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WHAT THE EXPERTS SAY



## Consumption management as part of grid management

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*Three specialists give their views on consumption management.*



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*« Consumption is fragmented, distributed and inhomogeneous. »*

### What are the drivers for managing consumption?

**Prof. Wil Kling:** The main drivers are the economy and the environment. The success of environmental policies and carbon reduction targets depends on effectively managing consumption, while electricity producers need to shave peak demand for cost reasons. In addition, distribution system operators (DSOs) can leverage consumption management to increase asset utilisation. Smart grids create opportunities for close to real-time adaptation of demand to the actual system status.

### What are the challenges with managing consumption?

**Prof. W.K.:** Consumption is fragmented, distributed and inhomogeneous, especially with residential users, who account for one-third of total demand. The challenge is to zoom in on the flexible (non-critical) portion

of consumption and influence the behaviour of consumers through price incentives or automated actions.

### What is your experience of consumption management?

**Prof. W.K.:** My 30 years in the industry made me aware of the importance of consumption management and demand response. And as a professor now, I lead research programmes that include demand-side management and demand response. Simulations and pilot projects show that demand-response mechanisms can provide considerable support for the integration of renewable energy sources and help establish efficient electricity delivery systems.

### What is the likely future for electricity consumption management?

**Prof. W.K.:** Probably, aggregators will take over the role of consumption management by contracting services of large numbers of residential customers and coordinating them. Also, developments in process automation and two-way communication will stimulate an active participation in the demand side and local balancing of consumption and production.

### What technologies and non-technical factors will contribute to effective consumption management in the future?

**Prof. W.K.:** Critical technologies are continuous two way communications, optimisation algorithms and predictive control techniques. Other factors include user behaviour and effective environmental policies.



*« Demand management is likely to expand as utilities increase their focus on customer service. »*

### What are the drivers of consumption management?

**David Sun:** The focus of consumption management is on demand response (DR), with natural extensions to distributed energy resources (DER). Long-term DR drivers are customer expectations for choices on

how their energy usage is managed, as well as technology/ business advances enabling those choices. With continued regulatory reform and smart grid projects, we can expect renewable integration and smart meter deployment to drive near-term DR/DER increases.

## And what are the challenges?

**D.S.:** While significant progress has been made in areas such as smart meters, communications, etc., there are still many technical and nontechnical challenges. They include modelling large numbers of distributed DR components, forecasting and scheduling of intrinsically stochastic DR, and monitoring and control of these devices in a multi-tier environment where dynamic aggregation and disaggregation are an operational necessity. These challenges reflect fundamental business transformation for grid operators, energy suppliers/aggregators, and classical utility customers.

## What is your experience of consumption management?

**D.S.:** We are seeing a trend among customers interested in DR and distributed energy resources. There are growing interests in renewable integration, improved asset utilisation including peak shaving, demand shifting, deferred capital investment and customer service. Even though DR is still relatively small, utilities want to be prepared.

## What is the likely future for electricity consumption management?

**D.S.:** Demand management is likely to expand as utilities increase their focus on customer service. Through a combination of technical and business innovations, consumers can become “prosumers” (producer-consumers) in the energy eco-system. Energy storage devices, distributed renewable generation, and DR will become an increasingly important type of energy resource.

## What technologies and non-technical factors will contribute to effective consumption management in the future?

**D.S.:** The integration of energy, information, and communication technologies will provide the necessary technical foundation for DR/DER expansion. This will lead to expansion of control room IT needed to serve

operators in the multi-tier operations environment. Other key contributors are regulatory reform and consumer awareness.



*« Interoperability and telecommunications are critical for consumption management. »*

## What are the consumption management drivers?

**Miguel Angel Sanchez-Fornié:** The strongest driver is the need to improve efficiency in energy consumption. But consumption will ultimately depend on the end users – who have to be given the capability to decide when and how to consume. Smart grids offer the opportunity to facilitate consumption management. They enable consumers to become active rather than passive and react to supply based on needs.

## And what are its challenges?

**M.A S-F.:** Some technical challenges still persist. For example, we still need more R&D in energy storage. But much of what is needed to manage consumption is available. We have smart metering, which shows each customer's consumption in almost real time, and also the capability to control consumption of individual appliances. And we have the telecoms technology to transmit all this data. The real challenge in managing consumption is the regulatory environment, which is not keeping pace.

## What is your experience of consumption management?

**M.A S-F.:** Iberdrola has focused on active demand response for some time. In Spain, we have been involved in important R&D projects to demonstrate technical feasibility. Iberdrola USA is also starting trials with demand response, including deployment of smart meters, and Scottish Power has carried out limited demand response trials.

## What future do you see for electricity consumption management?

**M.A S-F.:** It will happen. Perhaps in different ways and at different times, but it will happen. It's already under way in the United States. In Europe,

it will depend on regulation and the advances of aggregation. However, industrial consumers are already implementing measures to manage consumption.

## What technologies and non-technical factors will contribute to effective consumption management?

**M.A S-F.:** Interoperability and telecommunications are critical for consumption management and smart grids in general. But with more information exchange among devices, different telecoms technologies and interoperability standards, we must also take data privacy and cybersecurity very seriously in systems design.

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