

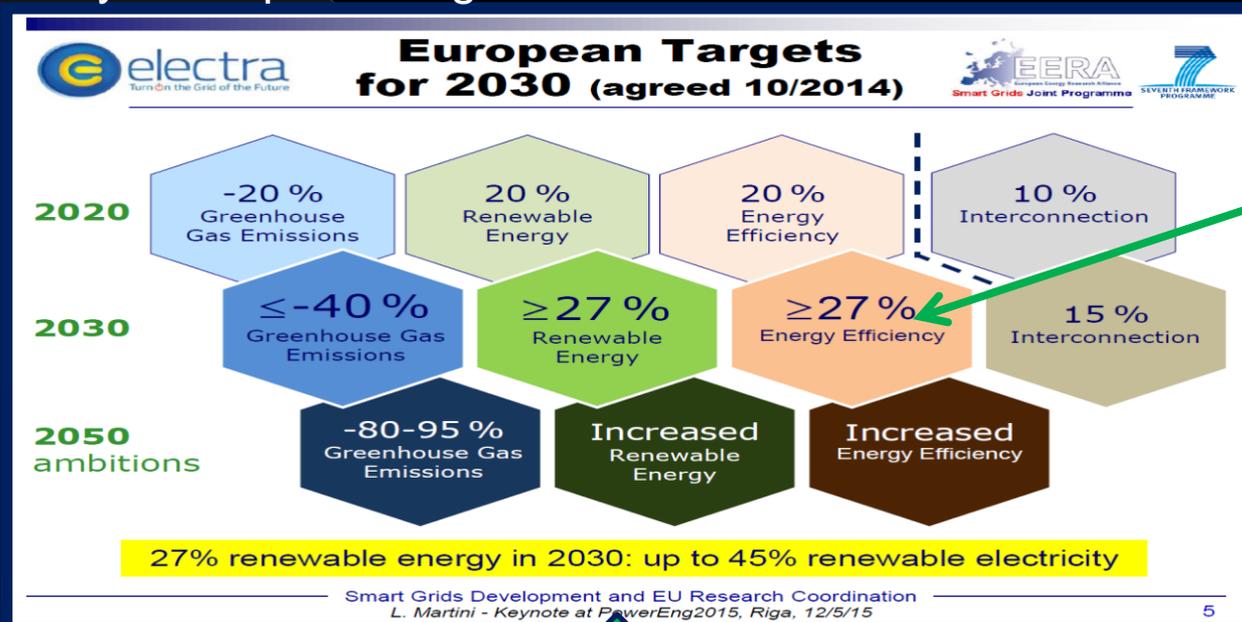
HEDNOs strategy in a very challenging new energy environment



The energy market is in transition



Why? European Targets for 2030- Transition to ZERO CARBON ECONOMY



Revised to 30% (winter package)

Transition to an energy market that will both meet high environmental standards and offer high quality services at a low cost.

DSOs across Europe are connecting increasing amounts of distributed generation to their networks, thereby actively facilitating and contributing to the energy transition.

The energy market is in transition



#EnergyUnion

#EnergyUnion

Energy Security and Solidarity
Moderation of demand
Internal Energy Market
Innovation and Competitiveness
Decarbonisation

40% cut in GHGs on
1990
Min 27% RES in
consumption
Min 27% energy saving
Min 15% interconnection
80% smart meter rollout

eurelectric
ELECTRICITY FOR EUROPE

The big investments towards smart distribution systems



because successful transition can only be achieved through the use of smart grids

- ❑ European networks will require **€600** billion of investment by 2020
- ❑ **€400** billion of this investment will take place in **distribution grids**
- ❑ The **DSO** share of overall network investments is estimated to grow to almost 75% by 2035 and to 80% by 2050
- ❑ €62billion on digitalization for European Power Grids through 2025



