Optimisation de l’efficacité énergétique, gestion d’actifs et smart grids. Des solutions novatrices au cœur du métier de Schneider Digital

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Our intent today

Provide insights on the use of digitization & Artificial Intelligence to improve Energy Efficiency & reduce CO2 emissions

Focus on

- Industry sector
- Smart grids

IoT – Translating the data deluge into meaningful insights Context that drives efficiency

CONNECT
Connect everything from shop floor to top floor

COLLECT
Capture critical data at every level, from sensor to cloud

ANALYZE
Convert data into meaningful insights

TAKE ACTION
Drive action through real-time information and business logic

- **Identify** and select data
- **Clean**, repair and pre-process data
- Manage **data storage**

- **Analyze** what has happened
- **Predict** what is going to happen
- **Simulate** for the short or the longer term
- **Optimize** to find the best solution

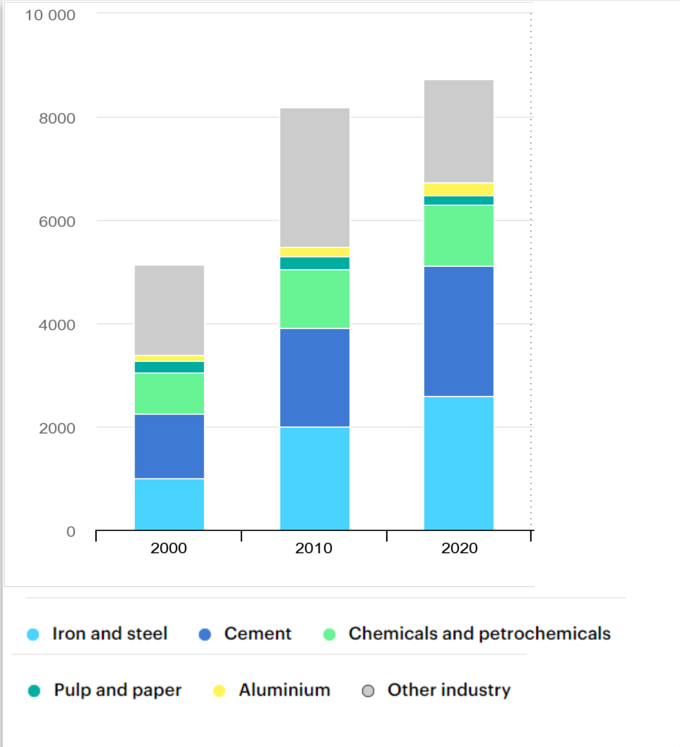
- **Visualize** key information
- **Integrate** key results from analytics into the operational application

EcoStruxure™
Innovation At Every Level

Industry figures

- Almost **40% of current global total final consumption**
- Energy consumption Increased an average 1% per year between 2010 and 2019
- Still dominated by fossil fuels (about 70%). However increasing electricity use especially in non-energy-intensive industries (18% to 22% from 2010 to 2020)
- Second largest emitting sector after power generation

Industry direct CO_2 emissions (Mt)



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How AI can improve EE and reduce CO2 emissions in Industry

Monitor energy consumption to early detect abnormalities

Metal example

Optimize operations and processes

Cement example

Support processes migration towards electricity

Glass example

Enable new energy landscape

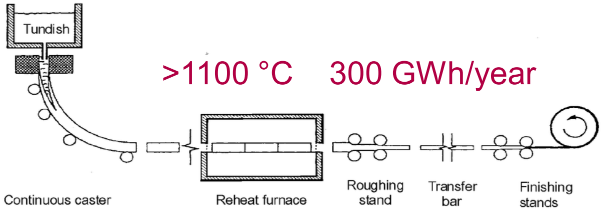
Microgrids and energy flexibility

Monitor energy consumption to early detect abnormalities

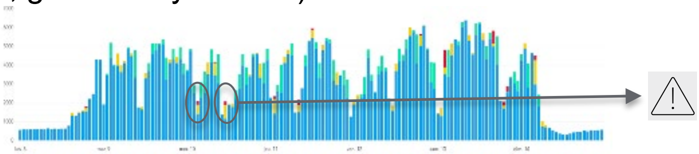
Principle

- Use AI to build the model of ‘normal’ energy consumption
- Run the model and compare to current real measurement to detect abnormalities
- Use AI to identify the possible root cause of problem and take action

An example in Steel industry



Model of the energy consumption of a rolling mill furnace relying on 1,5 year of historical data (energy & process data such as Temperature of combustion air, air/flow ratio, gaz flow by zone…)



Action taken was to fill the void of the furnace with the product to avoid heating air

