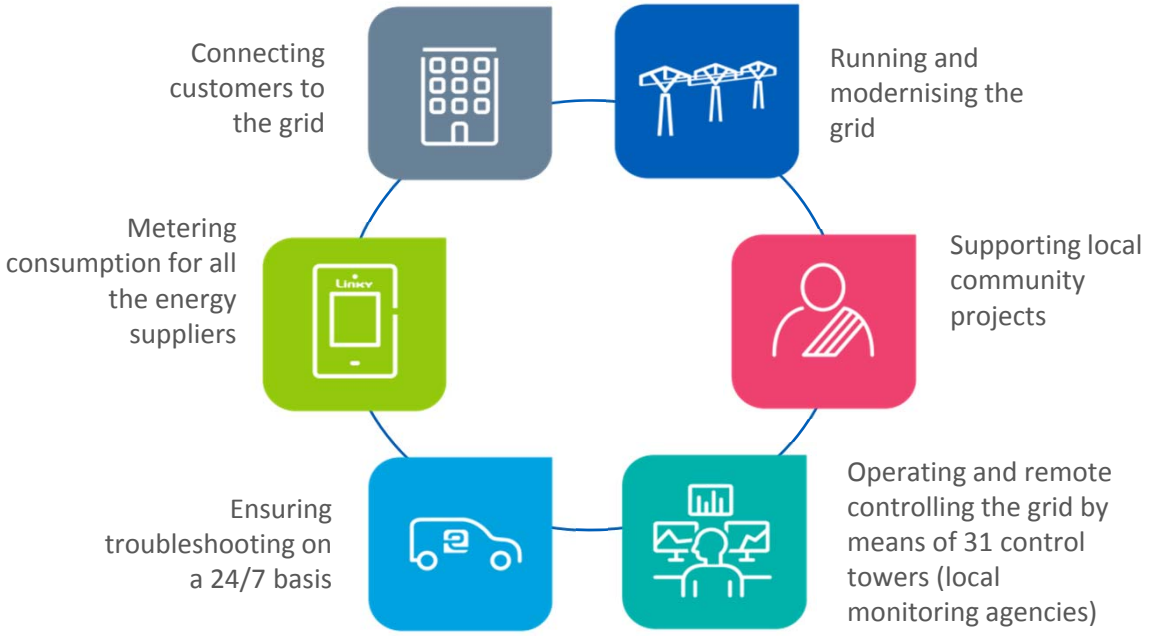
Michel Derdevet, Member of the Directory Board–Secretary General

September 5th, 2017

Enedis, the essential grid of the French electricity system



Enedis public utility missions



Electricity distribution in France

- **The public electricity distribution grid belongs to the local communities**
- **They entrust their maintenance and development to Enedis**
- **Enedis is the main manager of the French distribution grid**, covering **95%** of the country

Enedis in a nutshell

€ 13, 845 bn revenue in 2016

€ 3, 461 bn investments in 2016 (7% average annual growth since 2008)

36 million customers

Interventions 24 hours a day

38 507 employees

359 053 generation facilities connected to the distribution grid in France

An expanding network

1 348 876 km of power line (MV and LV)

98.4% new MV lines underground

8 288 km of open wire MV and LV overhead lines dismantled

16 728 km of new MV and LV twisted underground lines laid

2 260 power substations

Radical changes expected for power distribution networks

Climate and decarbonisation policies, and technical and digital innovation are driving radical changes to the business of distribution system operators (DSOs)

They are responsible for connecting and integrating large-number of small scale decentralised renewable energy sources as well as battery storage, charging stations for electric vehicles.

They will have to face demand side management, selfconsumption (prosumers) and improved energy efficiency.

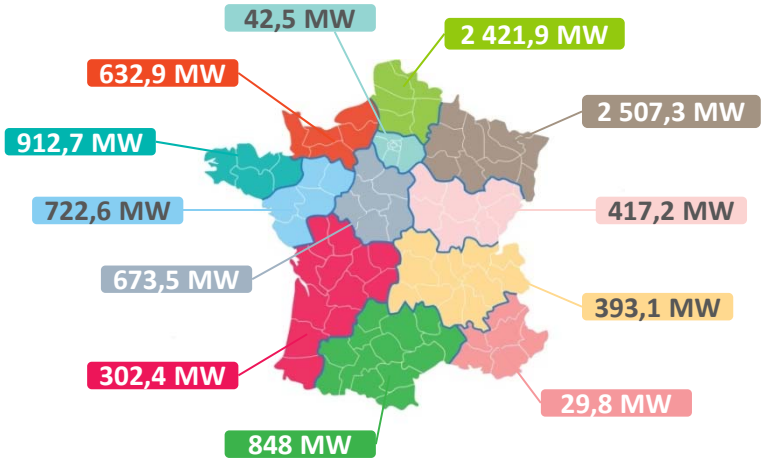
Access to more data will have to be managed for end-users as well as for different stakeholders of the electric system value chain.