DSOs are key facilitators



€400-620 billion

investment in networks this decade

2400

distribution companies

260 million

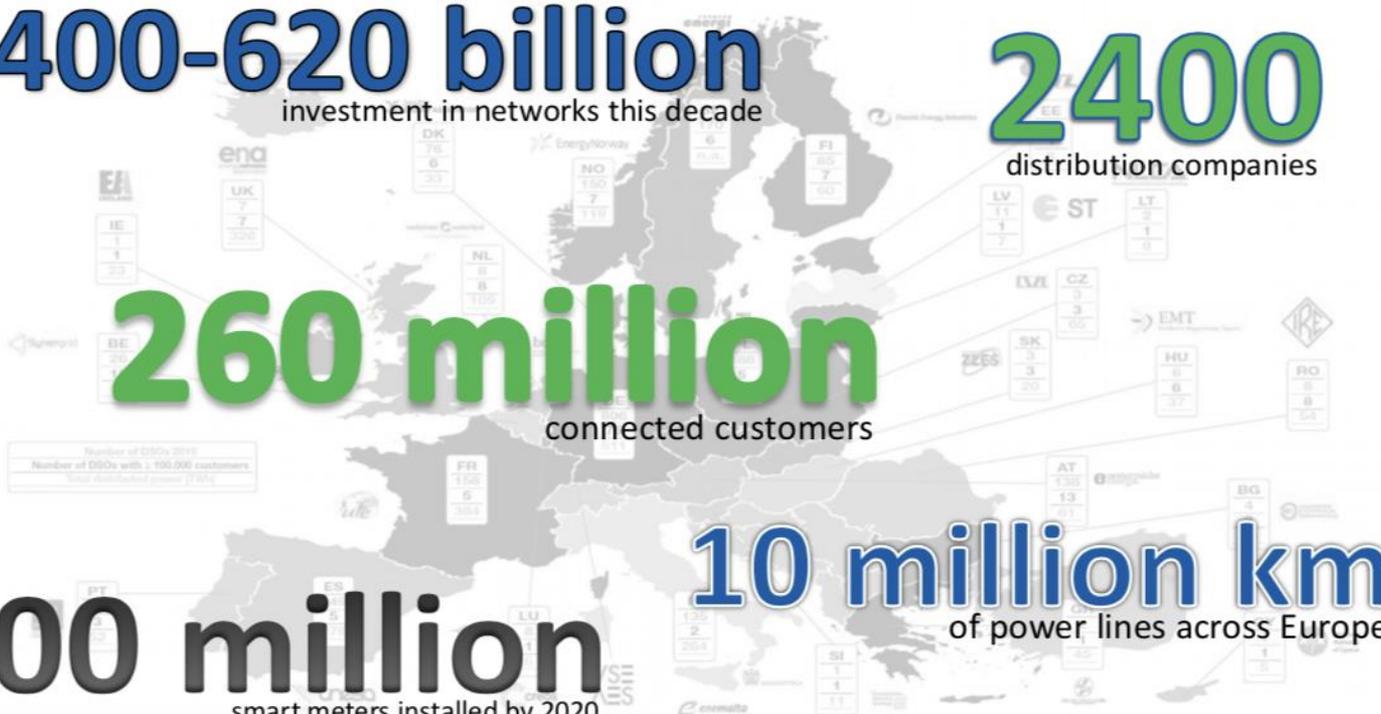
connected customers

200 million

smart meters installed by 2020

10 million km

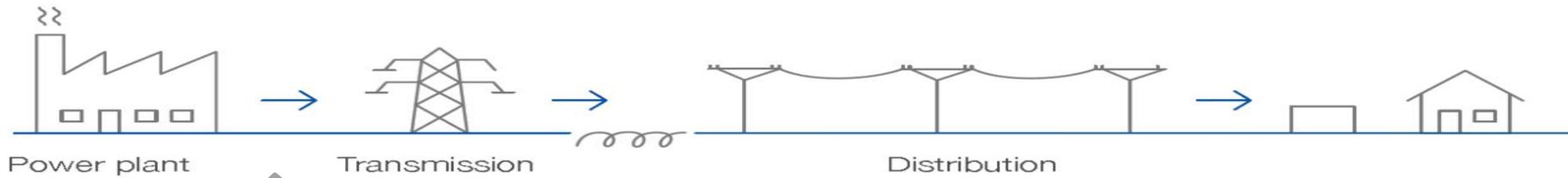
of power lines across Europe



The big challenge for distribution (and the reason we need **smart** grids)



