R&D NESTER

Inovação na Energia

Nuno Souza e Silva, Managing Director – R&D Nester

ConvERSE, 11 de Maio 2018

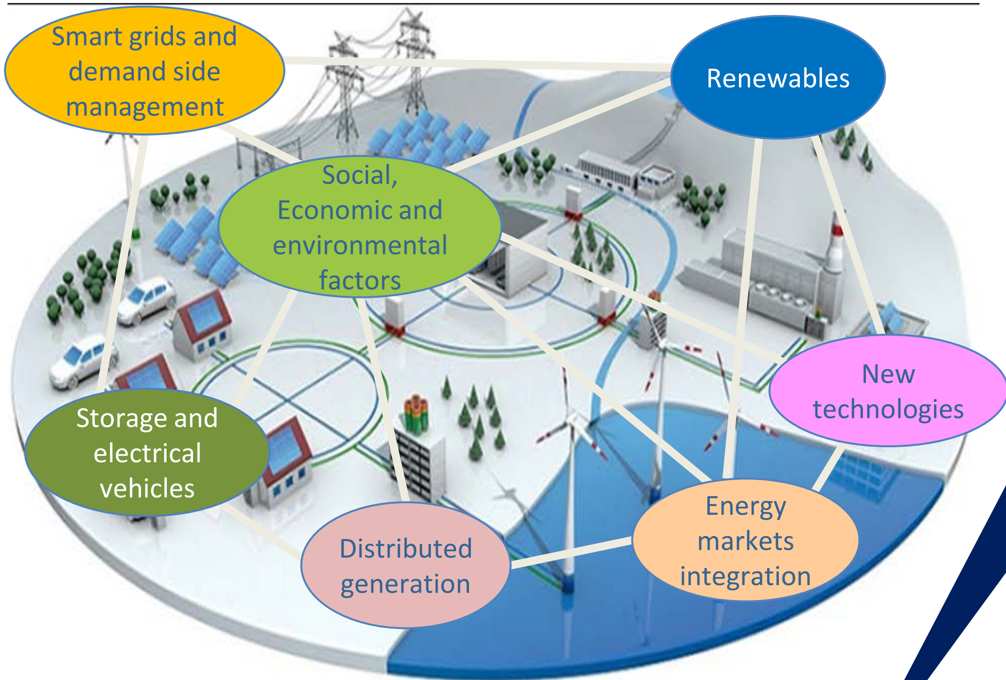
Presentation Content

- Network and System Operator goals
- Why the need for Innovation?
- Support for Innovation
- Innovation work being developed

3 key goals in current National and Regional Energy Policies

Security of Supply (SoS), Competitiveness and Sustainability

In a fast changing energy paradigm…



… 3 major goals prevail in every Energy Policy

Why the need for innovation?

