Potential & perils of HEMS

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Development of HEMS

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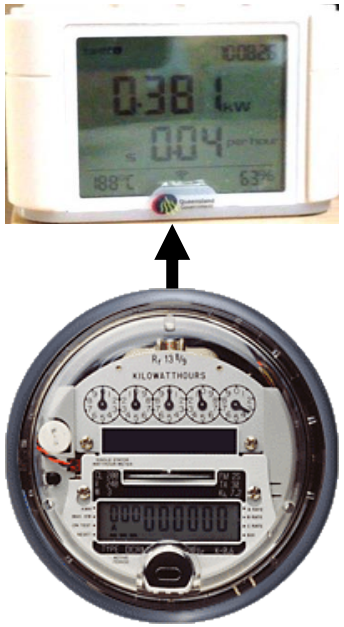

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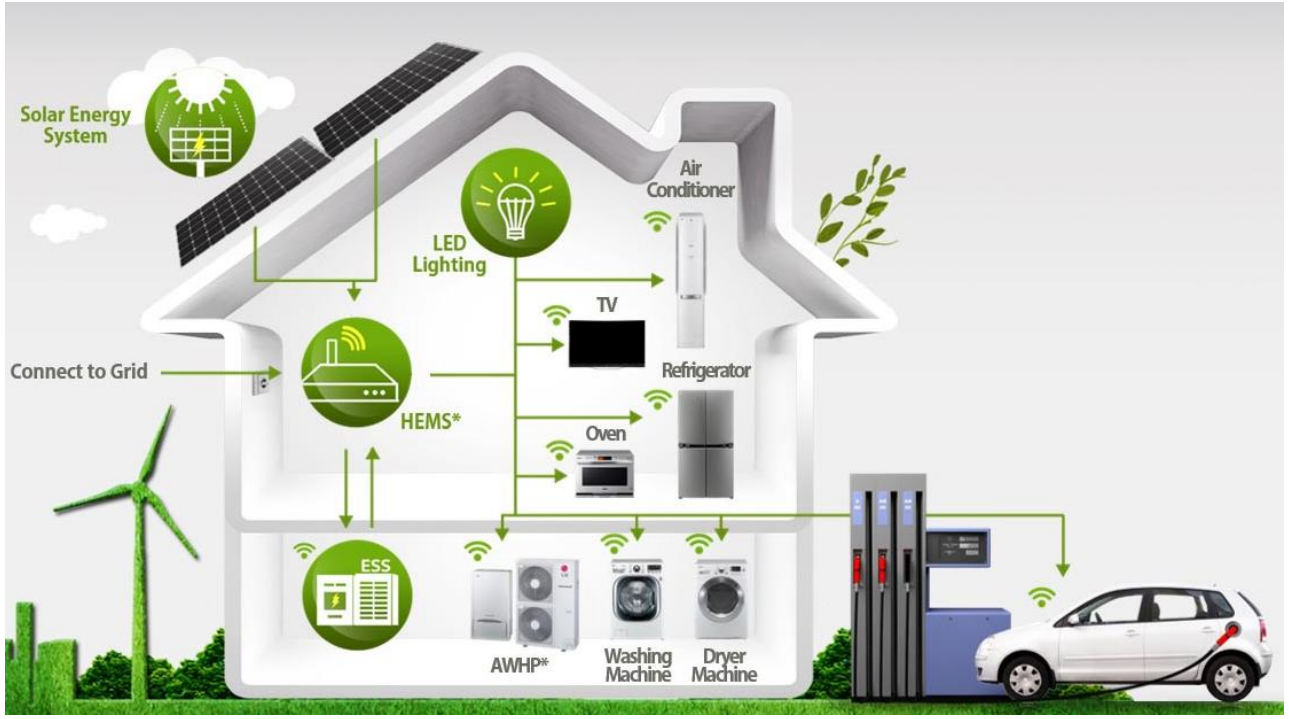
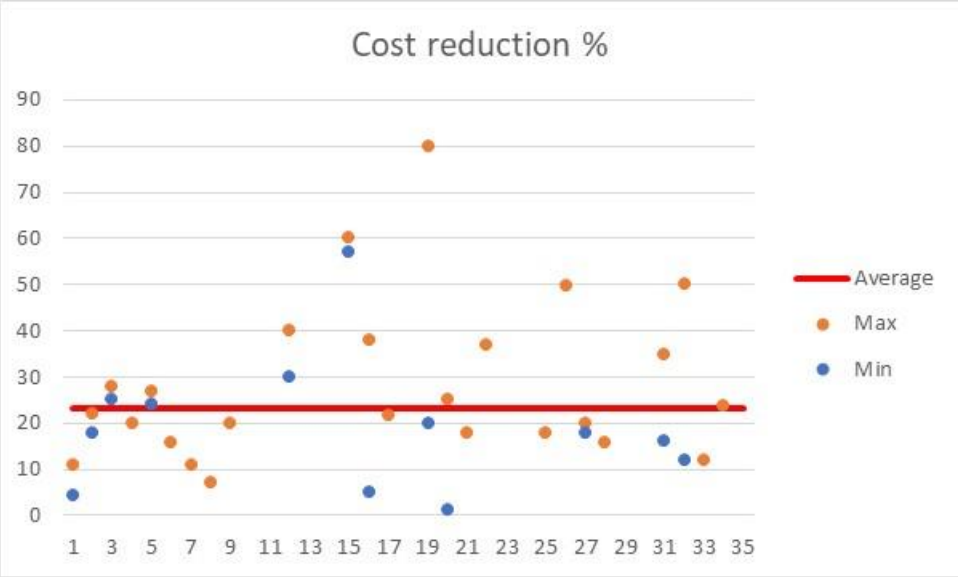
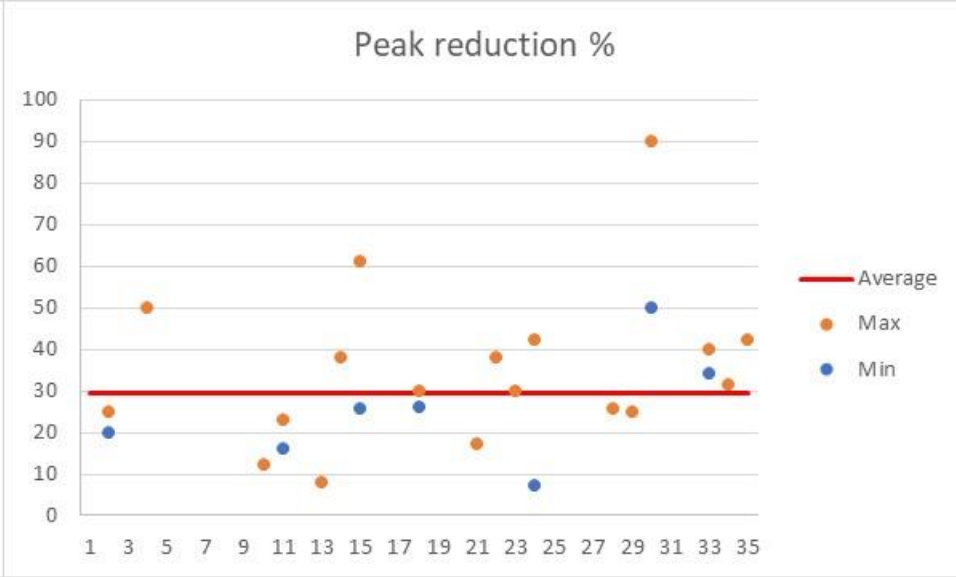


