Analytics for Energy Efficiency

By analytics we mean the extensive use of data, statistical and quantitative analysis, explanatory and predictive models, and fact-based management to drive decisions and actions. The analytics may be input for human decisions or may drive fully automated decisions.

Source: Thomas H. Davenport and Jeanne G. Harris in Competing on Analytics, Harvard Business School Press.

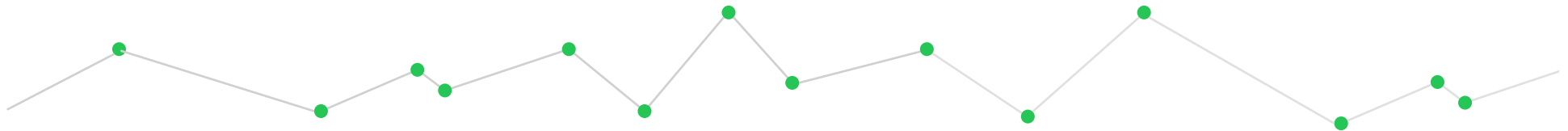## Schneider Electric

V. Boutin, ECEEE 2014, Arnhem

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Analytics 1.0 : The era of business intelligence

Analytics 2.0 : The era of big data

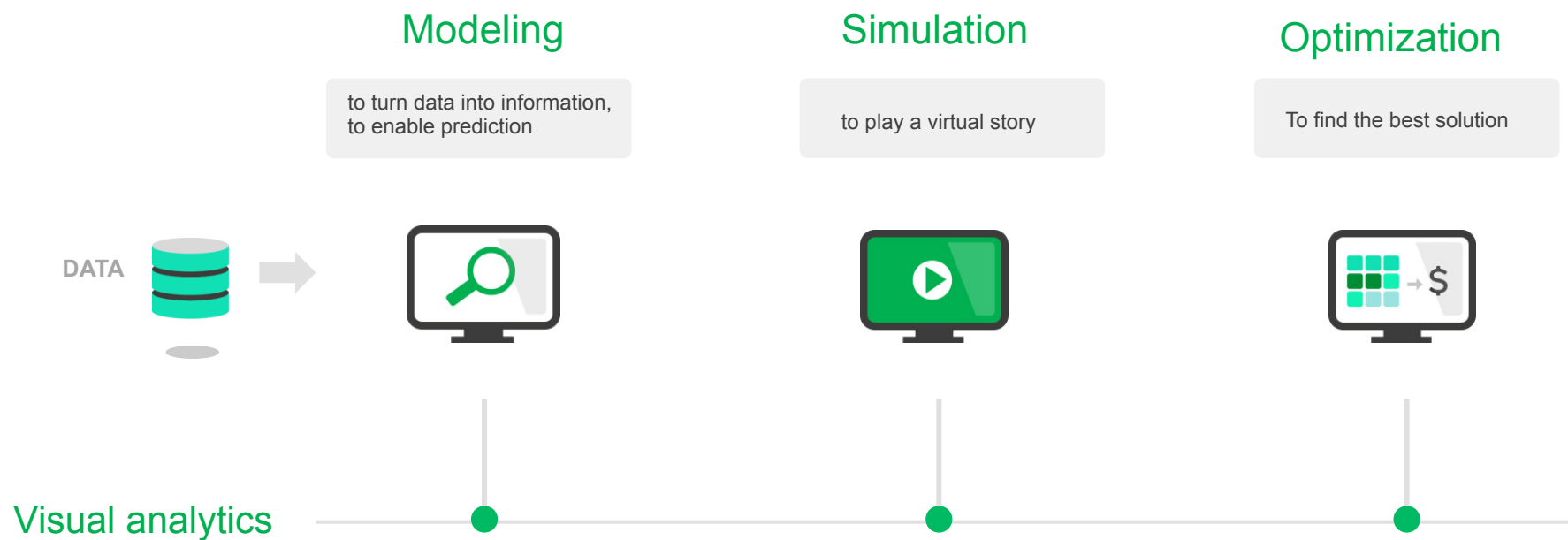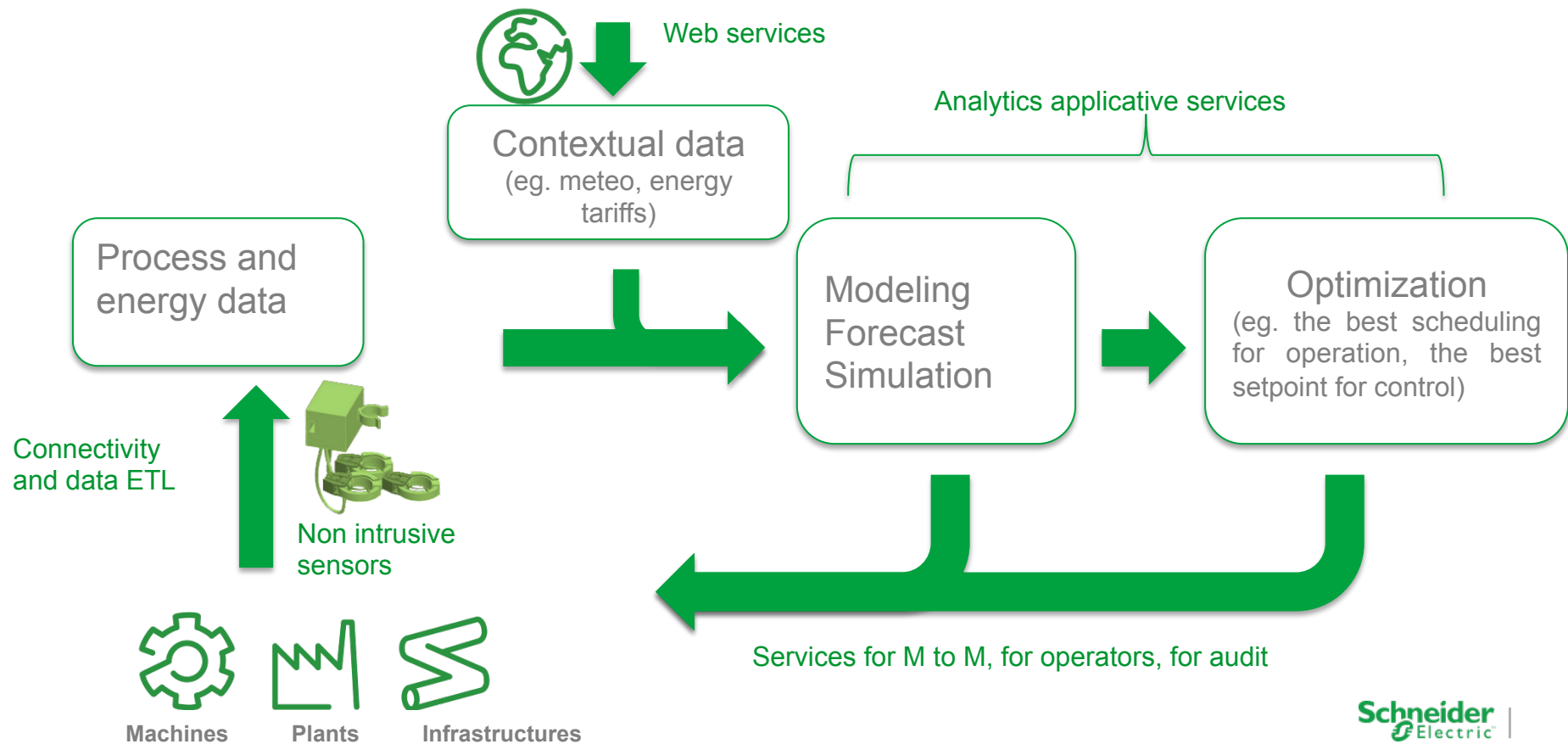We are entering in Analytics 3.0, the era of data-enriched offerings

What are Analytics?