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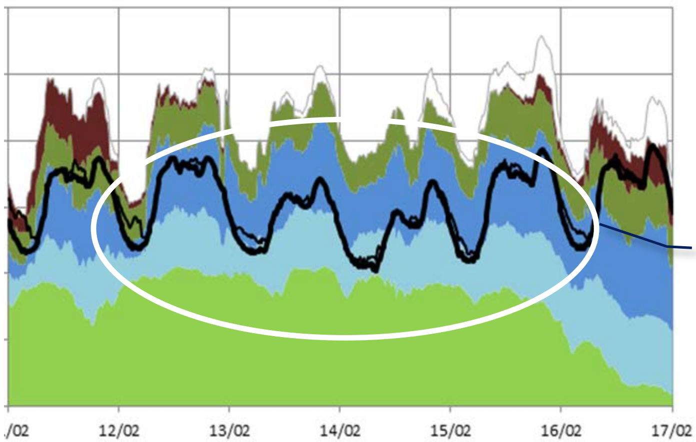
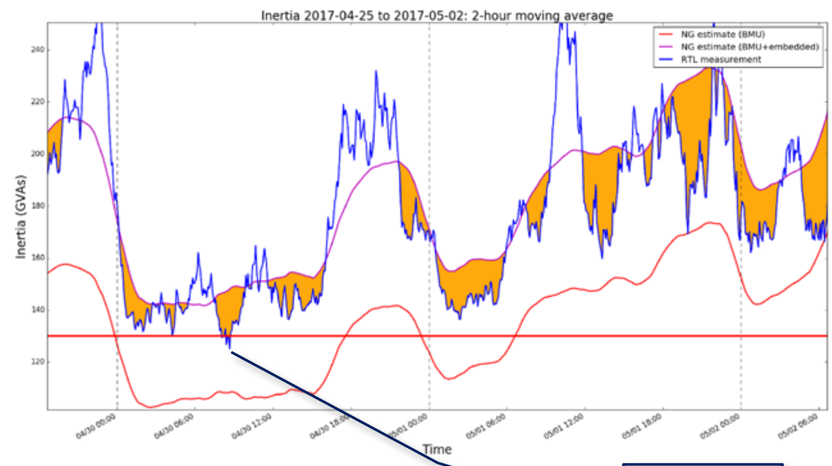
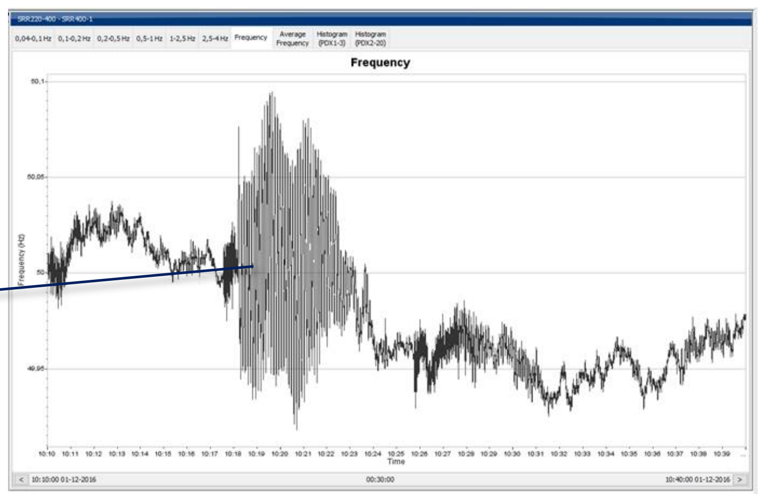
Some technical drivers:



4 consecutive days of 100% renewables generation



inertia in the system below the minimum



frequency oscillations in the network

- Increased % of renewables
- Increased electronics in the system
- Reduced inertia in the system
- Increased generation from consumers
- Inversion of energy flows
- Digitalization of communication and processes
- New technological assets in the system
- Integration into regional markets
- Integration energy vectors
- …

- Besides technical, drivers can be also economical, political, societal (estimulate new business models, players, efficiency, services for end users, …)

European Commission

OBLIGATION

Article 8 (5) of Regulation 714/2009:

*"The annual work programme….shall contain …**Research and Development activities**…"*

FINANCIAL ELIGIBILITY

Article 37 (8) of Directive EC 2009/72:

*"… approving the tariffs ensure that transmission and distribution system operators are granted appropriate incentive … support the related **research activities** …*

PROJECT THOR
Regulatory Funding of Transmission System Research and Development in ENTSO-E Countries
WHITE PAPER

Per Agrell
Daniele Benintendi

FINAL
2013-04-12

entsoe

Incentives for Innovation –
the TSO perspective

White Paper

February 2018

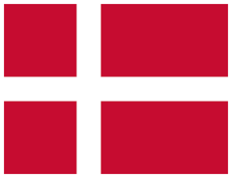
Contents

1) Scope and objectives
2) Challenges, barriers and the need of incentives
3) State of the art of type of innovation incentives
4) Considerations on the various incentive mechanisms
5) Portfolio of incentives options
6) Key Messages
7) Conclusions and recommendations
8) Appendix 1 Survey on current practices in Europe
Appendix 2 Summary of previous RDIC studies
Appendix 3 Literature references