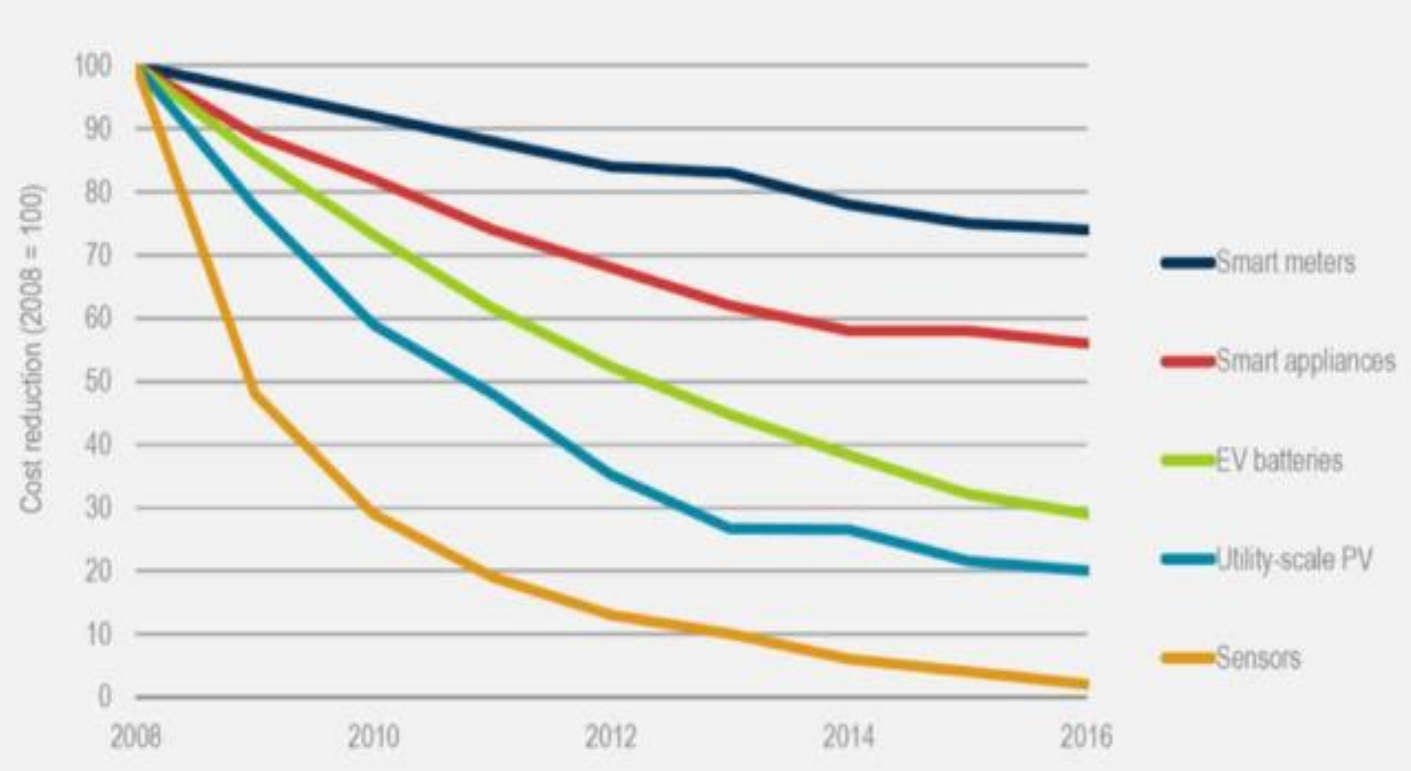
HEMS benefits





- A review of 36 studies of the benefits of HEMS
- found average cost reduction 23.1%
- reduction in peak demand of 29.6% (Beaudin and Zareipour, 2015)

Unit costs are driving uptake

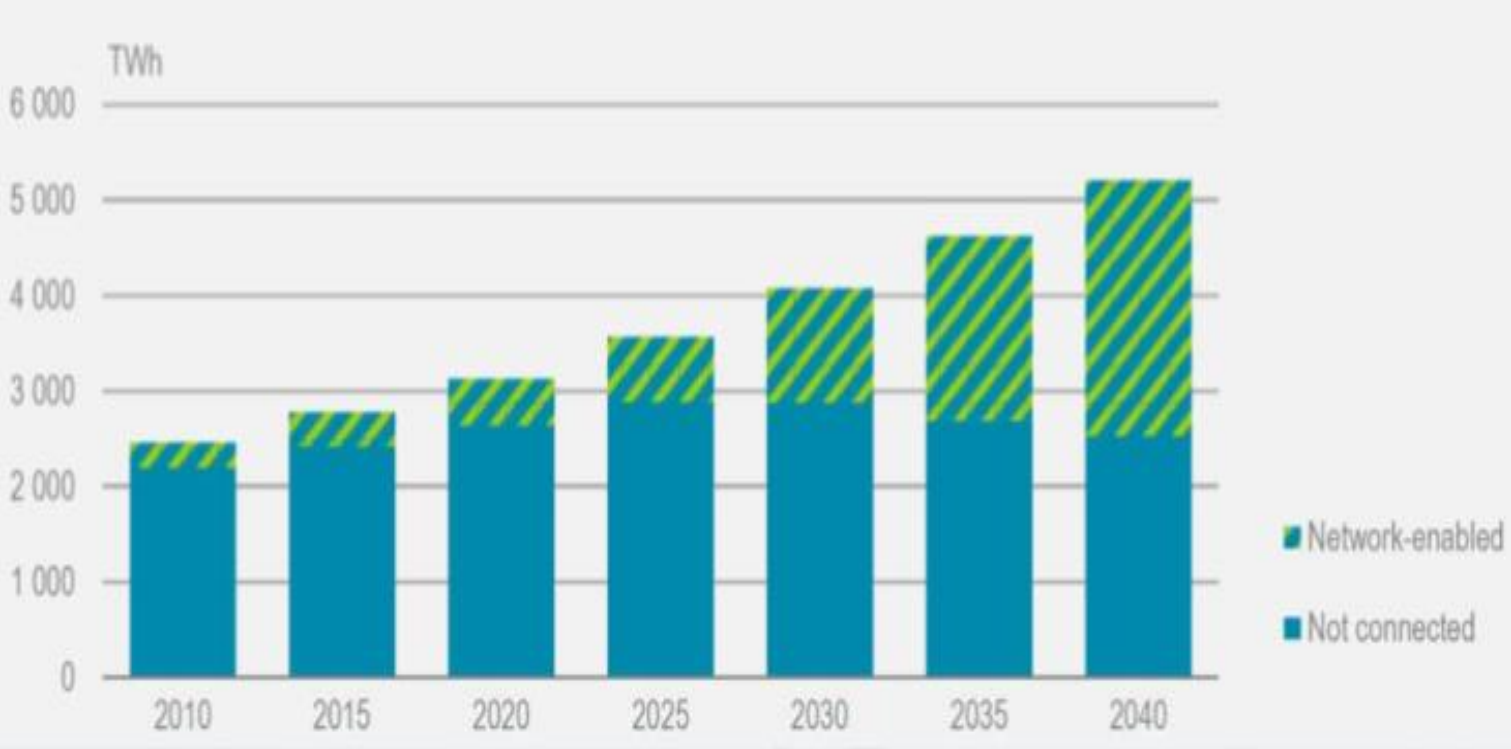


Unit costs of key emerging electricity technologies. Source: IEA Digitizing Energy Report