New challenges for DSOs

- High volumes of new data from numerous and diverse sources, and increasing complexity in system architectures and processes, which introduce business risks and the potential tor increased costs;
- Regulatory frameworks that are not designed for the new world - resulting in the real risk of loss of profitability and a resulting stifling of innovation; essential for driving the changes needed ;
- The mismatch between regulatory incentive mechanisms for DSO investment and optimal levels of capital and operational expenditure;
- Network planning and construction based on false conditions and incorrect business assumptions.

Support new renewable energy developments

Installed windfarm

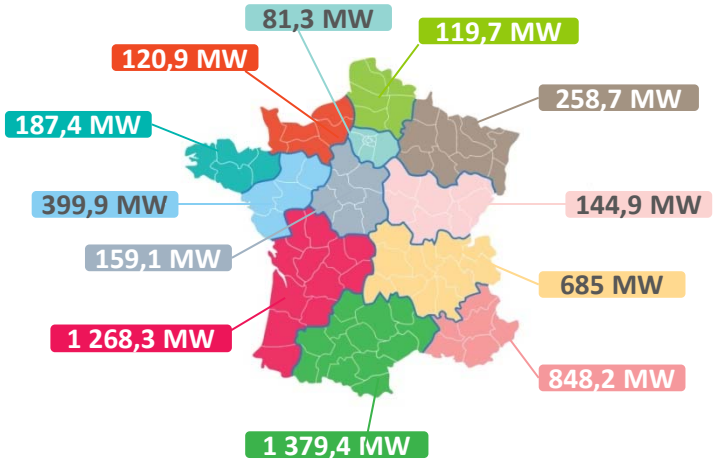


1 353 connected installations

9 904 MW*

*Connected generation facilities power

Installed photovoltaic inventory



350 986 connected installations

5 652,9 MW

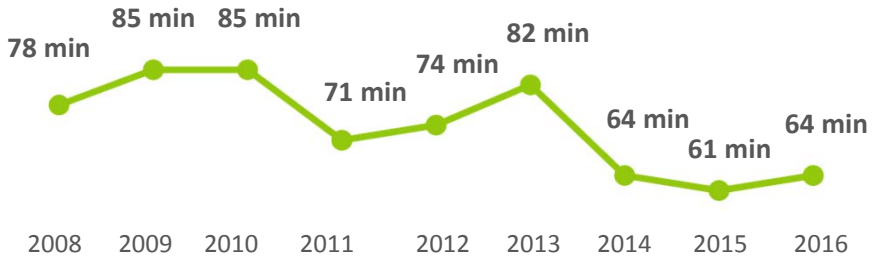
Increasing commitments towards our customers

Core service commitments

SAIDI (System Average Interruption Duration Index)

(excluding one-off events and transmission grid incidents)

Despite a number of significant weather hazards, SAIDI was maintained at a low level for the third consecutive year in 2016. This performance reflects our investments efforts over the last few years that are continuing in 2017.



A cost efficient company

Despite a number of customers per km of electric line smaller than in other European countries, Enedis provides good quality services with one of the most competitive prices in Europe.

Benchmarking of electricity transmission costs with TURPE 4 (share of Enedis)	Household 3 kVA simple rate	Household 9 kVA and electric heating	Small SME 50 MWh with a power of 50 kW	Large PME 400 MWh with a power of 130 kW	Industry 24 GWh with a power of 6 MW
Deviation from the European average	-31%	-9%	-17%	-30%	-39%

From : European benchmarking of the charge for use of electricity distribution networks – Schwartz & Co for the Energy Regulation Commission

Keep DSO as local operator: remain regional project partner

- Major town planning and housing renovation projects
- Contribution in town planning design
- Support of local town planning (LRP) and territorial climate-air-energy plans (PCEAT)
- Conventions for access to services in rural areas
- Support of positive energy territory for green growth (TPECV)
- Consulting and studies for the creation of development areas
- Bad-weather correspondants
- CITES approach (initiatives, territories and company contact)

Deploy secure and high standards technologies: smartgrids consistent with new uses

Linky, a new communicating meter

35 million Linky meters

a **6 years** deployment

€5 billion total budget

Smartgrids consistent with new uses

Operating remotely via the meter

Linky Hub Information system

Remote meter reading and operating system

Reacting faster on the grid

Detecting Self-healing Intervention

Diagnostic → **Action**

Better targeting network investments

- Data collection (Linky) and analysis
- Risk control
- Predictive maintenance

Adjusting the balance between production and consumption

Smart grids : the installation of demonstrators in France and Europe

BienVEnu 1
Experiment new solutions to optimise electric vehicle recharging in residential housing

Poste intelligent 2
Digital technology embedded in primary substation for better interface between high and medium voltage networks

SoMel SoConnected 3
Business models experimentation for the deployment of smart grid solutions in urban area