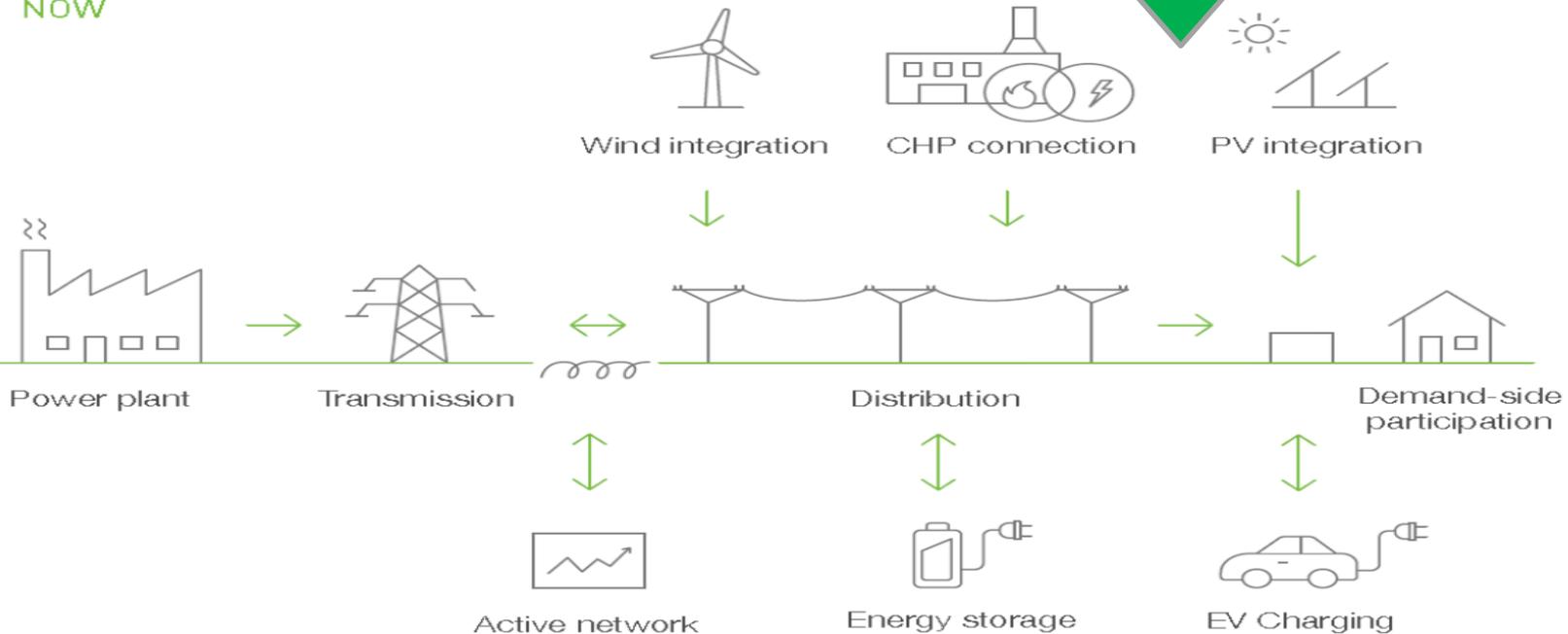
BEFORE



OLD BUSINESS

NEW BUSINESS

NOW



The big changes in the role of DSOs



Relying and promoting the role of market economy



Embracing and taking on new roles

Transforming the business model

Working in partnership with regulators, policy and law makers

Upgrading and modernizing assets and systems



Adopting new operating and planning techniques

The big changes in the role of DSOs

The digital utility of the future captures opportunities all along the value chain.



DSOs (Distribution System Operators) are becoming Data Centric companies

They are transformed from traditional grid operators to ICT-IT technology and data operators

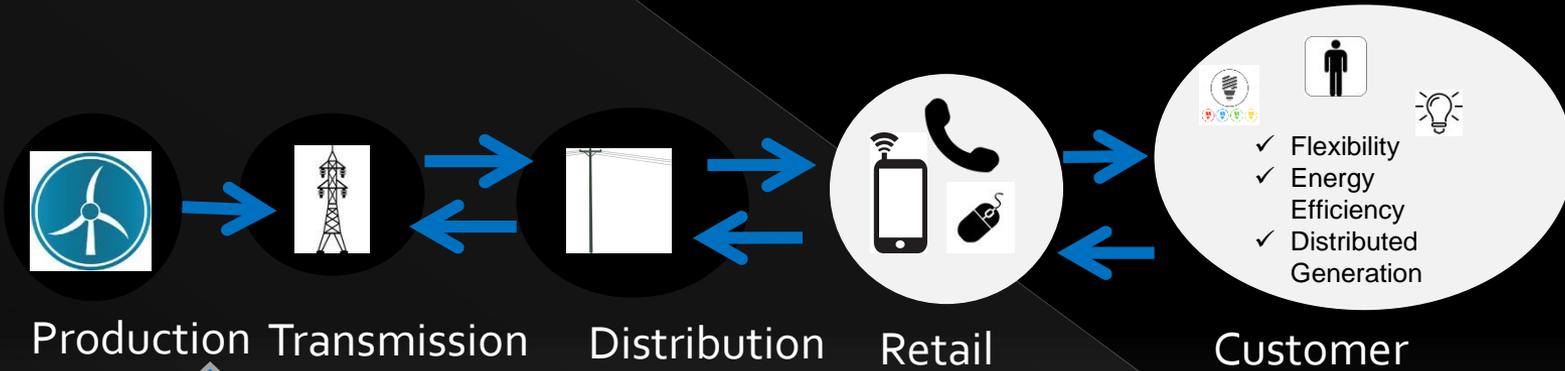
The New model of the market-The rise of the prosumer



existing model



Future model



The rise of the Prosumer

Interdependent relationship with the utility

Lower energy cost



For this transition and for a
successful new model
Technology is the key...
Smart Grids/smart meters



Smart grids open the way for effective **real time** network management and operation



- ability to predict and handle power infeed with bi-directional power flow to manage Intermittent and decentralised power production;
- evaluation of energy data to predict grid loads and anticipate bottlenecks. This allows for the optimisation of network investments;
- real-time processing of load data and generation, enabling the integration with demand/supply balancing service to optimise grid utilisation;
- new capabilities in predictive maintenance and self-healing concepts help to further reduce operational costs;
- predictive analytics based on sensor data, enabling smarter asset management with a fully digital allocation of spare parts, work, and logistics;
- long-term system planning and integration with other (regional) grids;
- hardware-in-the-loop testing that can use complex simulation coupled with actual hardware testing;

Furthermore Smart grids enable:



Digitalization in mobility and field operations, for example:

- digital support for grid operations, allowing very fast response, and/or allowing very thorough analysis of contingencies and their consequences;
- digital support for field technicians;
- digital business processes, replacing manual transactions in procurement, inventory management, invoicing and payment processing;