- Smart appliances to reach $61 Billion globally in 2019
- Smart home market to be nearly 1.3 billion devices by 2022
- 10% of homes will be ‘smart’ by 2025
- 100 million devices with Alexa installed have been sold
- 28,000 smart home devices compatible with Alexa - made by more than 4,500 different manufacturers
- one billion Google Assistant compatible devices in 2019

Source: IDC, MT Newswires

Growing demand and opportunity for optimization



Household electricity consumption of appliances and other small plug loads. Source: NIST 2018

Security concerns

Amazon's Alexa recorded private conversation and sent it to random contact

The company, which has insisted its Echo devices aren't always recording, has confirmed the audio was sent

▲ An Amazon 'Alexa' Echo Dot device

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Author:
Tara Seals

August 21, 2018
/ 12:58 pm

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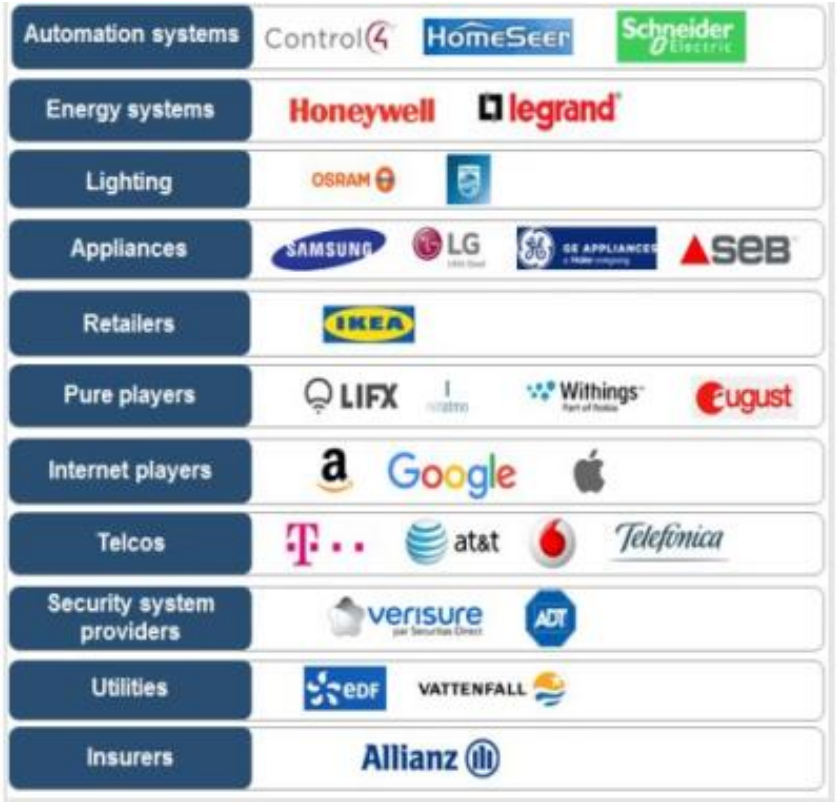
Securing HEMS

- Secure Communication Protocol - secure encrypted communication protocols e.g., DTLS, TLS/SSL, and HTTPS.
- Mutual Authentication Between Plugs and Servers
- Intrusion Detection System - to identify extensive scanning attacks
- Anti-Bot Mechanisms – e.g. CAPTCHA
- Data Integrity - Message authentication codes.

Potential for fragmentation

Wi-Fi, ZigBee, Z-Wave, WeMo, Bluetooth, Thread



Smart Plugs manufacturers: Belkin, Sonoff, TP-Link, Edimax, Wemo®, Xiamo, Anker, iHome, GE etc

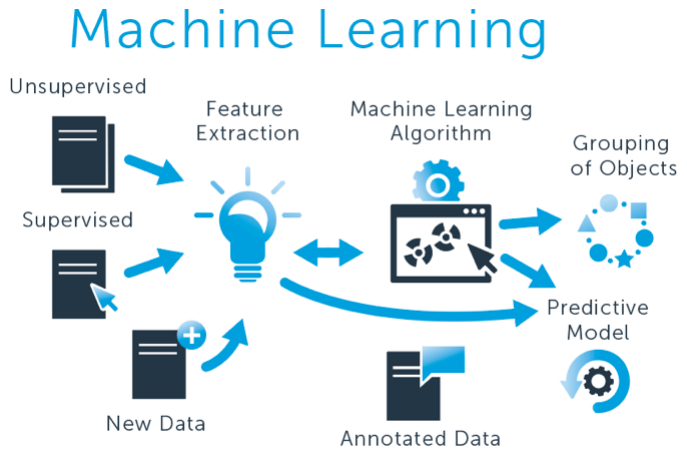
Categories of smart home element suppliers. Source: European Commission.

