

Digital trends in the electricity industry

Share this page:



Utilities are under pressure to decarbonize and decentralize; digital technologies can provide the energy industry with the tools to respond to these shifts.

Utilities are under pressure to decarbonize and decentralize; digital technologies can provide the energy industry with the tools to respond to these shifts.

In this article, we assess how industry trends are bringing decarbonization and decentralization to the fore, and how advances in technology are providing the electricity industry with the digital tools to respond to these changes.

Macro and industry trends

Growth in developed markets is slowing and becoming decoupled from demand.

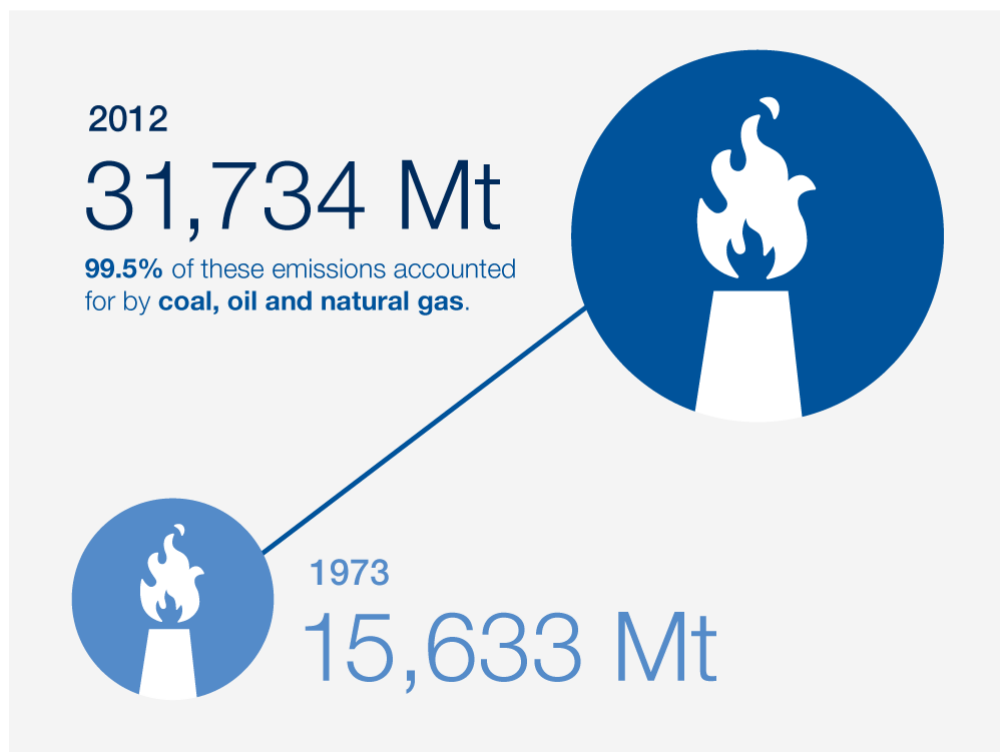
Electricity consumption in the United States and Europe represents about 40% of global demand, but has been declining in both regions in recent years. In contrast, energy consumption in the rest of the world grew by 5.1% from 2007 to 2012, driven by a higher rate of economic growth in emerging economies.

While the nature of this trend is uncertain in the longer term, in part due to the growth of decarbonized electrification and its potentially increased uses, such as in transport, it is clear that utilities must act now to decouple their revenue growth from future electricity demand in developed markets. With the potential of cleaner energy supply coming from renewable energy, and the surge in shale gas in North America, utilities are in a position where they must evolve their supply mix and innovate to protect their customer base.

The energy industry is under pressure to decarbonize.

More than 75% of global energy supply currently depends on nonrenewable sources such as coal, oil and natural gas, which contribute significantly to carbon dioxide (CO₂) emissions (see Figure 1).^{1 2}

Figure 1:
Growth in global CO₂ emissions from energy
(1973-2012, Mt)



There is consensus on the need to reduce carbon emissions. For the first time, there is a legally binding and universal agreement on climate, with the aim of keeping global warming 'well below' 2°C, with countries striving for 1.5°C above preindustrial levels.³ Almost 200 countries took part in the 21st UN Conference of the Parties (COP21) in December 2015, with agreement that much greater emission reduction efforts are required. The onus will fall on utilities to look beyond conventional generation to more sustainable fuel sources.

Rapid technological development makes decentralization possible.

Digital technologies are increasingly being applied to energy infrastructure, with consumers and businesses adopting distributed generation and storage solutions. With the declining cost of renewable technologies, including batteries that are being scaled rapidly by companies such as Tesla Motors and Panasonic, generation is being transformed. GE estimates that annual distributed power capacity additions will grow from 142GW in 2012 to 200GW in 2020, representing an average annual growth rate of 4.4%. When compared to an average annual growth rate in global electricity consumption of 3.3%, decentralized energy will grow at a rate that is almost 40% faster than demand.⁴

Technology and digital trends

The building blocks of the digital revolution

The advent of the cloud, social technology, big data and analytics are driving a number of technology trends that have immense potential for the electricity industry.