ISSYGRID 4
District-wide energy optimisation

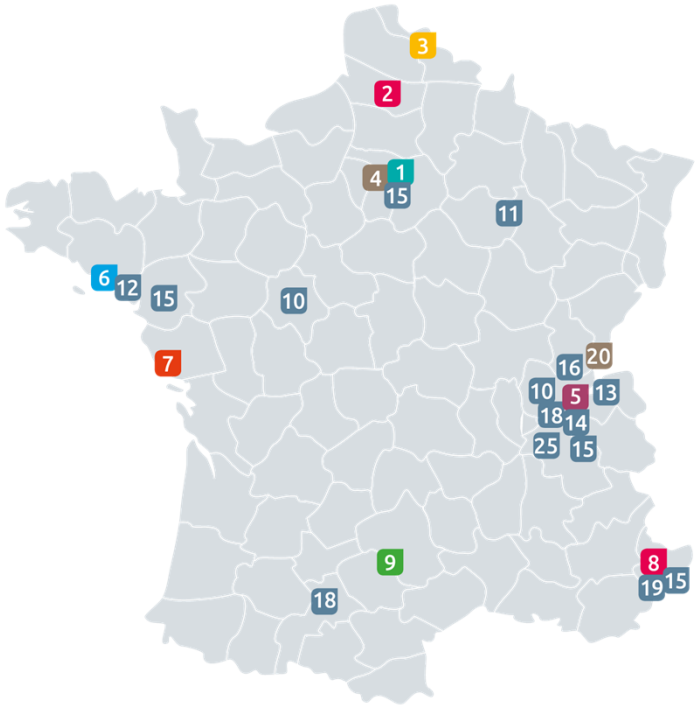
SMAP 5
Facilitating of rural renewables development

SOLENN 6
Contribution of smart grids to manage the electricity demand and to develop alternative to load shedding

Smart Grid Vendée 7
Optimise consumption and production over a region

Interflex – démo France 8
Experiment new network solutions in order to improve the reliability and efficiency of a local electric system

Smart Occitania 9
Experiment new solutions to support energy transition in rural areas



Projects completed

10 Linky
An experiment on nearly 300,000 smart meters

11 Venteea
Integration of important capacities of wind energy in a rural network

12 Houat et Hoëdic
Secure the power supply of two islands throu power modulation and redistribution of ener

13 Watt & Moi
Secure one-line access to electric consumption information

14 GreenLys
Smart grid contribution to urban areas equipped with LINKY

15 InfiniDrive
Management of recharging infrastructure for electric vehicles

16 Lyon Smart Community
Management of smart buildings, electric vehicles and solar energy

17 SOGRID
Development of a new PLC communication chain (Power Line Communication) to enhance the control of the distribution network

18 Smart Electric Lyon
Experimentation of innovative offers and services for customers downstream the meter

19 Nice Grid
Contribution of a smart-solar district: handle demand peaks and better take [illegible] of photovoltaic

ENEDIS L'ELECTRICITE EN RESEAU

The digital and environmental transitions

- Digitisation and open management of data: new prospects for electricity distributors
- Energy transition and the digital revolution are key drivers of distribution grids transformation
- Enedis power distribution grids are already smart and become even smarter:
  - equipped with sensors capable of providing information and data – the leading example being the 35 million smart electricity meters to be installed in French households by 2021.
  - Backed by recent legislation, the trend toward open data is, for DSOs, both a requirement and a lever: an economic, social and environmental requirement for enabling localities to prove their sense of responsibility and for developing innovative services for citizens;
  - but also a lever for distributors to become operators who, processing dynamic data, are open to their ecosystem – a lever for making new business models emerge for the local management of energy.

Databases, key element of the energy transition

In order to effectively support the energy transition, Enedis makes its data available to the actors of the electricity system.

18 datasets available to the actors of the electricity system on the OpenData platform*

Weekly electric report

Annual electricity production report up to the municipalities scale (IRIS)

Contribution to the French Government data platform « Etalab »

*https://data.enedis.fr

Changing business model

- Radical changes (social, technologies, regulation) unavoidable.
- How can DSOs anticipate and make the most of its new role in the decentralised world, while mitigating other changes (EVs, DSM, storage)?
- Answer: develop modelling and planning of decentralised energy scenarios, which will enable DSOs to think systematically about future developments and derive the best possible decisions on a quantitative basis.
- Most observers considers the focus will increasingly be on DSOs to make sure their systems are balanced and not overloaded:

This is the century of DSOs (Klaus-dieter Borchardt, EU, DG Energy)

The Winter « Clean Energy » Package

On 30th November 2016, the European Commission published the Winter « Clean Energy » Package on Energy Union, which:

•Acknowledges the role of DSOs as important actors at the heart of the energy transition

•Associates DSOs as key players in the European governance, through the introduction of a European Entity for DSOs

•Affirms the importance of distribution networks reinforcement

•Instructs DSOs to own, develop, manage or operate recharging points for electric vehicles

•Approves DSOs as neutral data managers

Opportunities for DSO's

•Encourage cross-border cooperation between distribution system operators .

•Interconnect the pioneers of local energy governance. Create a European Forum of the territories.

•Pool the European efforts of R&D with respect to smart grids.

•Create a European energy data platform.

•Map out European corridors for innovative mobility.

•Establish a Europe Energy College

Thank you for your attention

michel.derdevet@enedis.fr

enedis.fr | enedis.officiel | @enedis | enedis.officiel | mobile app