Automation & standardization

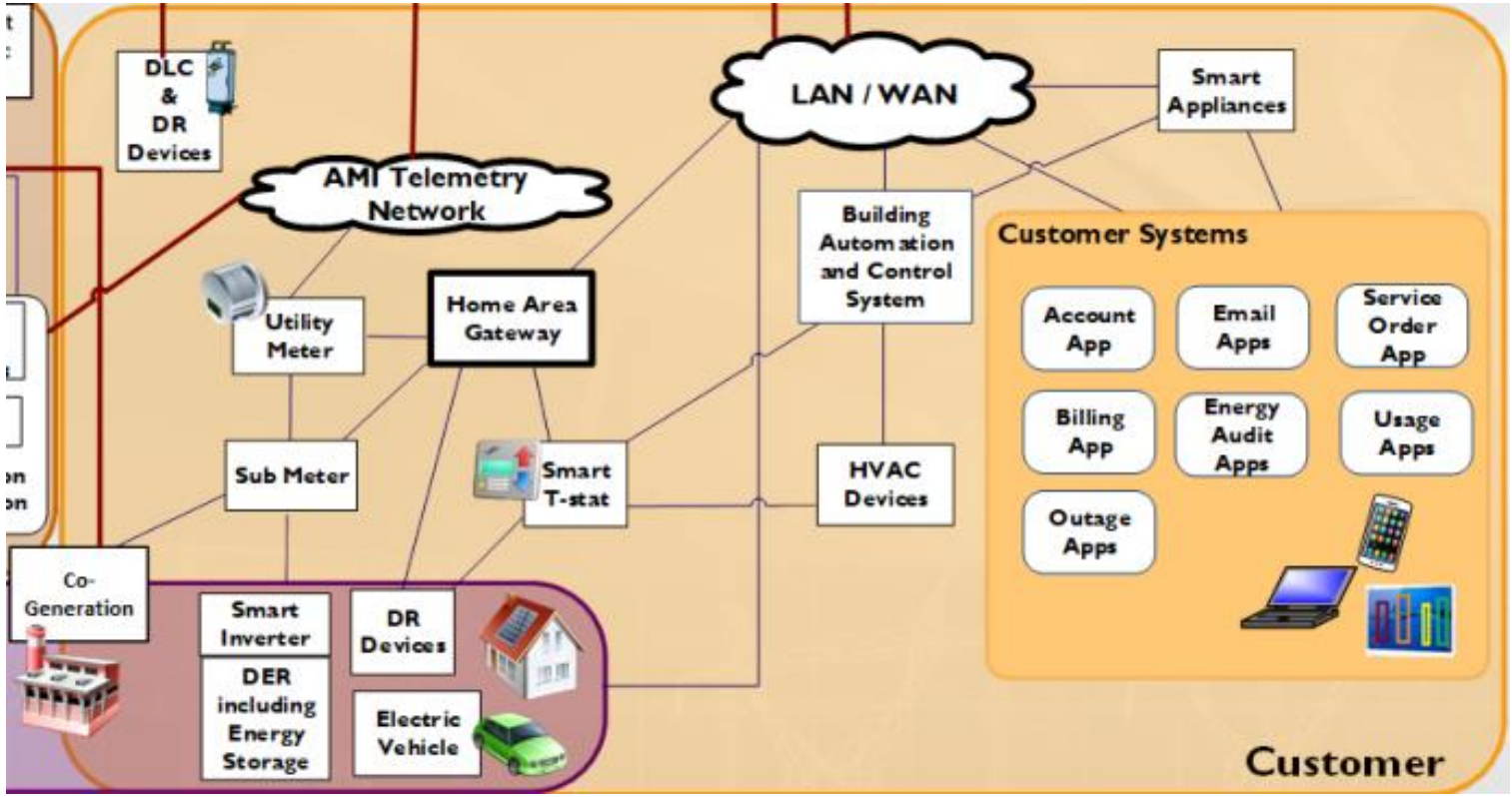
NIST Special Publication 1108r3

NIST Framework and Roadmap for Smart Grid Interoperability Standards, Release 3.0

- Automation utilizing ML, AI and M2M communication to manage the expanded data requirements and achieving optimization benefits.