2,8 GWh (3%) saved during a 4 months period

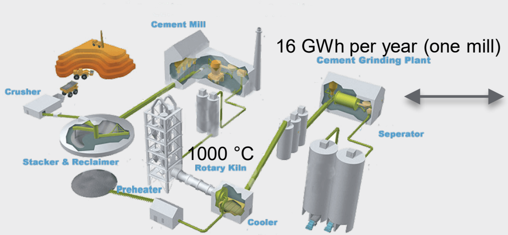
Sustainable Energy Consumption Solution for EcoStruxure MMM by Energiency

Optimize operations and processes

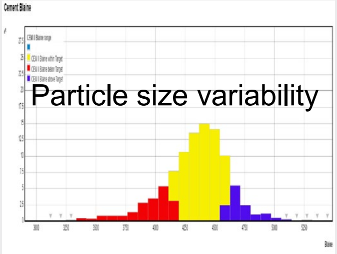
Many potential optimization areas relying on AI:

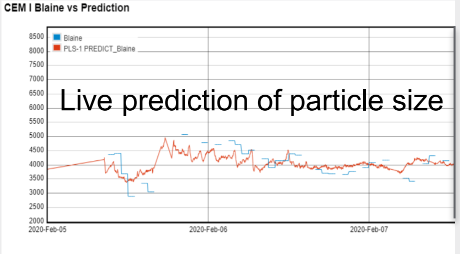
- Optimize a single process by identifying the ‘**golden set of parameters**’ leading to best efficiency under various operation conditions
- Reduce wastes due to non quality production with **predictive quality**
- Optimize global operations by better **scheduling of operations**
- …

An example in Cement industry



Prediction of the particle size at the output of ball mills (grinding) to enable reduction of particle size variability. When too fine, more product could be processed > over energy consumption





Energy estimated savings: 409 MWh per year for one mill (2.5 %)

Additional production: > 12 000 tons per year (2.9 %)

EcoStruxure Plant Advisor—Process Intelligence

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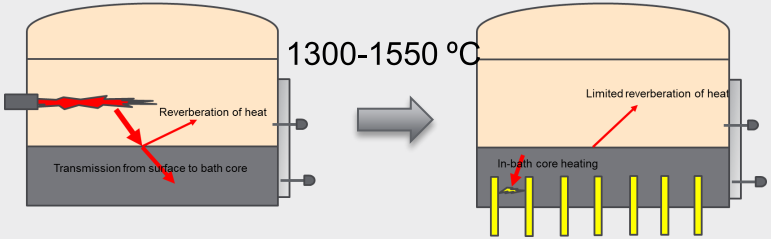
Support processes migration towards electricity

- Optimize control strategies through modeling capabilities
- Predict flexibility capabilities

An example in Glass industry

Glass industry : **400,000GWhr** global energy demand
Global mandate to reduce 100% of emissions by 2050 in Europe



Furnace electrification, incl. hybrid heating, completely transforms the glass process:

- Heat transfer: Direct heat in load, no losses, no time constraint time
- Distribution of heat: Finer transversal uniformity, no staggered heating, Multiple zones of control including possibility of side walls / central heating zones

Expected results: 80% emissions reduction, 25% full electric net energy gain

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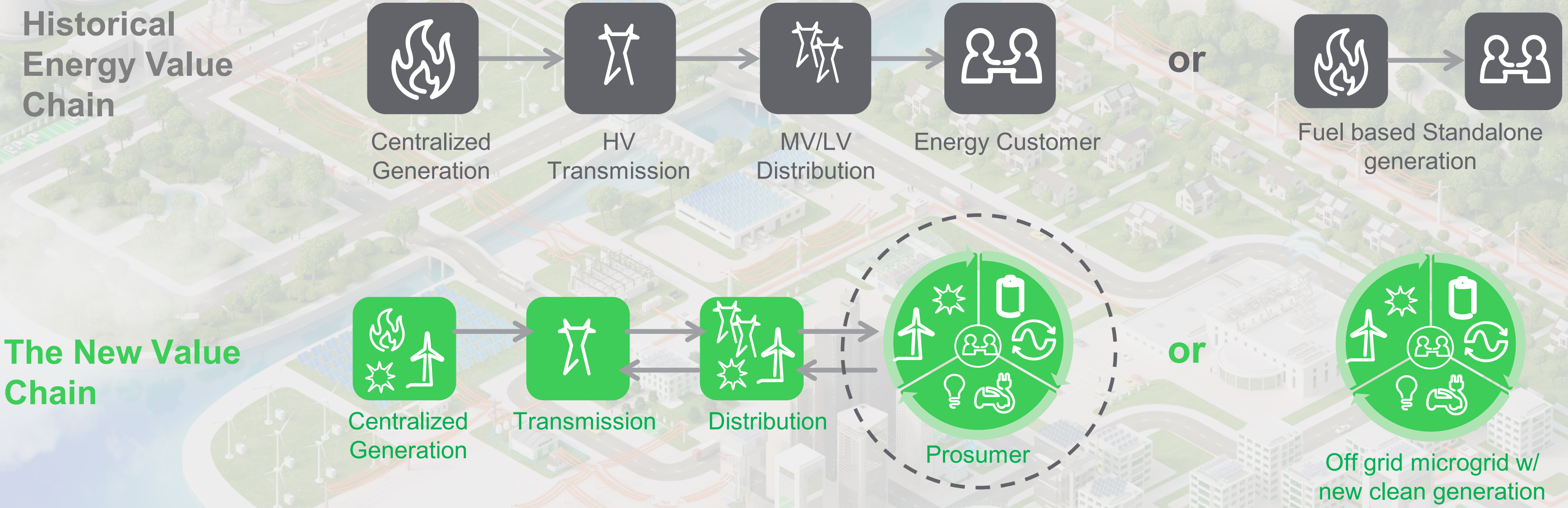
The new energy landscape