Digitalization in market facilitation, for example :

- meter-point operations to digitally connect to the consumer and enable value-adding services;
- collaboration with consumer and prosumer, consumers who produce their own energy, to reduce consumption and optimise network management;
- data-enabled transactions among DSOs, aggregators and supplier, aggregator and consumers, energy start-ups;
- fast transactions allowing close-to-real-time intra-day market closure for better integration of variable renewables in the wholesale market;

Smart Grids need smart meters



The EU aims to replace at least 80% of electricity meters with smart meters by 2020 wherever it is cost-effective to do so. This smart metering and smart grids rollout can reduce emissions in the EU by up to 9% and annual household energy consumption by similar amounts.

Smart meters should allow consumers to reap the benefits of the progressive digitalization of the energy market via several different functions. Consumers should also be able to access dynamic electricity price contracts.

A 2014 Commission report on the deployment of smart metering found: close to 200 million smart meters for electricity and 45 million for gas will be rolled out in the EU by 2020.

It is expected that almost 72% of European consumers will have a smart meter for electricity. About 40% will have one for gas.



Providing services for Real market interaction



Launching a Distributed System Platform that will allow, coordinate and manage:

- distributed generation
- energy sufficiency
- energy storage.
- electric vehicles
- demand response.

A dramatic change occurs in the way households and business interacts with the grid.
“Rise of the Prosumer”

It is a flexible, competitive platform that paves the way for developing numerous technologies and services and fosters participation of all market actors

It provides the appropriate interface for wholesale and retail markets interaction





The availability of huge amounts of data leads the digital transformation of energy and DSOs are steadily transformed in to data centric companies

Smart grid operators manage data and information flows through digital communication processes. DSOs manage **millions** of daily real-time signals through satellite, powerline communication systems, radio, fibre-optic lines, and other communication technologies.

Data management will continue being one of the key features of smart grid design, together with infrastructure for digitalisation and automation.