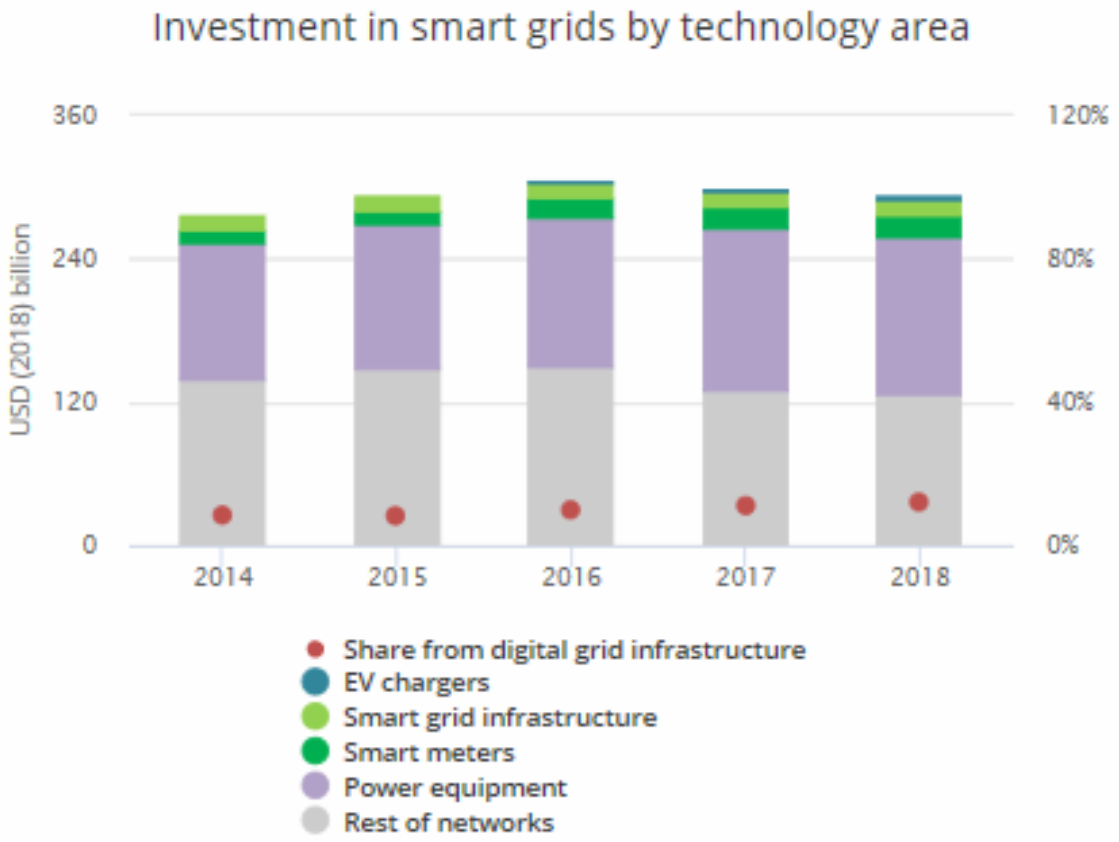
Digitalization behind the meter



Emerging household ecosystem. Source: NIST

- Focus on Intelligent distribution systems incorporating improved controllability and empowered customers
- Operations and intelligence across a diversity of household ecosystems

