PREDICTIVE INTELLIGENCE Solution for
Predictive Energy Optimization

Production:
Reduce Energy / CO_2 and Discover Disturbing Factors

Without energy, production stops. Electricity, heat, compressed air, … are significant for production processes.

For energy intensive industries like steel or aluminum production, energy costs are ca. 25% of entire production costs. Thus, it is obvious that saving energy costs is mandatory.

However, how can it be done without having negative effects on your production processes and product quality?

Energy Grids:
Predictive Optimization, also for Renewables

Different energy generators and consumers, which are combined to a multi-utility control center, should simply run in an optimal way. However, what is "optimal"? There are conflicting targets, like increasing usage of own power supply, reducing energy costs overall, cutting peaks, using machinery more efficiently, ...

If renewable energy is also generated, complexity is increased. Energy trading can be a lucrative building block, too, if trade fair risks are reduced.

The following table shows the levels of predictive energy optimization. Although those levels show a hierarchy, each optimization level is independent and achieves value add, individually. Thanks to self-learning algorithms, changes, caused by humans or machineries, are automatically understood; algorithms adapt and automatically roll out adapted calculations.

Optimization Level	Objective	Problem	Value Add
# 1 Energy Efficiency Analysis	Dynamic efficiency calculations for complex machinery to discover inefficient energy usage	Complex machinery, i.e. turbines or ovens, have highly diverse efficiency, depending on many different factors. Therefore, efficient usage is not always clear.	• Assessment in which situations machinery is used efficiently. • This transparency enables optimal usage of machinery. • Calculation of costs for machinery usage
# 2 Energy Prediction	Permanently reliable predictions of energy consumption and generation, also in highly dynamic environment	High number of dynamic disturbing factors makes good planning difficult.	• Highly accurate and reliable predictions, also for renewable energy • Reliable planning and optimization, also in complex multi machinery networks
#3 Root Cause Discovery	Transparency which influences have which effects on energy consumption and generation	Despite same situations (production machinery, …), highly diverse energy efficiency	• Discovering complex disturbing factor combinations • Sustainable adaption of processes for optimized energy usage
#4 Multi Machinery Control	Best possible control of multi dimensional machinery to reach global optimum	Various complex machinery, combined in a network, are influenced by diverse, dynamic and contrary disturbing factors.	• Simulate best operation of multi machinery network. Either recommendation given to machine operators or automatic control (machine to machine) • Automate energy trading in a predictive way, also for renewable energy • Recommendations are given to machine operators how they can achieve the same output (quality, volume) with less energy.

Features

Dynamic pattern discovery

In highly complex and dynamic data, hidden and multifaceted data patterns are discovered. High complexity can mean big data/data lake, but also hardly any data/gaps in data.

Benchmarks have proven that PREDICTIVE INTELLIGENCE reaches significant more accurate predictions in complex and dynamic data than state-of-the-art methods like Deep Learning, Neuronal Networks, …

In addition, often, those methods deliver satisfying results on learned data, but are not reliable on un-learned data. PREDICTIVE INTELLIGENCE realizes equally good results on untrained data.

Influencing factor discovery

Available data is analyzed for their influence on energy efficiency. In this way – even out of data lakes – significant factors are discovered. Transparency leads to optimized process re-design. In addition, sensors are optimized because attention is paid to relevant sensors, only, instead of gathering as much data as possible.

Energy efficiency analysis

Automated analysis to assess energy efficiency.
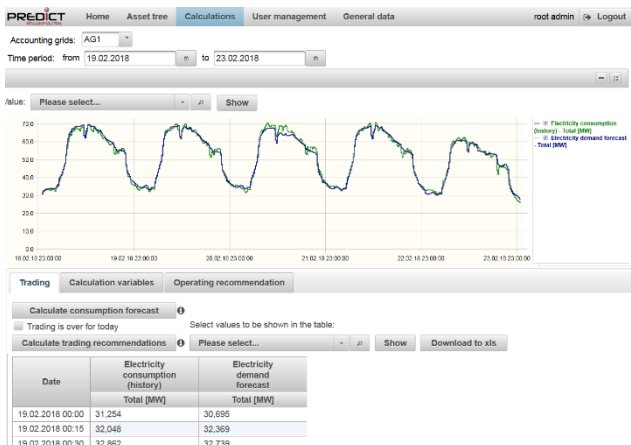
Energy prediction

Highly accurate predictions for better planning and control.

Root cause analysis

Disturbing factors are discovered, early. This transparency enables sustainable process improvements

Predictive maintenance

Future machinery problems are discovered. Thus, machinery is always running as energy efficient as possible.

Predictive machinery control

Complex algorithms simulate variants in machine settings and control machinery in a predictive way, to realize optimal energy efficiency. Instead of automatic machinery control, recommendations can be given to machine operators.

Self-learning: Manage changes over time

Production processes are not static. Changes happen again and again, for example, production lines` utilization is changed, production items are changed, … This leads to high number of process variants, like heavier or lighter machine assignments, etc.

Self-learning algorithms understand dynamics of those changes and adopt analyzed data patterns automatically.

Thus, there is no need to engage Data Scientists regularly to adjust mathematical models to changed reality. PREDICTIVE INTELLIGENCE realizes those adjustments automatically.

Self-learning: Enable scalability

In state-of-the-art methods, Data Scientists might be required to modify mathematical models for each individual machinery instance.

However, PREDICTIVE INTELLIGENCE learns the individual context of each instance, automatically. Thus, no Data Scientist has to adjust mathematical models for individual machinery instances.

Technical flexibility

PREDICTIVE INTELLIGENCE has a flexible architecture. It can be run on Linux or Windows, can use SQL or SAP HANA© and is GPU-enabled for high performance.

It can be easily integrated into your IT architecture (cloud, on premise, edge), either with own user interfaces, or as analytics core to send results into your existing energy management system.
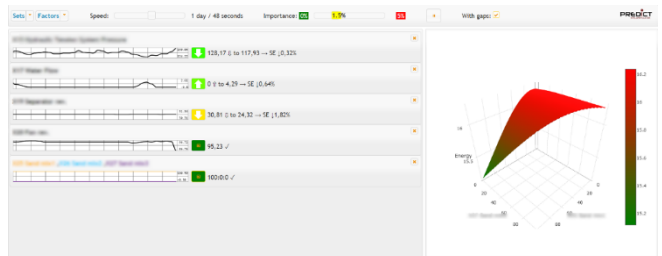
Highly accurate predictions, influencing factor analysis and predictive control, also in multi machinery control centers

PREDICT
INTELLIGENT SOLUTIONS