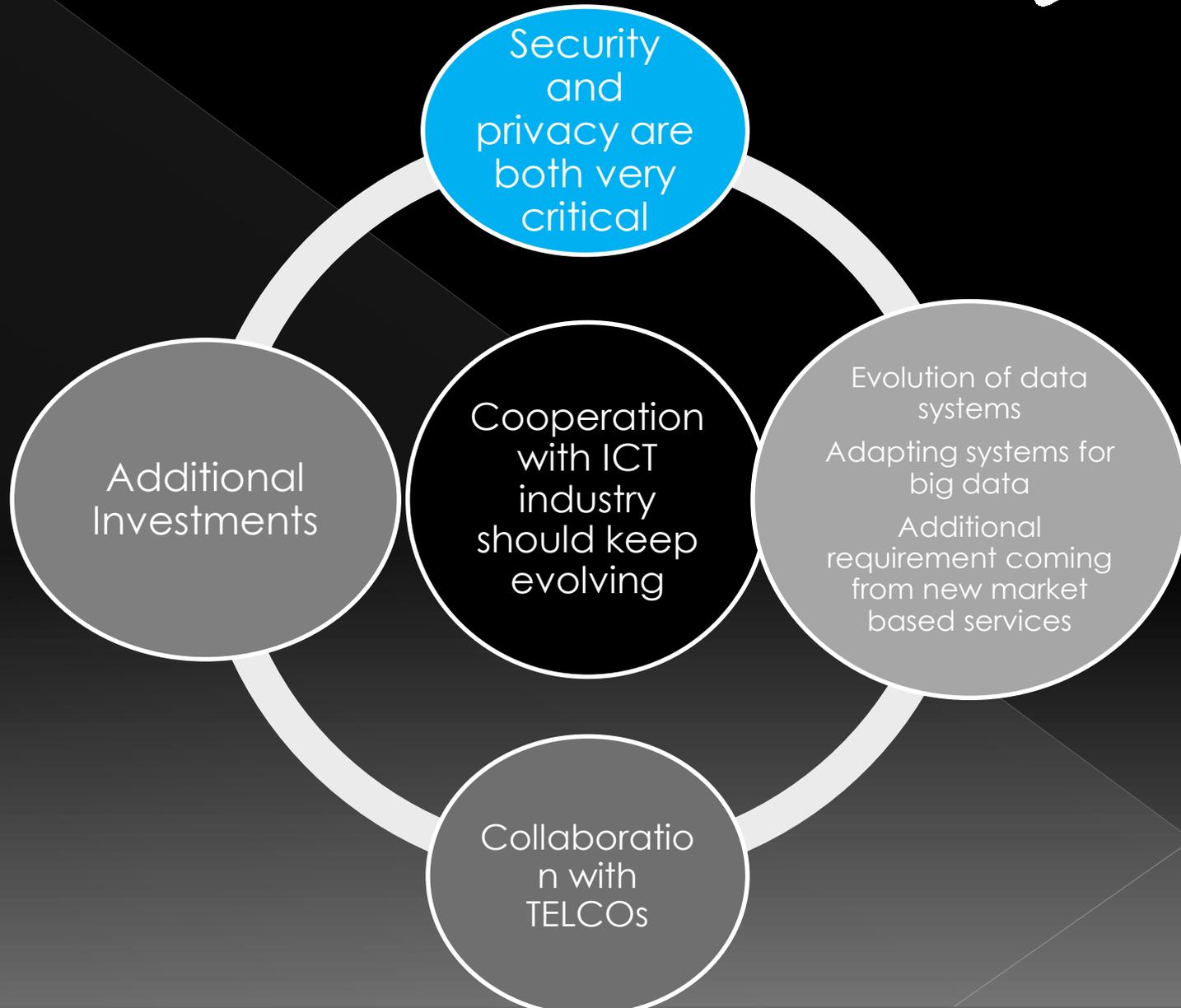
The big data challenge for DSOs



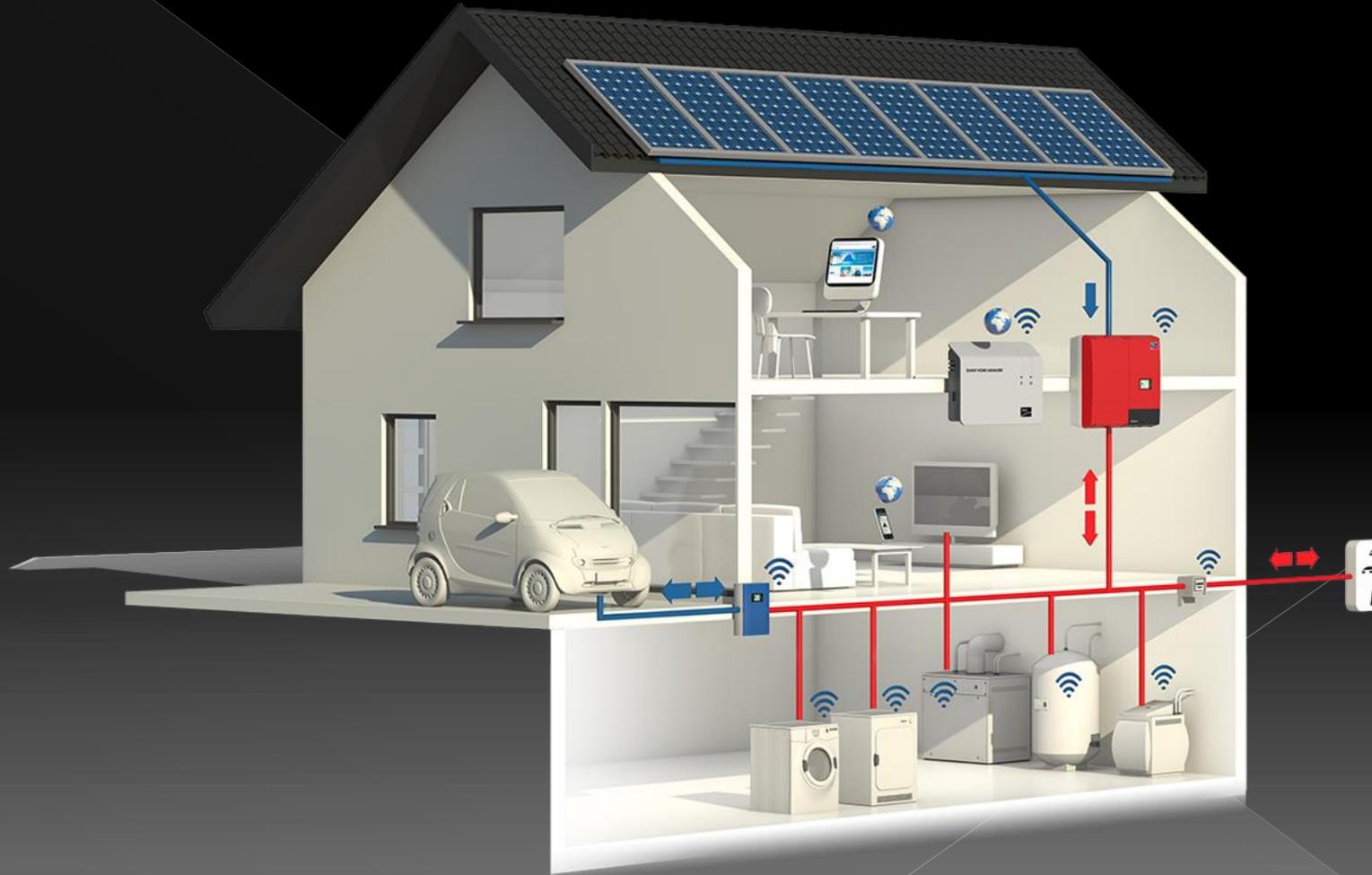
Data management must be fair, efficient, transparent, and non-discriminatory.