Modeling

to turn data into information, to enable prediction

Simulation

to play a virtual story

Optimization

To find the best solution

DATA

Visual analytics

Smart Energy features based on Analytics

Web services

Contextual data
(eg. meteo, energy tariffs)

Analytics applicative services

Process and energy data

Modeling
Forecast
Simulation

Optimization
(eg. the best scheduling for operation, the best setpoint for control)

Connectivity and data ETL

Non intrusive sensors

Machines   Plants   Infrastructures

Services for M to M, for operators, for audit

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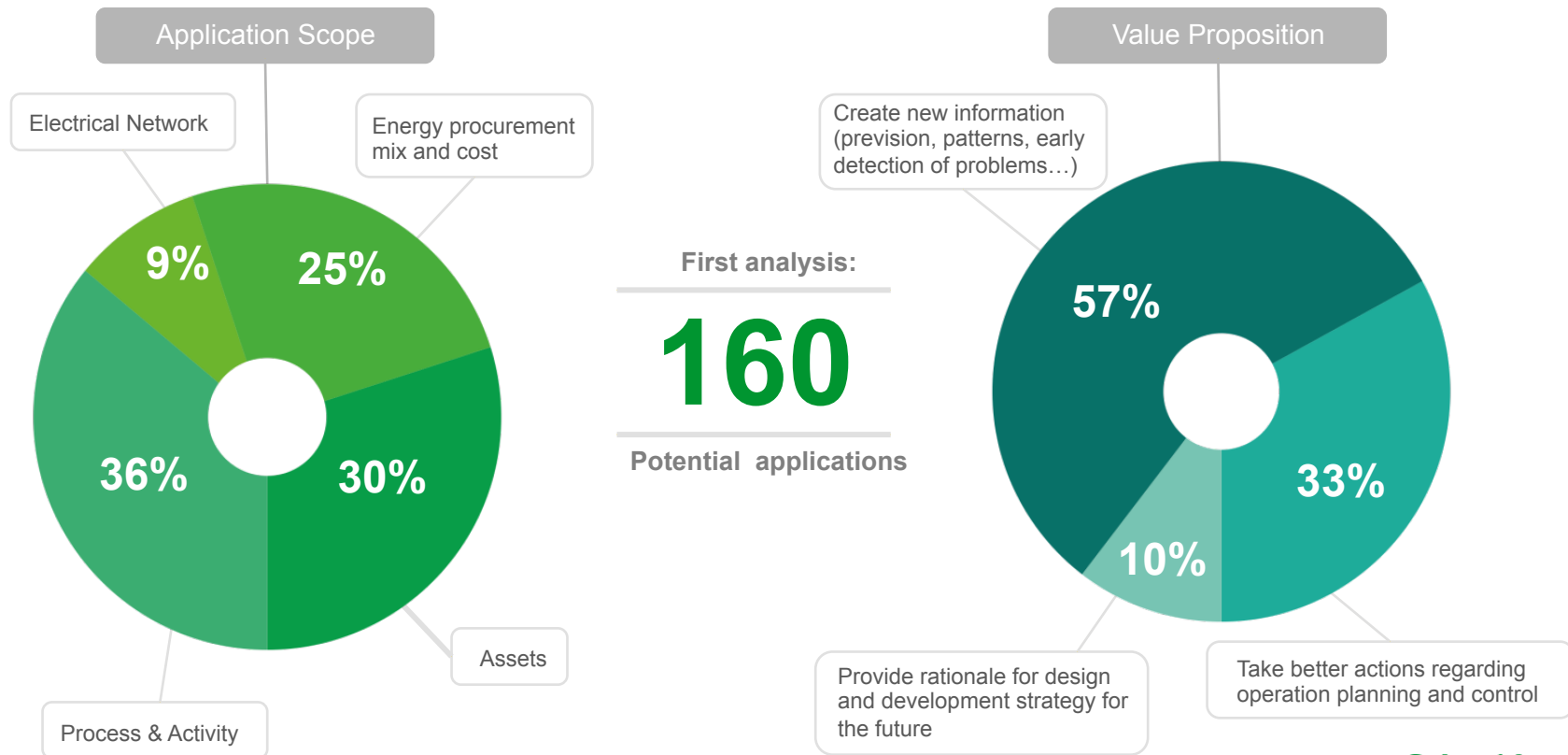
Technical enablers
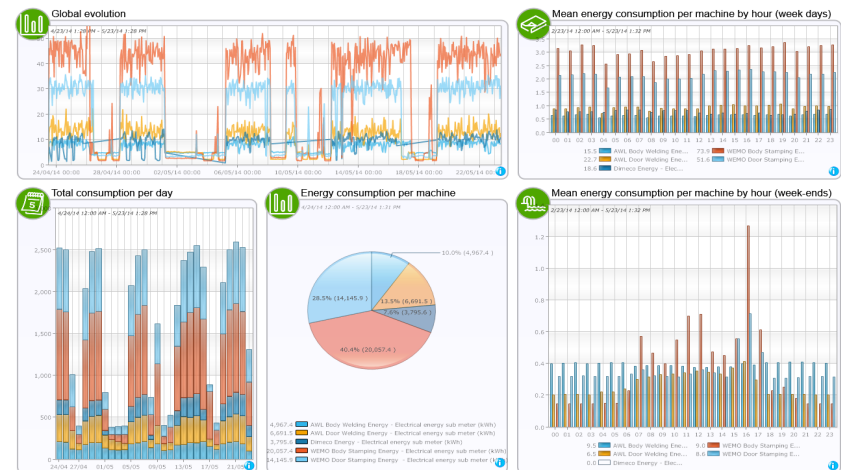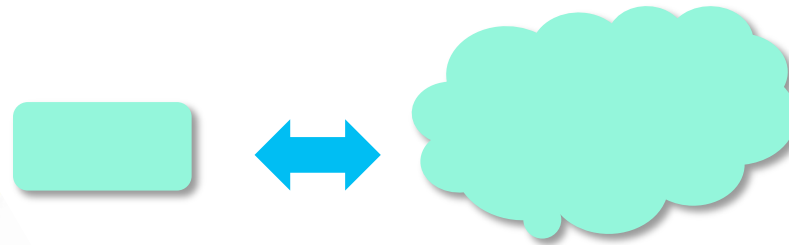
Pervasive sensors   Connected objects   Infrastructure for data collection and storage   Analytics technologies

