Digital Energy

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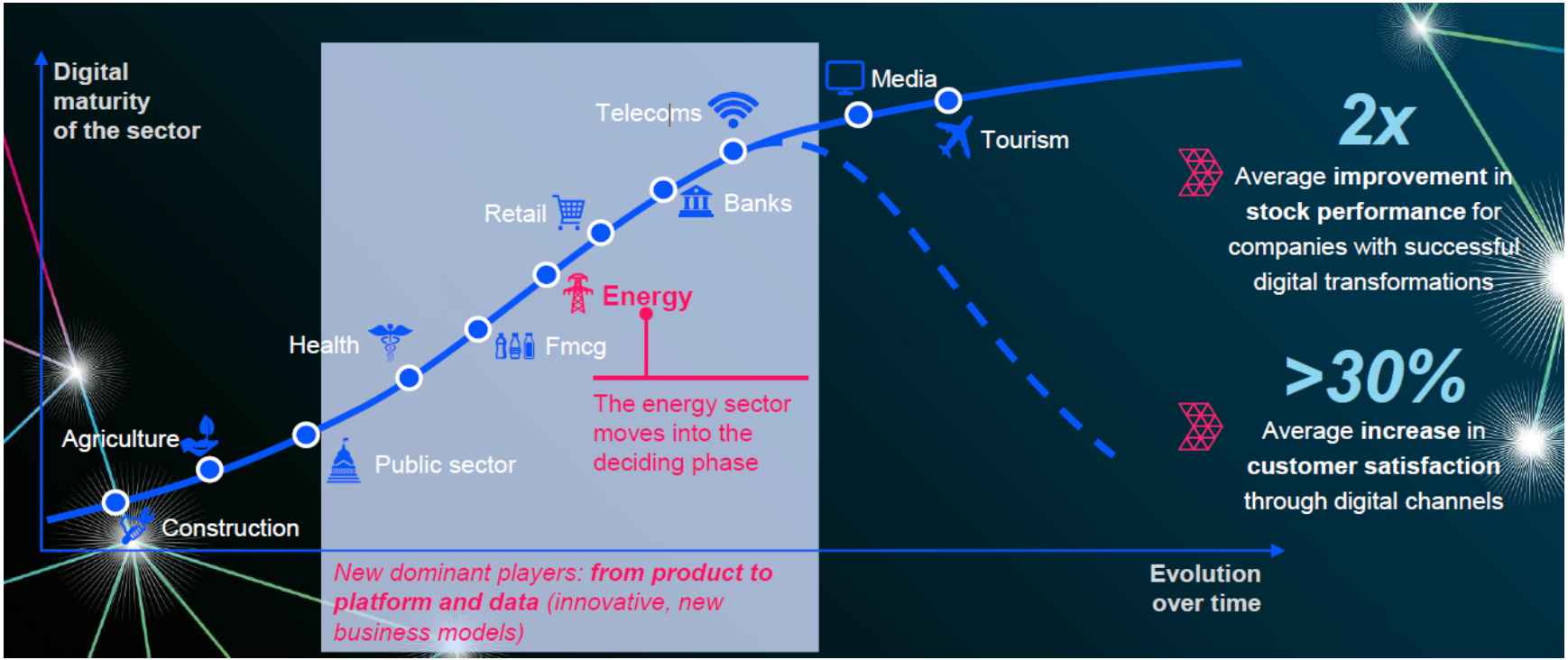
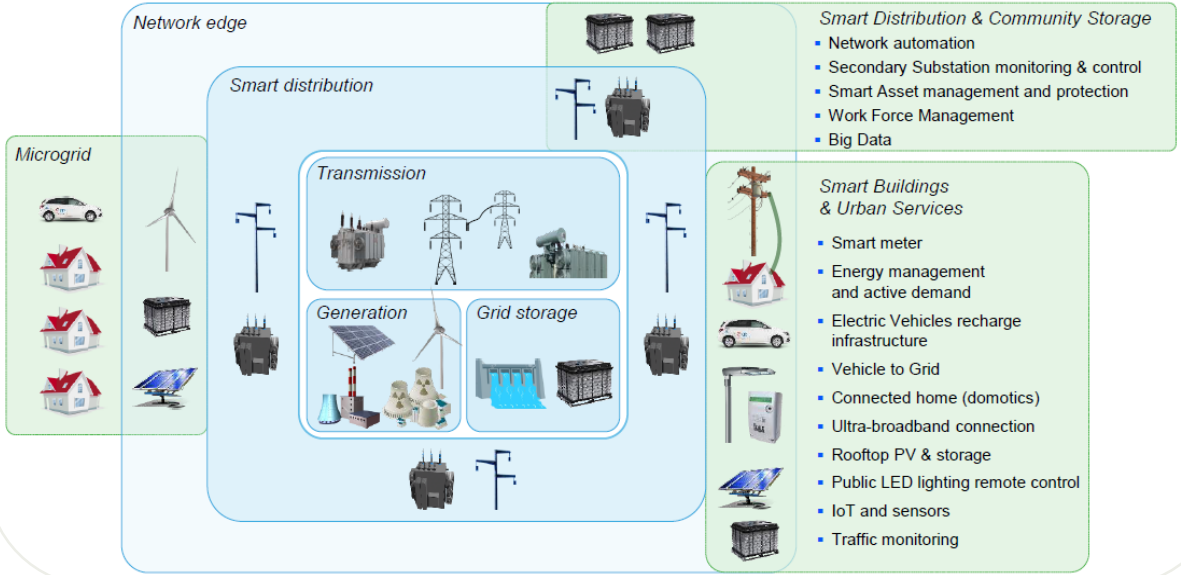
The energy industry has already started its digital journey