- Data management is key.. DSOs are now embracing the technical (active grids/systems) and commercial (demand side response, aggregation, local management of grid constraints, local balancing) changes needed to support the evolving energy market.
- DSO functions will have to be repowered so that DSOs can play an active facilitation role below transmission level across the market, thus guaranteeing system stability, preventing local interruptions, and enabling markets and services in a neutral and non-discriminatory manner.
- DSOs and energy regulators must ensure that residential customers are clear that their main relationship is with retailers, whilst recognizing that, from time to time, DSOs will have a direct relationship with residential customers for emergencies or other services such as new connections. More sophisticated or larger customers may sell their flexibility, either directly or through suppliers and aggregators, to DSOs in order to ensure grid stability.

The big data challenge for DSOs



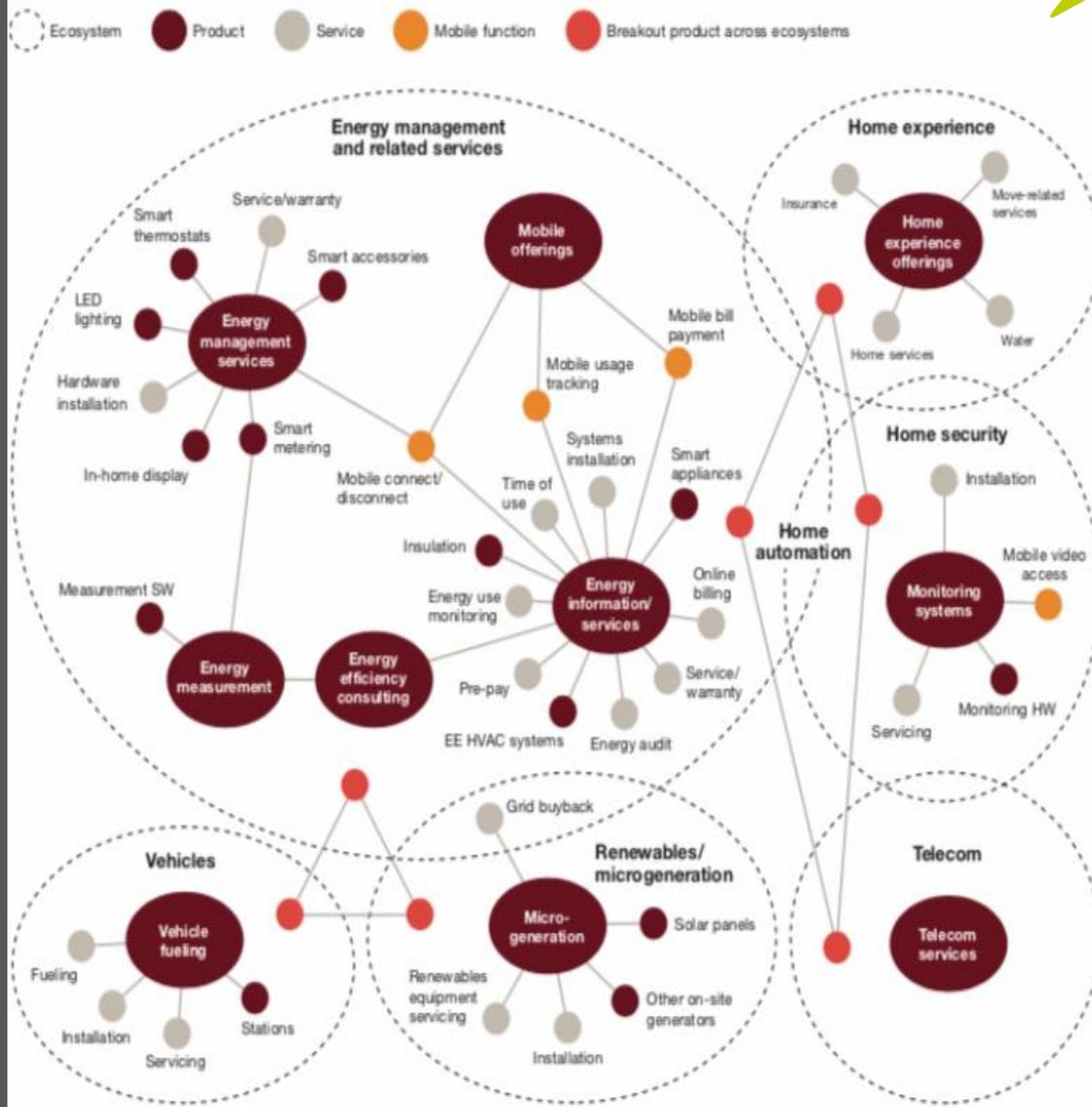
The digital transformation of the energy systems is a fact
The customer is at the center of this transition



The customer at the center of this new very complex energy ecosystem



Developments in power technology and home automation mean that the relationship between the customer and the way they manage their energy is now more fluid and far-reaching



Customers have choices around generating, storing and trading their own electricity as well as about energy management, efficiency, automation, monitoring and control. The battle is already on... A battle "to own the connected home"



The Greek DSO

Hellenic Electricity Distribution Network Operator

Who we are and what we do

A stylized icon representing a group of people, with several figures highlighted in blue.