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Analytics represent a huge potential for efficiency

Application Scope

Electrical Network 9%

Energy procurement mix and cost 25%

Assets 30%

Process & Activity 36%

First analysis:

160

Potential applications

Value Proposition

Create new information (prevision, patterns, early detection of problems…) 57%

Take better actions regarding operation planning and control 33%

Provide rationale for design and development strategy for the future 10%

7 Analytic features for the future of Operational Efficiency

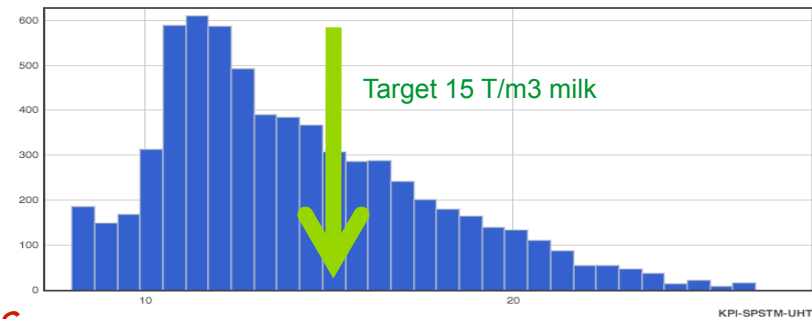| Decision support through simulation | Context dependent control | Resources & activities planning and scheduling | Condition monitoring, diagnostic, maintenance | Data correlation & prediction | Data Disagreggation & information discovery | Performance evaluation & benchmarking |