Digital is enabling a new energy paradigm

The transformation of the energy system

Digital assets



Other key levers

- Market design
- Digital literacy
- Cybersecurity

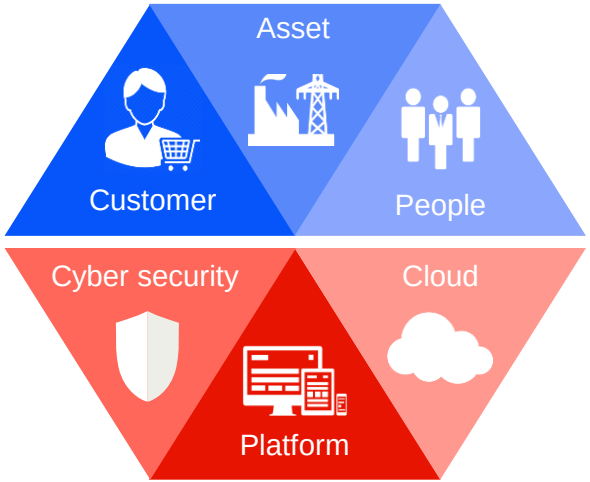
Additional efficiencies from the system: **smart buildings, transport, cities**

Source: BNEF, Opportunities in energy transition, December 2016

Enel's digital journey
€ 4.7 Billion of investments in 2017-19

Maximize asset value leveraging **data exploitation** and **core processes redesign**

Deliver **higher service quality** to customers through renewed approach(e.g., user-centric design)



Unlock people full potential by introducing new ways of working and enhancing employees' services

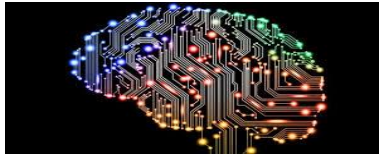
"Cyber security by design" to define and **spread secure system development standards**