7,000
employees

Delivering uninterrupted electricity to 7,4 million consumers across the country through Medium and Low Voltage networks.

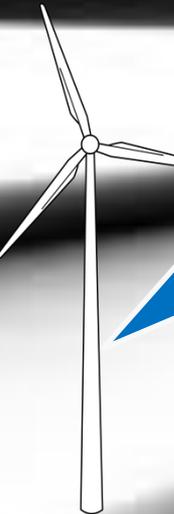
Managing the High Voltage networks in Attica and the Islands.

Our fundamental tasks are **to ensure:**

- The efficient **Operation, Maintenance & Development of the country's Distribution Network**
- The **management of the Non-Interconnected Islands electricity systems**
- **Unhindered access** to our Network for all energy consumers and dispersed generation
- The smooth operation of electricity supply market

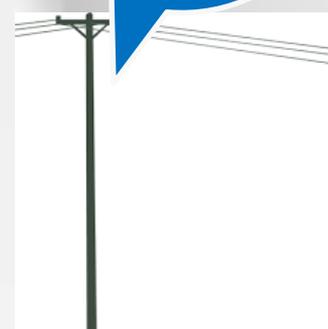
An icon representing a residential neighborhood with several houses.

7.4 million
customers

A stylized icon of a wind turbine.

RES

Capacity:
3,790 MW
Amount:
56,491

An icon representing a power line tower and cables.

Total
Network
Length
236,000
km

Who we are and what we do



- **Operation of Distribution Network**
- **Network's Inspection and Maintenance**
- **Faults restoration**
- **Provision of services to the users of the Network (consumers, producers, suppliers) at the offices**
- **Consumption metering**
- **New Connections of Consumers and Producers**
- **Network Development**



Network length: 6 times around the earth

RES connected to the Network



RES Interconnected & Islands	Amount	Capacity (MW)
PV Roofs	41,421	374
PV Net Metering	272	4
PV LV	12,857	942
PV MV	1,621	1,220
Small Hydro	104	189
Wind Farms	167	927
CHP	24	74
Biogas	22	52
Biomass	3	8
TOTAL	56.491	3.790

Non Interconnected Islands

(NII):

Amount of RES 5.098
Total capacity 483 MW
97 Wind Farms 323 MW
1758 PV 136 MW
3242 PV Roofs 24 MW
1 Small Hydro 0,3MW



Some of
our major
projects

HEDNO leads the Greek energy market transition by transforming the Hellenic Electricity Distribution Network into a Smart Network



Our strategy is built upon the implementation of new technologies



1.25 billion investments

HEDNO's Transformation Plan (2015-2020):

1. Modernize Attica **network Control Centers**
2. Establish Island **network Control Centers**
3. Modernize **network control** centers in the rest of the Country
4. Upgrade remote metering equipment of the regional networks
5. Set up a Geographic Information System (G.I.S.)
6. Set up a new web-based Customer Service System
7. Set up remote customer service systems
8. Upgrade Network Development Planning
9. Build infrastructure in Non-Interconnected Islands to implement NII Code
10. Develop "Smart Island", Pilot project – Further expansion plan
11. Apply remote metering for LV customers, Pilot project - Further expansion plan
12. Re-organize supply chain



Always emphasizing on innovation

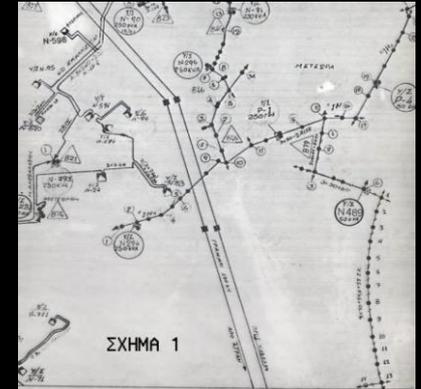


Interactive electronic representation of the Distribution Network (GIS)

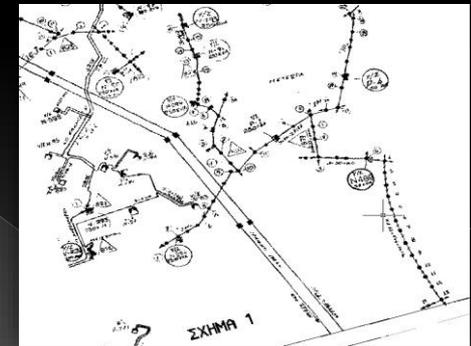


Expected benefits:

- Facilitation in **keeping, collecting, update and processing of geographical and descriptive data of the Network.**
- Speed in **exchanging** network maps and descriptive data between services.
- **Support – upgrade of Distribution technical activities**
- **Improvement in project monitoring.**
- **Improvement in users' service provision**
- **Contribution to monitoring of fixed assets.**
- **Contribution to facing crisis.**
- **Possibility of rapid and rational planning of works.**
- **Monitoring of indexes referring to energy quality and power supply time.**
- **Improvement of Administrative Information support of decision making.**
- GIS constitutes the **basis for many other future applications** (for e.g. Support of centers for faults reception, support of “Smart Grid” Transformation of the Scanned handwritten map into digital slide format applications etc.).
- **Increase of personnel productivity.**



Scanned handwritten map – as support material of field teams' orientation.