CAPEX

OPEX
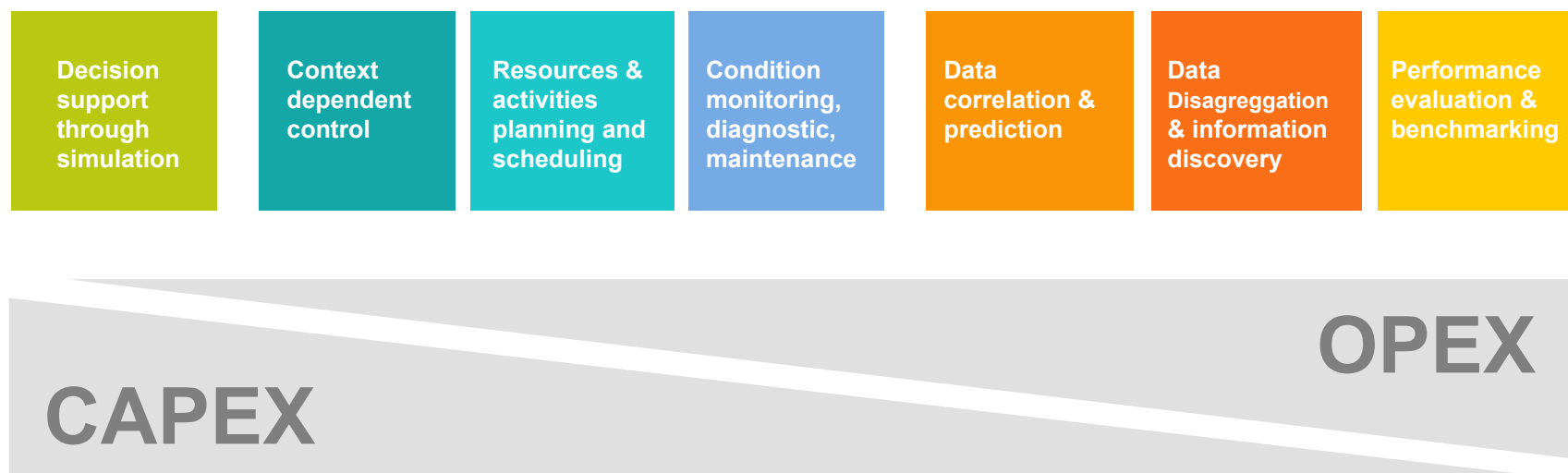
Example n°1 : We use analytics to reduce variability of energy / steam performance – the dairy case
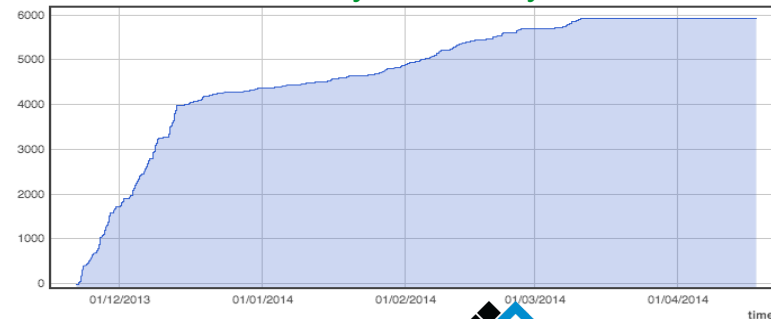
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Specific Energy Performance Indicator