- Need for innovation widely recognized internationaly

Support for Innovation

Some examples



"The TSO Energinet has to **ensure sufficient R&I activities necessary for the future** efficient and environmentally friendly transmission and distribution of electrical power (extract from the Law of Electrical Power Supply)."
"R&I costs of Energienet are covered partly as OPEX, partly as CAPEX and partly by external funding."
"The 17.5 M€ was a Public Service Obligation, **financed by the tariff** and is simply distributed on the yearly consumption of kWh (all electricity consumers contributed 0.004 DKK/kWh)."

Recently, the regulation on R&D activities has evolved with a specific part for regulated grid tariff dedicated to R&D. This part is detailed in the regulatory framework and foresees a dedicated 4 year budget for the regulatory period. Through this regulation, the French regulator (CRE) "**gives RTE the means in order to launch and realize R&D and innovation projects which are necessary for the building of future electric grids**". It guarantees the absence of barriers coming from the tariff to launch such projects.
For the period 2017-2020, 142 million Euros are dedicated **in the regulated grid tariff** to RTE R&D activities.

In the present configuration, R&D in power systems is mostly entrusted to few public specialized bodies, which are **paid by the tariff** through a specific component (€cents per kWh) which has remained rather constant along the years.

- Heterogeneous mechanisms to support innovation

Source: ENTSO-E

Support for Innovation

Some examples

The yardstick regulation creates an environment where TSOs are incentivised to perform better, both in the short and the long run. Costs for innovation are included in the total costs (totex) of the sector and are remunerated to the TSO through the yeardstick approach. In this way, the TSO can find their own balance in their degree of innovation and are able to optimise their choices.

Costs for R&D are treated as pass-through costs when they fulfill certain conditions, in order to avoid short term disincentives (~7 Million in 2016). It must represents a maximum of 0.3 % of the TSO's regulatory asset base.

There are two main mechanisms. Network Innovation Allowance (NIA) and Network Innovation Competition (NIC). Up to 0.7% of the allowed revenue under the NIA mechanism can be accessed. The NIC gives National Grid access to bid for a share of up to £ 30 M for large scale demonstration projects

- Heterogeneous mechanisms to support innovation. Not all countries provide incentives or support innovation explicitly.

Source: ENTSO-E

Innovation work being developed by R&D Nester

- Innovations aiming at reducing total system cost, reduce risk of operation, increase security of supply, allow increased penetration of renewables

- Benefits for energy system and consumer

Source: ENTSO-E

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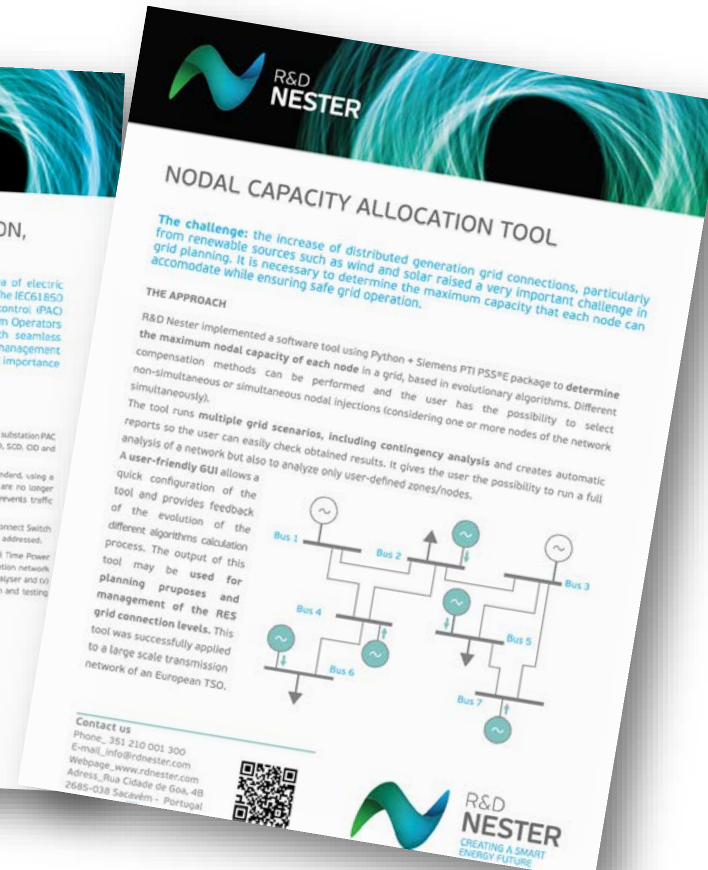