Enhance data usage, storage, and shareability, **leveraging cloud technologies**

Innovate while **standardizing** core company's platforms

New business models to put the customer at the centre

Digital transformation is reshaping the boundaries of the electricity industry



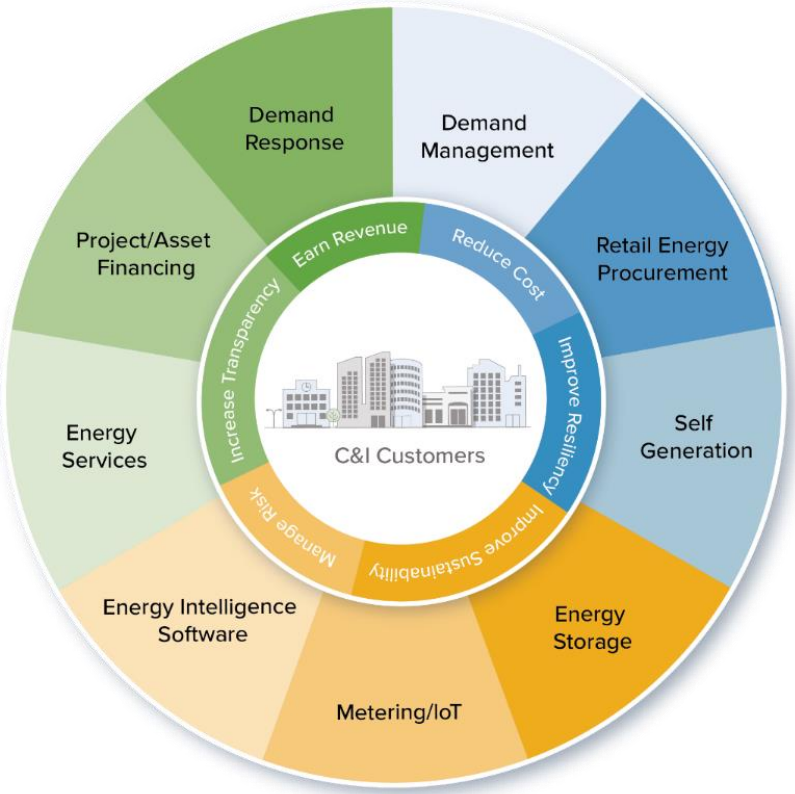
- **Machine learning and advanced data analytics** to enhance predictive maintenance, outages localization/resolution and achieve the next level of efficiencies across the value chain

- **New business models** to create and extract value in adjacent sectors (e.g. emission reduction in transport, cities, industry) and integrate new sources of flexibility into the electricity system

- **Open platforms** to enable new participants in the market: aggregation, demand response, peer-to-peer transactions

- **New interfaces** to enhance quality and efficiency of interactions, energy monitoring and control, remote management, etc.

Digitalization is enabling a fully-integrated energy management
Example: Commercial and Industrial customers



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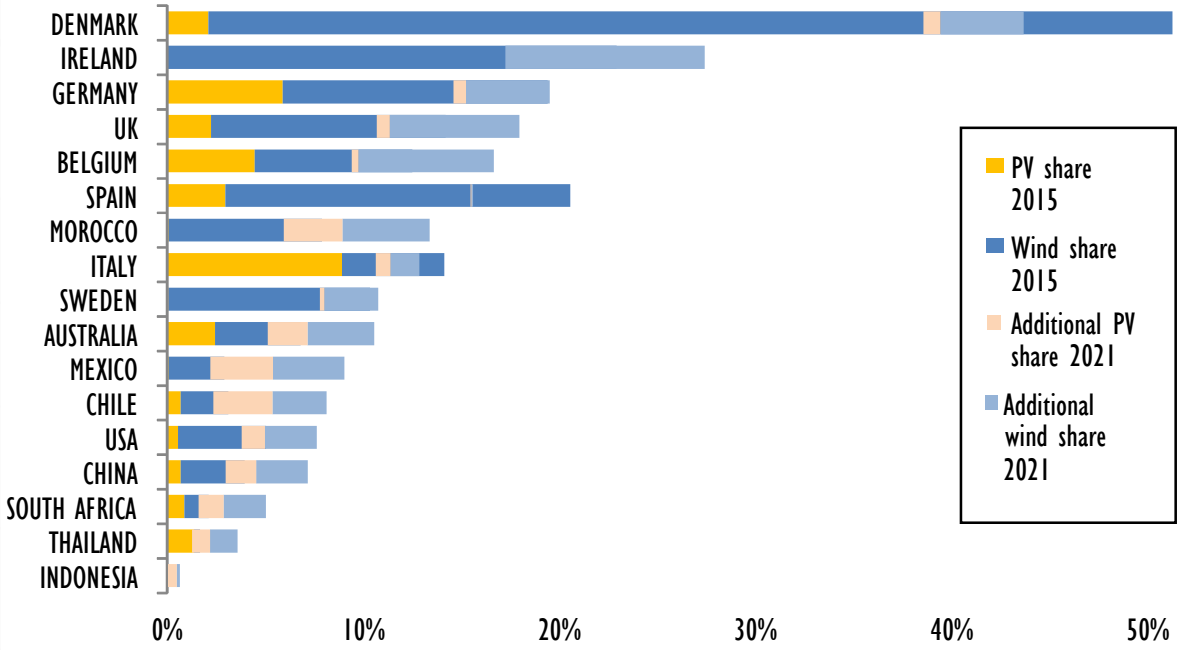
TODAY:

- 6,800 MWs of curtailable load in 10 countries
- More than US$1B in customer savings to date
- Streaming data from 14,000 enterprise sites
- Managing one million bills annually
- US$200M invested in technology

The more Europe deploys variable renewables, the higher the value pool for customer-led flexibility

Phase of VRE deployment	Description	Country Examples
1	VRE capacity is not relevant at the all-system level	Majority of countries, incl. Mexico, Indonesia, South Africa
2	VRE capacity becomes noticeable to the system operator	Austria, Brazil, India, Sweden
3	Flexibility becomes relevant with greater swings in the supply/demand balance	Italy, Greece, Germany, Spain
4	Stability becomes relevant. VRE capacity covers nearly 100% of demand at certain times	Ireland, South Australia, Denmark
5	Structural surpluses emerge; electrification of other sectors becomes relevant	
6	Bridging seasonal deficit periods and supplying non-electricity applications; seasonal storage and synthetic fuels	



VRE = Variable Renewable Energy
Source: IEA, Medium Term Renewable Energy Market Report, 2016 and Status of Power System Transformation 2017

The digital journey is deeply changing the business model of electric utilities

Enel → enel

From selling commodities…

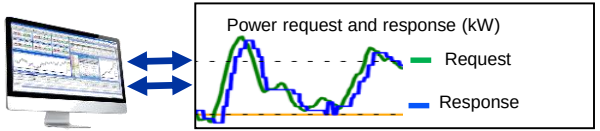
Owning all Generation Assets

Intelligence as a Cost to support the Business

…to providing solutions

Managing Assets for third parties

Intelligence as Source of Revenues: Aggregators and Vehicle to Grid



Acquisitions and Collaboration with Innovations Hubs and Startups

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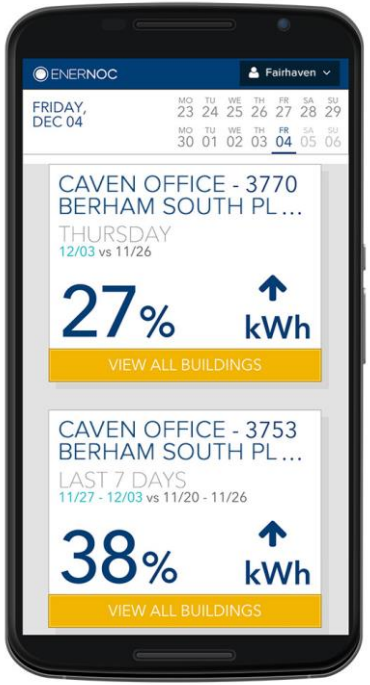
World largest demand – response operator, based in US and operating in 11 countries. Acquired by Enel



How Europe and national institutions can make it happen

Support digital networks to enable the digital transformation

Roll-out of enabling technologies should be facilitated to foster digitalization (smart grids, smart meters, fiber optics, 5G…). Openness and interoperability standards have to be ensured

Empower customers in smart ways

Clear information, proper tools and efficient access to data while respecting privacy are needed to allow customers to be active players in the future markets, while participating on a level playing field

Ensure an inclusive digital society

Transition towards the digital society requires digital skills and mindset. To ensure a smooth transition, private and public sector should maximise the joint effort to ensure diffusion of digital competences

Ensure cybersecurity

Cyber-risk needs to be addressed in a dynamic and systemic way. The future cybersecurity certification framework should make all stakeholders (including ICT providers) accountable to reduce cyber-risk

Support an innovation ecosystem to accelerate digital technologies

Access to finance is key to support innovation both in the start-up and scale-up phases. New funding programs shall accelerate digitalization taking the best from startups, large companies, venture capitals, etc.