



THE ENERGY TRANSITION, LED BY A COMBINATION OF INNOVATIVE ENGINEERING AND DIGITALIZATION

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The energy transition is led by a combination of innovative engineering and digitalization. This white paper goes through the major consequences on corporates.

FROM ENERGY CONSUMER TO ENERGY PROSUMER

The energy sector is in the midst of a major transition, with massive disruption occurring across the entire energy value chain. This transition is primarily fueled by efforts focused on decarbonizing the global economy and a shift toward an increasingly clean, intelligent, mobile, and distributed energy ecosystem. Linear value chains supporting one-way power flow from centralized generation to the end customer will give way to a more sustainable, highly digitized, and dynamic energy system. This system will support two-way energy flow in which customer choice (optionality), clean energy, innovation, and agility command a premium. At the same time, various energy carriers will become increasingly interconnected and integrated (including electricity, liquid and gas fuels, and heat).

Cloud based systems allow energy managers to access information with greater flexibility. By utilizing a cloud based system, users can store information from many different data acquisition systems and access and analyze this information from different sites with one application. In fact, such a system allows for easier portfolio management as it is possible to view all managed sites at once. Because energy managers are able to access information remotely, this also reduces on-site maintenance to only when absolutely necessary, saving time and expenses associated with manual maintenance.

Cost reduction proves to be one of the greatest benefits of cloud based energy management systems as it allows energy companies to curb costs for the development of local infrastructure. Software innovation however is crucial to remain competitive. Because these systems are generally sold as a service, the consumer does not need to take care of the maintenance and updating of the database and infrastructure which again reduces wasted time and money that could be spent on implementing energy and money saving practices based on the data received. Additionally, clients only need to pay for what they use thereby reducing excessive overhead costs. Cloud services not only do minimize costs of software development and maintenance but also direct monetary costs, the cost of time and resources on maintaining in-house IT professionals and infrastructure on gathering, storing and analyzing energy data. This proves most beneficial for sectors that do not or cannot prioritize in-house energy management software experts.

ENERGY EFFICIENCY AND ELECTRIFICATION

Energy efficiency improvements will remain an important objective for every company as it is a key option to reduce costs and emissions and increase productivity. Energy efficiency improvements can be incremental, like better insulation or more efficient equipment, or they can be based on novel technologies such as different separation principles that can reduce the steam used in distillation (or enzymatic processes reducing the demand for heat to arrive at high temperatures). With the increased penetration of renewables in

electricity markets and the resulting decrease in electricity prices, electricity-driven options to improve energy efficiency should become more attractive.

FLEXIBILITY AND STORAGE

Changes in the energy system will inevitably lead to a higher volatility in energy prices, and most notably in electricity prices. Companies flexible enough to make optimum use of this volatility in prices will be the winners. Flexibility can be generated in various forms. Sometimes, there is flexibility in part of the process, for instance, in pulp and paper mills where the intermediate product, pulp, can be stored in large volumes. The level of pulp production can then be determined based on the price of electricity. Other flexibility options are connected to cogeneration units that can be operated depending on natural gas and electricity prices.

Cloud based systems allow for greater deployment flexibility, meaning that it is easy to either upgrade or downgrade resources which proves a great advantage for energy management systems compared to owned infrastructure. This allows the consumer to reduce or increase site data acquisition and maintenance much easier and in response to demand. For energy management specialists and consultants, this proves especially beneficial as clients evolve, i.e. more sites are easily implemented into the system for better facilitated management.

Furthermore, with the decreasing prices of batteries, electricity storage may become an attractive option for manufacturing companies. This is even more the case if freight fleets turn to full or hybrid electric: controlled charging can then be applied. Demand side management programs making use of intelligent control systems in a digitized environment will help to harvest the benefits of flexible production. All these options have the potential to use electricity

when it is cheapest and thus decrease operational costs, and even lead to a decisive competitive advantage in electricity intensive production processes.

Renewable Electricity and Renewable Heat energy have become the energy sources of choice for many companies; this choice is supported by RE100, an initiative of well over 100 companies, who have chosen to use 100% renewable electricity.

This can include local production, external sourcing via power purchasing agreements (PPAs), or buying guarantees of origin and renewable energy contracts. Renewable electricity is becoming increasingly available at prices competitive with conventional power generation. Renewable power procurement by industrial end-users has rocketed in recent years and will continue to grow as costs of renewable energy are competitive with fossil energy generation.

An important driver for this activity is the emergence of innovative PPA concepts, which offer manufacturers the possibility to hedge against the volatility of fossil fuels. Moreover, turning to renewable energy-based production provides the opportunity to produce green products, which are becoming increasingly important for many market segments.

CYBERSECURITY IS KEY

Every business possesses sensitive, important information that is crucial to business operations and must be protected. Cloud-based services are the simplest way to keep information backed up and safe. Specifically, it is cited that small businesses are twice as likely as larger companies to implement cloud-based backup and recovery solutions. This solution saves time and large up-front investments. With cloud-based energy management software, energy data and savings analyses are securely maintained and updated without much work from the customer.

Case study:

As part of its global Climate Commitment, Ingersoll Rand committed to a 35 percent reduction of its greenhouse gas (GHG) footprint by 2020. To deliver on this goal, the company targeted a 10 percent increase in energy efficiency compared to a 2013 baseline – and has achieved the goal two years ahead of schedule. Ingersoll Rand conducted an energy audit of its own large facilities and upgraded air conditioning systems, building controls and lighting, and eliminated energy leakage from its compressed air systems while measuring, validating and reporting the results. It reduced energy use by 109,000 MM BTUs and electricity consumption by 22,000 MWh, which is the equivalent of 26 million pounds of coal and the powering of 1,750 homes for one year.

The company announced investments in renewable energy technologies, further illustrating its Climate Commitment. At three large manufacturing sites in the U.S. and China, Ingersoll Rand initiated or commissioned on-site solar installations to address 15 percent of the energy load at these locations. This is equivalent to saving 560,000 gallons of gasoline and taking 1,000 cars off the road.

In addition to on-site renewable energy sources, Ingersoll Rand has signed a power purchase agreement (PPA) for approximately 100,000 MWh of wind power annually. The PPA replaces 32 percent of the company's U.S. electricity consumption with green energy, and reduces U.S. Scope 2 GHG Emissions from Electricity by 32 percent.

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