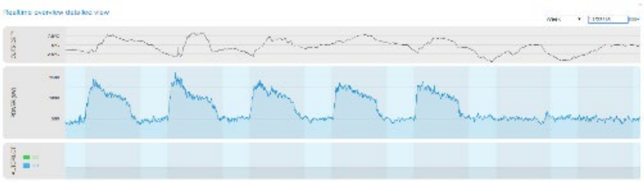


Decentralized + Flexible + Connected

Consumer morphing in prosumer

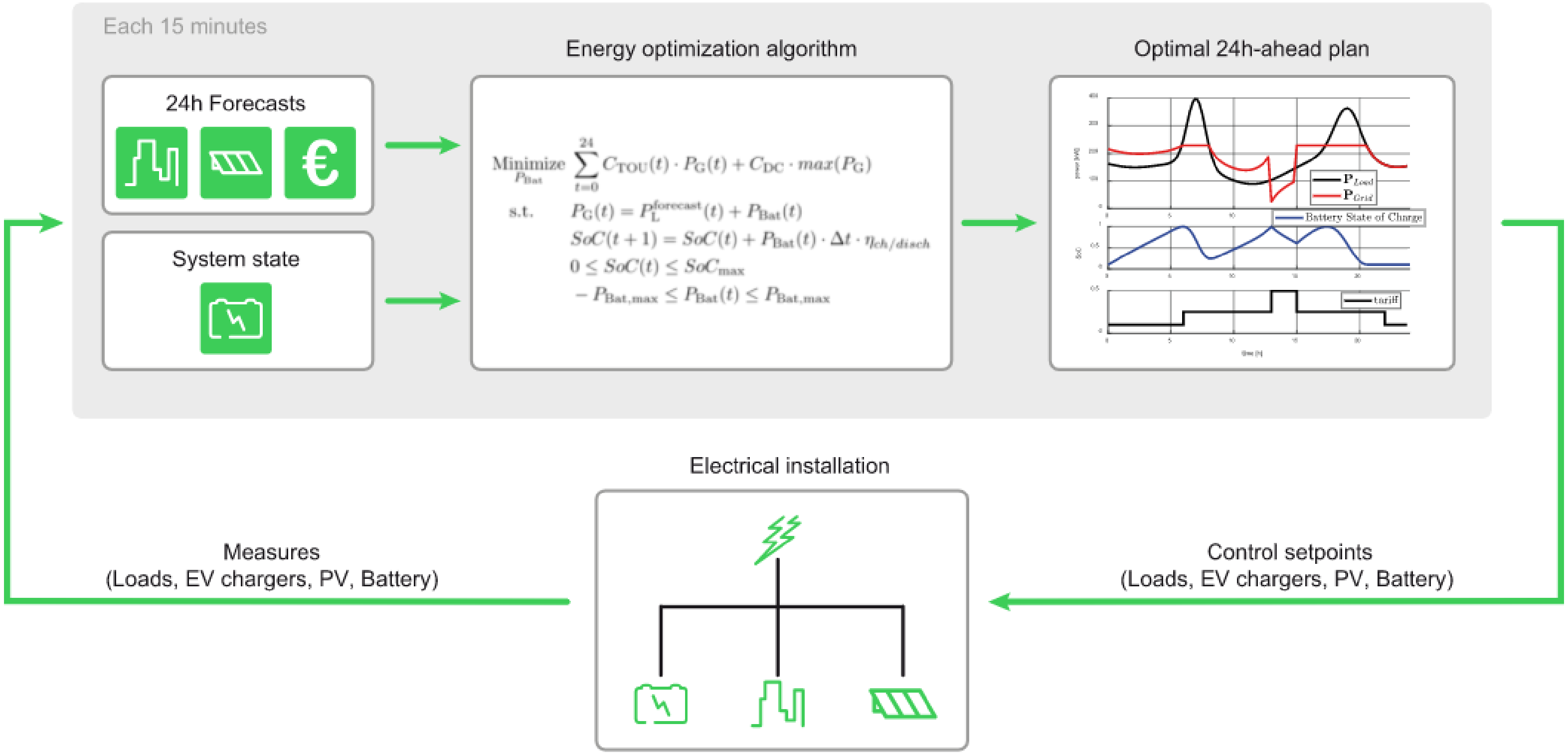
Main prosumer use cases

Remote monitoring & forecasting	Monitoring Power / Energy and other KPI for each DER using a web access Electrical / thermal energy
Tariff Management	Control DER (consume/produce/store energy) according to variable electricity tariff rate Electrical / thermal energy
Demand Charge reduction	Control DER (consume/produce/store energy) for reducing site consumption peak
Self consumption	Control energy storage and PV system for maximizing the energy consumption from PV system
Demand Response*	Control DER for participating in DR mechanisms
Frequency Regulation*	Control local generation and BESS to support frequency regulation (local logic in DER Box)
Off grid mode preparation	Control DER for anticipating on future off grid events
No export	Control DER for avoiding exporting energy to the grid



*according to a standard sequence of operation