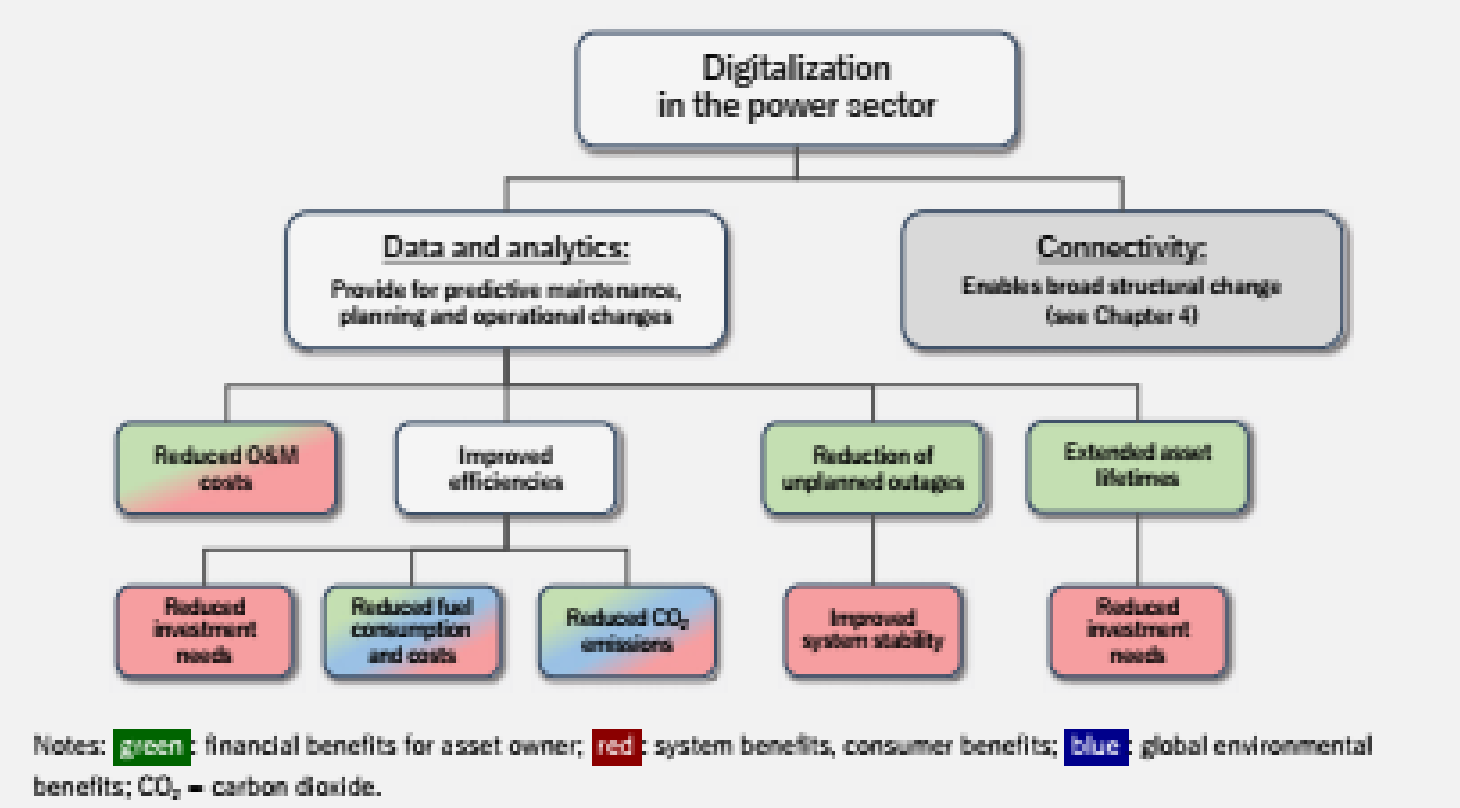
Smart grid investment required



- Smart grid investments rose 10% in 2018, however investment in these technologies remains low compared to investment in traditional infrastructure

