6 DATA MANAGEMENT

Digitalization in the energy sector in Chile

Predictive Maintenance

Forecasting and predictive analytics

This class groups uses oriented to data analysis using Smart Meters and / or AMIs. These uses allow to have a more reliable network for the information and forecasts that they deliver.

Application presence by country

Uses/Applications	Germany	Finland	Japan	China	USA	UK	Sweden	France	South Korea	Singapore
Predictive Maintenance	■									■
Forecasting and predictive analytics	■	■			■	■				

Application potential by sector

Uses & Applications	Transportation	Industry	Buildings	Electricity Generation	Finance	Public Sector	Main type of energie
Predictive Maintenance	■	■	■	■		■	Electricity and fossil fuels
Forecasting and predictive analytics	■	■	■	■	■	■	Electricity and fossil fuels

Enabling Technologies

Technologies	Load monitor	In home display	Smart thermistat	Smart light	Smart plug/switch	Smart appliance	Hub	Smart meters	AMR/AMI	V2G	EV/PHEV	IED (relays, SCADA...	PMU	WAMS	Smart Sensors	Sensor and actuator	LAN/HAN/NAN/WAN	Cloud	5G	Machine learning	Data mining	Nature inspire	ANN	Multi-agent systems	Clustering	NLP	Digital twin	Autonomous vehicle	Blockhain	Actuators	3D printers
Uses & Applications	Smart home & Smart building							Smart grid							IoT & IoE					Big data, machine learning & AI										Physical action
Predictive Maintenance								■	■			■		■						■						■					
Forecasting and predictive analytics																				■	■		■		■						

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6.1 Predictive maintenance

This condition-driven preventive maintenance program uses direct monitoring of the mechanical condition, system efficiency, and other indicators to determine the actual mean-time-to-failure or loss of efficiency for each machine-train and system in the plant.

Common examples

Predictive maintenance is part of Germany's digitization agenda (BDEW, n.d.), within the category of digital services, in which it is mentioned that the gap to reach digitization of products and services is a new corporate culture and a greater capacity for innovation.

In the United Kingdom, maintenance is part of the innovations with artificial intelligence; the gap for their implementation is a greater presence of these technologies (which requires investment) and other related technologies such as technologies for data acquisition in real time (mainly through the cloud).

Opportunities

Significant cost reduction.

Increases supply security by optimally managing equipment maintenance.

Information, infrastructure and regulation requirement

- Infrastructure required for data acquisition.
- This use involves handling a large amount of information

Barriers

Infrastructure: it's necessary to have a greater adoption of technologies (and advances in them) that complement this use (acquisition of data in real time, AI, etc.); more computational resources compared to current maintenance systems; labelling data, can be an exceedingly expensive effort.

Others: it relies on historical data that may need to be built up and not necessarily available immediately; Lack of trust, knowledge and understanding of potential benefits.

Application synergies

- With a continuous Emission monitoring (4.2) system, it's possible to detect an abnormal situation in order to predict possible maintenance.

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Predictive maintenance

International real application

NextEra Energy (American energy company Fortune 200) applies machine learning to optimize the operating parameters of its fleet of wind turbines, with the aim of maximizing production and performing predictive maintenance, obtaining a reduction of between $ 3 to $ 4 per MWh.

Examples of international goals

The desired state is one where predictive maintenance is mature in the network, so the gap is to achieve greater adoption of this use by adding improvements in its operation using new technologies such as, AI, Cloud Services, IoT, etc.

National key partners and resources

Public policies recommendations to Chile

- Promote policies to increase the public investments in digital infrastructure, build a large-sale ICT infrastructure.
- Promote articulation between the different institutions related to the digitization of the different sectors at the national level.

CURRENT STATUS OF THE APPLICATION IN CHILE

FORECAST OF FUTURE DEMAND FOR THE APPLICATION

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Digitalization in the energy sector in Chile

6.2 Forecasting and predictive analysis

Forecasting is a technique that uses historical data as inputs to make estimates that are predictive in determining the direction of future trends. Predictive analytics is the use of advanced analytic techniques that leverage historical data to uncover real-time insights and to predict future events.

Common examples

The U.S. Department of Energy has sponsored, in partnership with the National Oceanic and Atmospheric Administration, public, private, and academic organizations, two projects to advance wind and solar power forecasts.

Opportunities

It makes better use of renewable energy sources by being able to feed the algorithms that predict their behavior with data, and thus obtain accurate predictions that allow better planning and operation.

Management of consumers data could lead the policy making process in terms of better understanding of demand elasticity, demand forecasting, consume patterns and responsibilities in the peak hours, etc., these examples apply for electricity, transport and heating.

Labelling data can be an exceedingly expensive effort.

Information, infrastructure and regulation requirement

- Infrastructure required for data acquisition.
- This use involves handling a large amount of information

Barriers

Economic: High investment cost for equipment to obtain the relevant data and information.

Regulation: there are no external incentives for electrical system operators.

Others: historical data may not be easy to obtain.

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Predictive maintenance

Application synergies

- DER (2.5) owners would be interested in a forecasting tool in order to get the highest possible profit.
- By demand forecasting it's possible to manage Demand response (2.1) in a better way.

International real application

GREENBYTE

Greenbyte is a USA company that has customers in more than 30 countries, and it offers a software platform that help owners of renewables sources to make more informed decisions by using forecasting and predictive analysis[9].

[9] Greenbyte, Available on https://www.greenbyte.com/about

Examples of international goals

- No specific targets were found

National key partners and resources

Ministerio de Energía – Gobierno de Chile; COORDINADOR ELÉCTRICO NACIONAL; ACERA; DIRECCIÓN METEOROLÓGICA METEOCHILE

Public policies recommendations to Chile

- Reduce the digital gap among the different territories of the country.
- Develop pilot programs to promote the use of different digital applications, involving the public, private sector, and academia sector, which may reduce the barriers of entry of different technologies.