▮ (red)	Cleaning
▮ (yellow)	Sterilizatio
▮ (blue)	Production
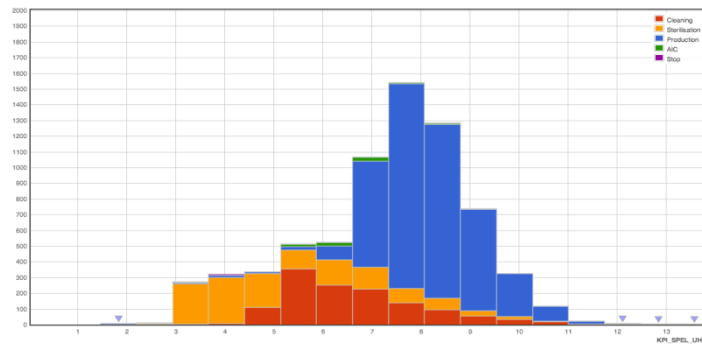
Specific steam consumption(kwh/t product)

Target 15 T/m3 milk

KPI-SPSTM-UHT

3

Off line analysis

Losses due to variability 12 000 t/year 168 000 EUR

01/12/2013   01/01/2014   01/02/2014   01/03/2014   01/04/2014

time

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Example n°1 : We use analytics to reduce variability of energy performance – the dairy case

Correlations between process data

Data driven model to predict energy performance

KPI_EL_TOTAL

- Measure
- Prediction
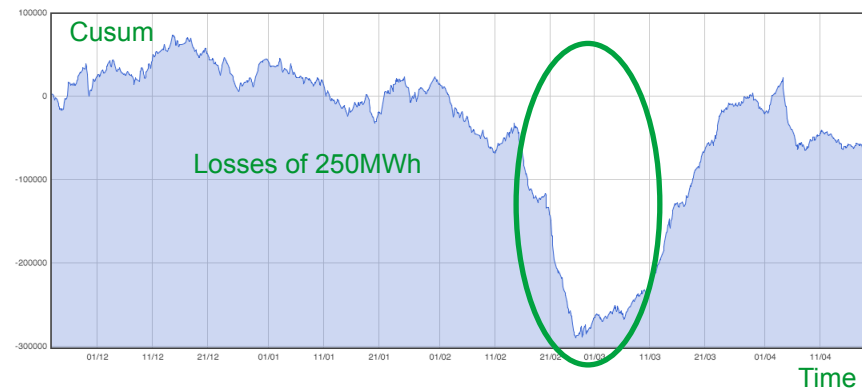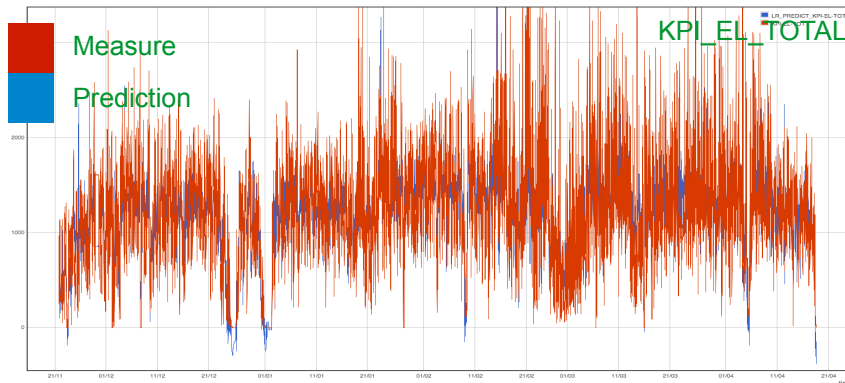

On line analysis

Use the model to compare observation vs calculation
Detect performance drifts and evaluate their impact

Cusum

Losses of 250MWh

Time

Example n°2: We use analytics to optimize the control of multiple sources of energy (inc. batteries) - the case of lift