Transformation of the Scanned handwritten map into digital slide format.

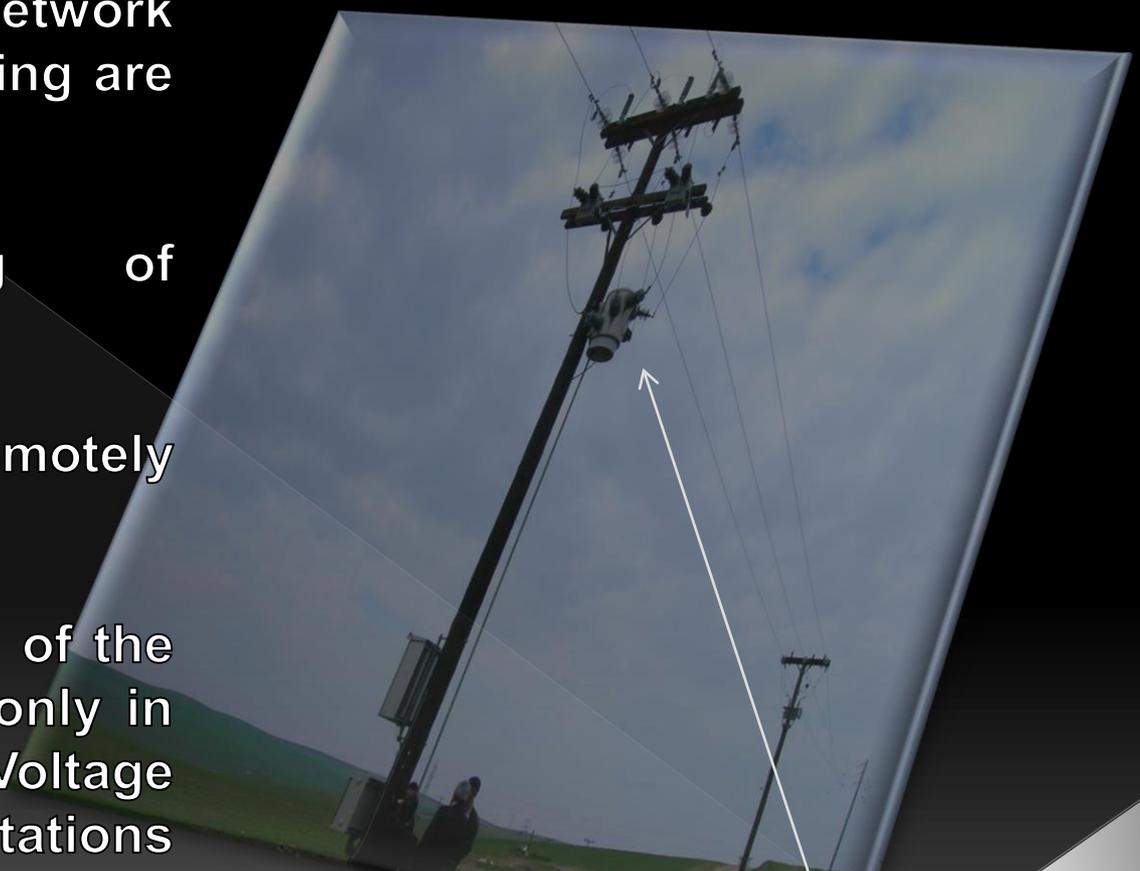
Distribution Network Control Centers



Through Distribution Network Control Centers the following are mainly realized:

- Constant monitoring of operation status and
- Execution of remotely controlled actions

In the significant elements of the Distribution Network, not only in the High to Medium Voltage decrease Substations (Substations 150kV/20-15-6,6kV) but also in Medium Voltage Networks.



Remote controlled Switch in the overhead MV Network

Future projects in Islands



1. Smart Island(s) initiative of HEDNO-RAE-Ministry of Energy
2. Storage+PV and new demand side management technologies
3. RES+desalination
4. Smart Street lighting
5. Kythnos island (revisited)
6. Electric Vehicles infrastructure
7. R&D platforms and international cooperation with relevant actors (DSOs-Retail market players-Telecom-IT-R&D community)

Responsible for the management of electricity systems in 32 Non-Interconnected Islands (NII)



Round up...



The potential that digitalization brings to the energy industry is vast

It is apparent that thriving in the new era may mean sailing into uncharted waters

DSOs face many challenges ahead of the maturity of smart grids, when large scale distributed generation would be integrated and the Big Data challenge.

More active grids will also require a more advanced monitoring and management of the grid, for which **innovation technologies are needed.**

New technologies not only give the opportunity to new players (aggregators, Energy Service Companies) to enter the market and to offer new products (shift load, energy efficiency), but also empower customers encouraging them to be active (enabling flexibility and demand response).

The future belongs to prosuming (producing with consumer input) and active energy management





We connect
People
Businesses
Infrastructures
Information
Technologies

*Thank you very
much*