Investment in smart grids by technology area. Source: IEA

Digitalization beyond the meter



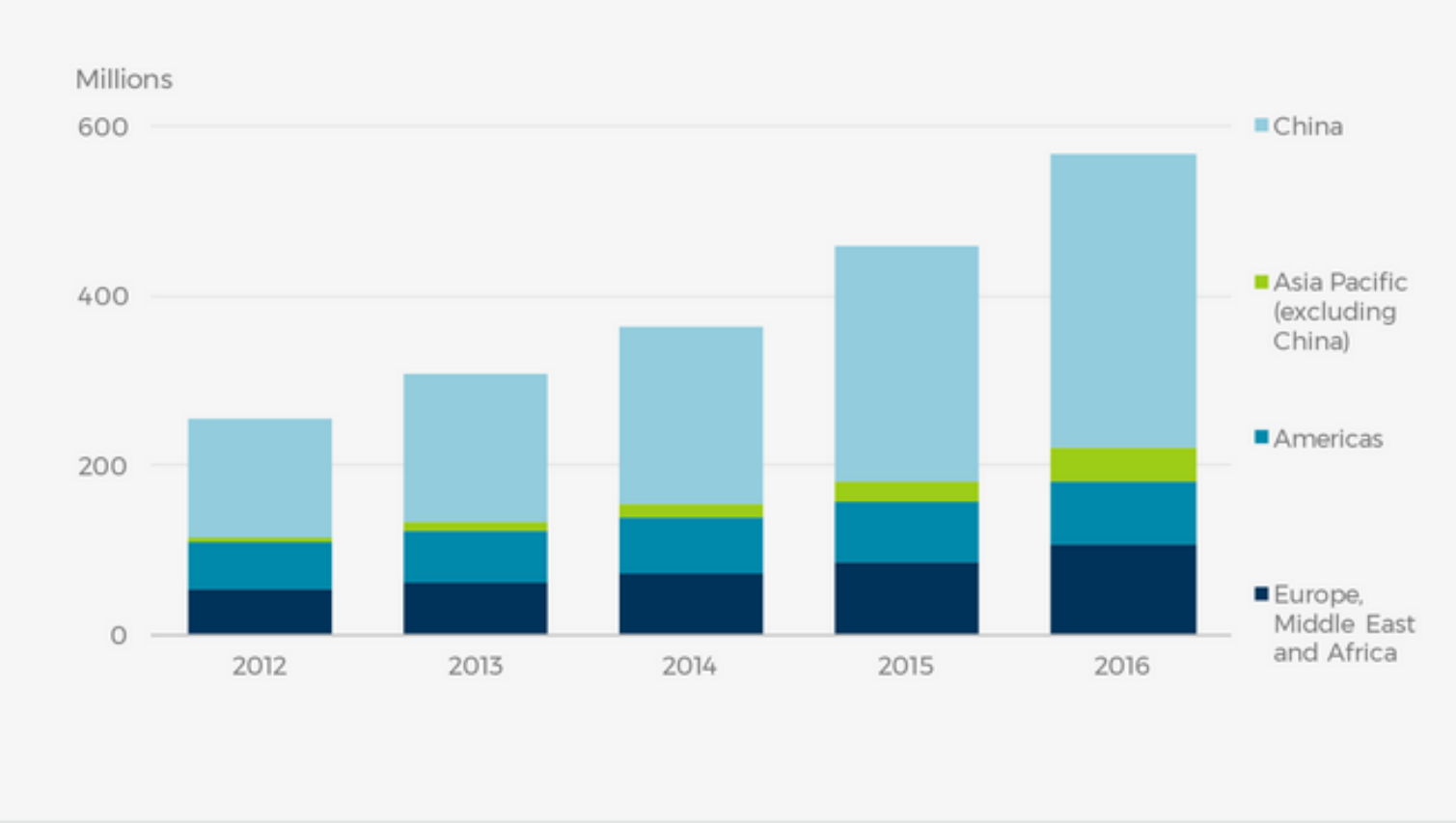
- Digitalization can benefit power sector owners, consumers, the wider electricity system and the environment