- Benefits for energy system and consumer

Source: ENTSO-E

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Consortium with partners from Portugal, Spain, France, UK

Interreg
Atlantic Area
European Regional Development Fund

FCT Fundação para a Ciência e a Tecnologia
MIT Portugal
INESC PORTO
IST-ID
MIT Massachusetts Institute of Technology
R&D NESTER
iTds
LNEG
ADENE

SusCity
Urban data driven models for creative and resourceful urban transitions

Global Energy Interconnection Development and Cooperation Organization
全球能源互联网发展合作组织

- Benefits for energy system and consumer

Source: ENTSO-E

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R&D NESTER

- Innovations aiming at reducing total system cost, reduce risk of operation, increase security of supply, allow increased penetration of renewables

BIG DATA OCEAN
Consortium with partners from
Portugal, Greece, Germany, UK, Italy, Cyprus, Israel

FLEXITRANSTORE
Consortium with partners from
Belgium, Greece, Portugal, Bulgaria, Cyprus, Hungary, Spain, Germany, France, Ireland, Slovenia, Croatia, Turkey

An Integrated Platform for Incresed FLEXIbility in smart TRANSmission grids with STORage Entities and large penetration of Renewable Energy Sources (**FLEXITRANSTORE**)

TDX-ASSIST
Consortium with partners from
UK, France, Germany, Portugal, Belgium, Slovenia

Coordination of Transmission and Distribution data eXchanges for renewables integration in the European marketplace through Advanced, Scalable and Secure ICT Systems and Tools (**TDX-ASSIST**)

SmartNet
(R&D Nester in Advisory Board)

OSMOSE
Consortium with partners from
France, Spain, Italy, Slovenia, Belgium, Serbia, Switzerland, Germany

Optimal System-Mix Of flexibility Solutions for European electricity (**OSMOSE**)

- Benefits for energy system and consumer

Source: ENTSO-E

Innovation work being developed by R&D Nester

- Innovations aiming at reducing total system cost, reduce risk of operation, increase security of supply, allow increased penetration of renewables

Participation and membership in selected international organizations and fora

Allows state-of-the-art information, networking and potential funding

EERA – European Energy Research Alliance

SMARTGRIDS

European Technology Platform for Electricity Networks of the Future

ETIP SNET

European Technology and Innovation Platform Smart Networks for Energy Transition

WG1 - Reliable, Economic and Efficient Smart Grid Systems
WG4 - Digitalization of the electricity system and Customer participation
WG5 - Innovation Implementation in the Business Environment

cigré – INTERNATIONAL COUNCIL ON LARGE ELECTRIC SYSTEMS

SC5 – Markets and Regulation
WG C5
WG B5

entsoe – Reliable Sustainable Connected

(supporting REN)