- **Cloud computing** is improving business agility, with an unparalleled time-to-market advantage. Big data is helping companies innovate, with the capability to analyze large quantities of both structured and unstructured data, generating insights in real time.
- **Mobile** is enabling new business scenarios, while social channels are transforming the ability to connect with customers quickly, directly and cheaply.
- With the emergence of the **Internet of Things**, the volume of data that electricity companies can access – through the car, connected home, wearables and smart cities – will increase exponentially.⁵

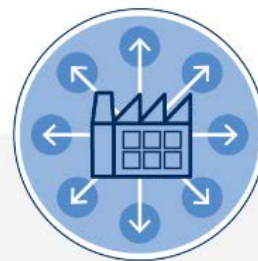
Over the coming years, these technologies will combine to deliver a new layer of connected intelligence. It will revolutionize the ability of electricity companies to improve the efficiency of the electricity system and better meet their customers' diverse needs. However, three technology trends in particular are especially relevant to tomorrow's electricity provider: intelligent enterprise, platforms and mass personalization.

The platform revolution will offer an opportunity to develop an entire system for electricity and beyond, spanning the digital and physical worlds.



Intelligent enterprise

Machines are becoming smarter, and software intelligence is being embedded into every aspect of a business, helping drive new levels of operational efficiency and innovation. This trend turns big data into smart data, enabling significant cost and process efficiencies. For example, enterprises can shift to predictive maintenance by using analytics. As machine-to-machine communication becomes more prevalent, the interaction of people, data and intelligent machines will have far-reaching impact on productivity and operations.



Platforms

Leading companies are bringing together digital initiatives onto the same platform to create next-generation products and services. While factories were the platforms driving the Industrial Revolution, computer and communications platforms have driven the information and connectivity disruptions of the past 30 years. Now, digital platforms are the next wave of change. According to the Massachusetts Institute of Technology in the United States, 14 of the top 30 global brands by market capitalization in 2013 were platform-oriented companies that connect buyers, sellers and third parties in real time.



Mass personalization

The 'Internet of Me' is the personalization of applications, products and services. It is changing the way people and enterprises interact through technology, placing the end user at the center of every digital experience. Current examples include equipping employees with tablets and smartphones, and making changes to information technology infrastructure to facilitate a bring-your-own-device program. An environment in which every intelligent device provides a channel for engagement with a customer is approaching quickly, creating an opportunity for electricity companies that can move fastest.

Digital adoption in the electricity industry

The maturity of digital initiatives in the electricity industry is varied – from projects using advanced analytics to optimize assets and the widespread implementation of smart meters, to early moves by some utilities to manage and integrate distributed generation resources. To illustrate, 43% of utilities are currently investing in digital technologies as part of their overall business strategy, indicating a mixed approach.⁶

Energy technology providers are playing a key role in enabling the digitization trend, releasing a suite of smart turbines and panels, and sensors for commercial infrastructure. There are several examples of

leading connectivity platforms for industrial, commercial and retail customers, such as **Johnson Controls'** Panoptix and **Honeywell's** Intelligent Buildings.

Equally, change is coming from non-industry actors, including both established players and startups. Such companies are emerging across the value chain, from Bosch and Telenor optimizing the grid, to **BT** and **Comcast** connecting the home. In addition, a whole host of startups are entering the home hardware space, from **tado°** in thermostats to **Rainforest** or **2GIG** in home displays.⁷

The changing electricity ecosystem offers opportunities for energy utilities to develop partnerships with energy technology companies at the forefront of the industry's digitization.

Drawing on these industry and technology trends, we have identified four themes – Four themes – [asset life cycle management](#), [grid optimization and aggregation](#), [integrated customer services](#) and [beyond the electron](#) – that we believe will be central to the digital transformation of the electricity sector over the next decade.

1. International Energy Agency (IEA), Renewable energy, IEA Forecasts.

<http://www.iea.org/topics/renewables/>

2. International Energy Agency (IEA), Energy and Climate Change, 2015.

<https://www.iea.org/publications/freepublications/publication/WEO2015SpecialReportonEnergyandClimateChange.pdf>

3. UN Framework Convention on Climate Change “Adoption of the Paris Agreement”, December 12, 2015 <http://unfccc.int/resource/docs/2015/cop21/eng/l09.pdf>

4. GE: The Rise of Distributed Power,

2014 <https://www.ge.com/sites/default/files/2014%2002%20Rise%20of%20Distributed%20Power.pdf>

5. World Economic Forum, Industrial Internet of Things: Unleashing the Potential of Connected Products and Services, 2015. http://www3.weforum.org/docs/WEFUSA_IndustrialInternet_Report2015.pdf

6. Harvard Business Review, The Digital Transformation of Business, 2015.

https://hbr.org/resources/pdfs/comm/microsoft/the_digital_transformation_of_business.pdf

7. CleanTechnica, op. cit. <http://c1cleantechnicacom.wpengine.netd>