Impact of digitalization on electricity sector assets. Source IEA

Addressing complexity through distributed intelligence

- Layered intelligence throughout the grid
- Can occur at many locations, node and grid edge
- Reduces data transported
- More effectively managing the scalability associated with field devices

Smart meter roll-out



Acceleration of smart meter installations. Source: IEA

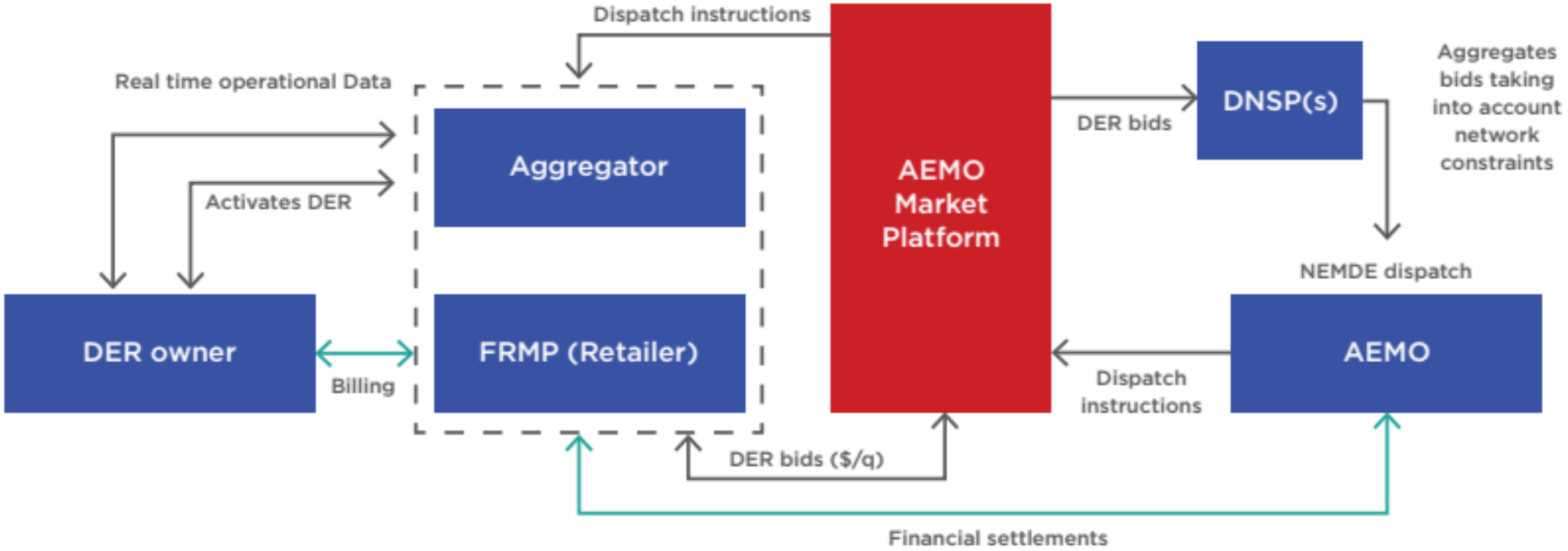
- Smart meter roll-out a proxy measure of smart grid enablement
- In Australia there are roughly 3.3 million smart meters installed across the NEM.
- 2.8 million are in Victoria.
- 13.6 million meters in total, accounting for less than a quarter of all electricity meters

Smart grid readiness

- Australia lagging developed economies in smart grid preparation
- Despite rapid PV adoption, monitoring, control and communications that would allow effective network optimization are required

ETI 2019 Performance/Readiness matrix by country. Source: World Economic Forum

Reconfiguring the NEM



Proposed AEMO central platform. Source: AEMO Integrated System Plan

Thank you