- Benefits for energy system and consumer

Source: ENTSO-E

Innovation work being developed

Some more real examples

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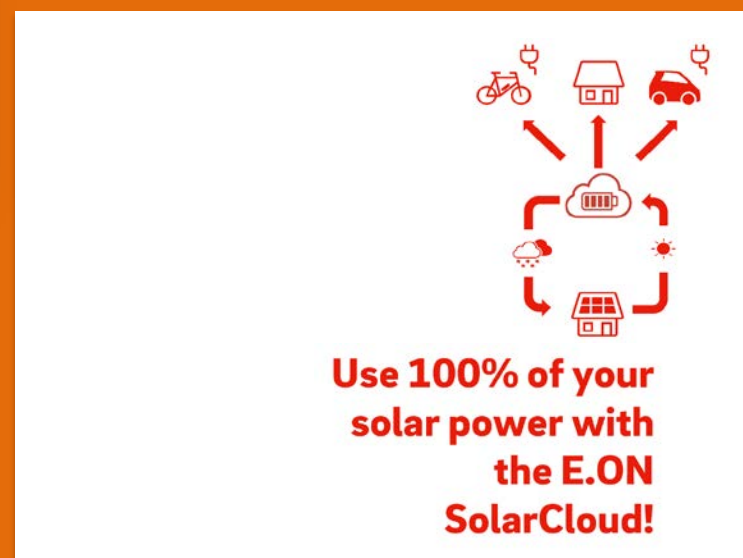
- Contributing to decarbonization, benefiting from digitalization, improving the customer experience, contributing to security of supply

NEC to supply 20MW ESS to Ørsted for grid stabilization

Published on: May 3, 2018 11:23 amBy: Jade Beevor

Danish renewable energy firm Ørsted, formally known as Dong Energy, announced on April 25 it is to install a 20MW lithium ion energy storage system in the UK after signing a deal with NEC Energy Solutions, a wholly owned subsidiary of NEC Corporation.



Innovation work being developed

Some more real examples

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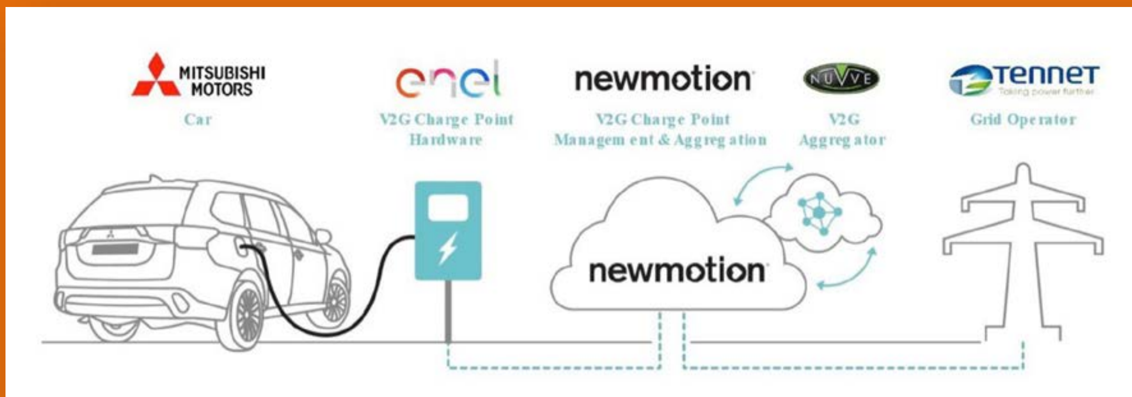

DEEP DIVE

How utility pilot programs are driving renewable energy integration

SCE and APS want to use electric vehicles, water heaters and demand response to help add more wind and solar to the grid.

50MW of Enhanced Frequency Response batteries go online in Britain from VLC Energy

VLC Energy has completed the 40MW Glassenbury project (pictured) and a 10MW battery park at Cleetor to fulfil two EFR contracts won in August 2016. Image: VLC Energy.


www.rdnester.com
CREATING A SMART
ENERGY FUTURE