Major trends
Green,
people safety in case of emergency,
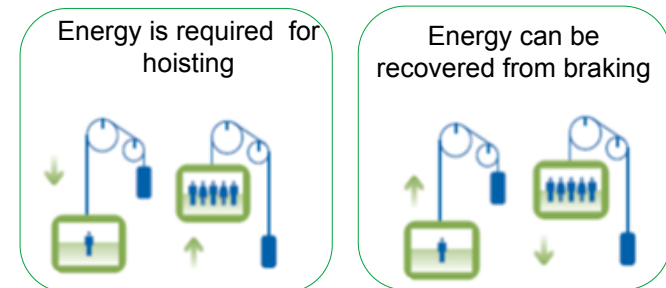costs reduction

Specific opportunities for energy recovery

Opportunity for new energy systems
Energy recovered from process, local production
Leveraging variable energy prices
Storage is the cornerstone of multi-sources energy systems

Main issue is to reach an attractive ROI
CAPEX: Evaluate opportunities
OPEX: Leverage the use of equipment

Energy is required for hoisting

Energy can be recovered from braking

Example n°2: We use analytics to optimize the control of multiple sources of energy (inc. batteries) - the case of lift
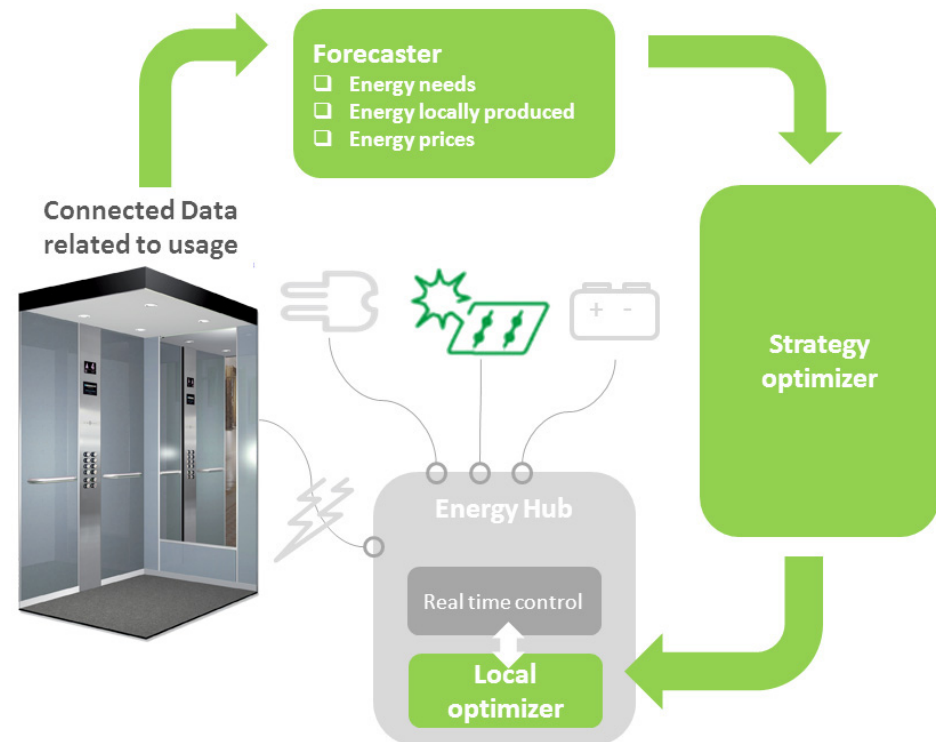
Conditions to minimize OPEX without any risk regarding service

Minimize energy and maintenance costs (especially battery replacement),

Master autonomy reserve,

Take into account the demand for energy, the local energy sources capabilities, the variable energy prices, and the storage equipment wear

Experimental pilot in Arrowhead project

Strategy and Technology

Corporate organization focusing on Innovation

Domain engineering and roadmap
Business Value & Experimentation
Analytics & Software Delivery

We are the Global Specialist in Energy Management™

25 billion € revenue
(FY 2013[1])

43% of revenue in new economies
(FY 2013[1])

160 000+ employees in 100+ countries

4-5% of sales dedicated to R&D

1:Pro-forma basis including LTM Sep 2013 revenue from Invensys

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