Technical Solution (Model Predictive Control)

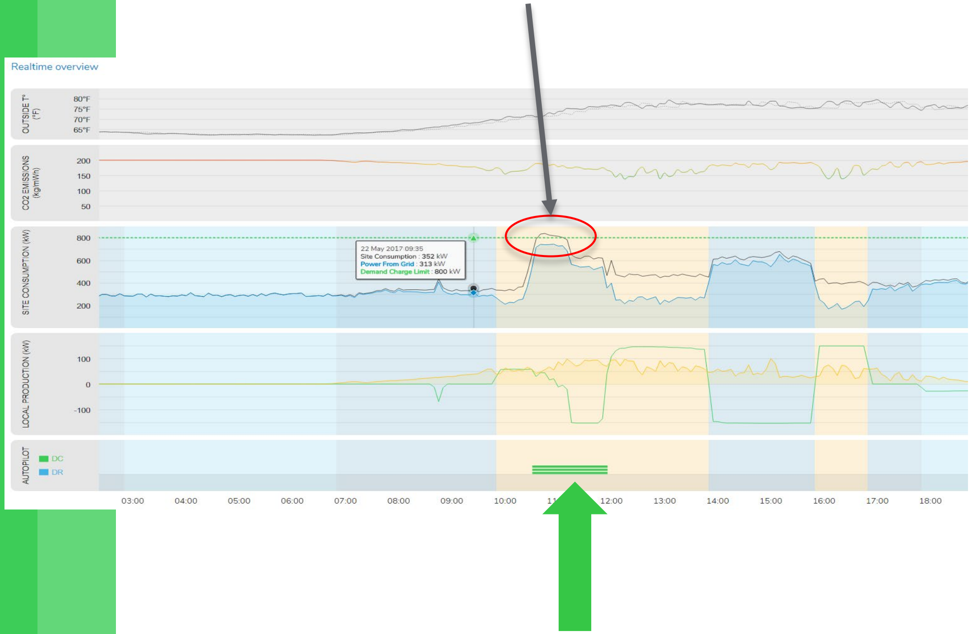


Demand charge – Peak shaving

- Shaving the consumption peak in order to reduce demand charge or to avoid paying penalties
- The threshold is set automatically and dynamically or set by configuration
- DC is higher priority than TM
- *Example 1:* shedding an HVAC during a peak consumption period, while ensuring the comfort of the building occupant
- *Example 2:* discharging an energy storage system or turning on a distributed generation asset during a peak consumption period

Energy bill optimization

Total consumption over DC threshold



Priority of the DC on the TM for recovery

Self consumption

Consume energy produced locally first, import energy second

- *Example 1:* charging an energy storage system with the extra amount of electricity produced by a PV system and consuming it later during the day

Being greener and energy bill optimization

Tariff management – Load shifting

EV charging station load shifting