

NTT DATA

ENERGY AND UTILITIES

WHITE PAPER



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NTT DATA AND SAP

ALL CHANGE IN THE ENERGY ECOSYSTEM

New directions in energy

All markets are in a state of change: that is a basic fact of life, and the energy market is no exception to this rule. Yet before we analyze the drivers for change and the potential technology responses, let's consider why this industry is different and special.

First, it is extremely broad in scope. It covers extractive industries: mining for coal (and now uranium and lithium), oil exploration and production; manufacturing on a huge scale (wind turbines and towers, hydro-electric schemes, refineries); distribution (grids, sub-stations, cables); and retail (customer relationships, maintenance and services response).

Second, the modern world economy is the gift of this industry, which provides easy access to lighting and heat, every form of mobility and the power to drive our factories. We can mark the beginning of the modern world to the point when fossil fuel powered machines became almost universally available. No matter what else changes, we will always need power, and in greater amounts every year.

Third, the greatest crisis of our civilization can also be traced back to the energy industry. As bad news accumulates around climate change, we cannot escape the truth that carbon emissions, pollution and by-products from burning fossil fuels are the key factors in these developments.

The energy industry is therefore faced with the greatest dilemma in its history: continue to provide the power our civilization needs, but do it while decarbonizing, decentralizing, keeping us secure and providing greater precision and efficiency, through better use of data.

This is a huge agenda for any industry, especially when any disruption leads not just to loss of corporate profits but to real human suffering and all-round economic recession. In 2022, we have had proof of this in the most dramatic way, a major geopolitical upheaval in Eastern Europe, which was not factored into anyone's plans, has seriously disrupted the world's economy.

Sudden competition for a commodity that has gone from being readily available to in short supply, has led to a major shock to our economy. This has reminded decision-makers that we are all vulnerable to energy related issues. The need for change has become a little more urgent as a result. So what are the strategic developments of most urgent significance?



Restructuring the energy market

The rise of **renewables** has been faster than expected, changing the cost base of the power generation industry, as the main sources of renewable power: wind and solar, are now less expensive than hydrocarbon-based alternatives. This has led to a major increase in new technology investment, while making the overall generation mix more complex.

Distribution grids are under unprecedented pressure as the move to electric vehicles and area heat pumps are also accelerating fast. A recent research paper from the University of Wuppertal in Germany reveals that urban power grids will be expected to deliver on average 162% of today's requirements by 2030, rising to 200% plus by 2050. This requires new thinking about everything from cable locations and sizes to the output of high and medium voltage substations, plus new software-based management solutions.

Digitization is another change factor, as providers cope with the need to manage bi-directional energy traffic, virtual power companies are becoming more influential and relationships between providers and large customers become more complex (with some customers selling more to the grid than they take from it).

Markets are generally becoming liberalized, though this approach varies from country to country. In most places energy trading, spot markets and other forms of active energy management are in place, which makes availability the key to viability and success. Behind all of these developments is the one that sets the context for everything else.

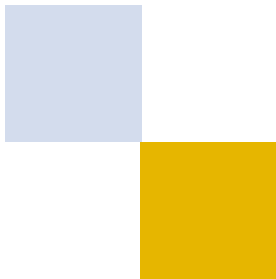
Cybersecurity, which never used to be an issue in the industry but which is now a cause for extreme concern with governments and commercial organizations alike. Critical National Infrastructure (CNI) is relentlessly targeted by bad actors, many of them funded by governments, and the battle to keep supplies safe never ends.

Regulation, with tighter legal constraints every year designed to manage an orderly commercial marketplace, while meeting the carbon emissions targets set by governments and international bodies, without jeopardizing economic goals. Regulations must also ensure fairness and good quality service to customers, while enabling investment in new technologies and fostering adequate forward planning.

And of course, as already noted earlier, the greatest factor in driving change is the **Climate Crisis**, with the world still hoping to keep average temperature rises to 1.50 C, while finding it hard to agree on the actions needed to make this happen.

In an industry and market as huge and complex as this, data is the single factor that holds everything together. Creating and managing integrated data flows right across the industry enables everything from enhanced agility to better customer responsiveness; from early identification of potential issues to performance optimization.

As the industry aims to become more sustainable, efficient and carbon neutral, the need for integrated digital platforms as the foundation for systems and solutions across the marketplace becomes more urgent. In the rest of this paper we will look at how we can build such platforms, the kinds of tools we need and the potential outcomes we can deliver.

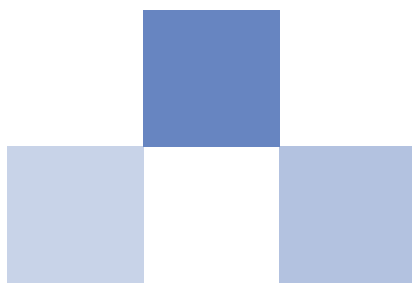


BUILDING A SUSTAINABLE INDUSTRY

The energy industry is facing one great challenge: becoming truly sustainable right across its operations. Although the industry is extremely diverse, ranging from huge corporations to small-scale energy retailers, the need to become more sustainable connects them all. So how are they facing this challenge?

Decarbonization

The world needs its most carbon-heavy industry to reduce emissions and pollution, permanently, efficiently and quickly. That means corporations moving fast to a low carbon future will gain an immediate competitive advantage.



Energy companies cite regulatory pressure as a key driver for their moves to more sustainable business models, and this driving a strong commitment to decarbonization across the value chain, with most extractive industry players, in particular, targeting carbon neutral status by 2050. Key factors in achieving this goal include:

- Introducing a higher proportion of renewables into power generation, which explains why investment in offshore wind and onshore solar is growing rapidly.
- Monitoring and managing supply chains. Under the Scope 3 targets set by the UN, corporations are fully accountable for emissions across their supply chains and must ensure full audit of suppliers and transport networks.
- Reducing waste and emissions in all operations, which includes everything from higher levels of recycling to use of electric vehicles, and from better insulation to low energy lighting and much, much more.
- Fostering wider usage of low carbon options in products taken to market, transport networks and power grids.

The indications are that energy businesses are working hard to decarbonize but there is still a long way to go. As we will see, the basic requirement for monitoring carbon emissions and driving them down is access to data: which is the key to all effective change.

Investment opportunities

Key characteristics of the wider energy market include high capital costs, margins that are often low, and intense competitive pressure. To stay profitable in this environment is not easy and requires business leaders to manage their investment priorities with care, continuously seek new ways to keep customer satisfaction high, and relentlessly improve operational efficiency.

NTT DATA's own research shows that 63% of all investments made by energy utilities is focused on technology related to generation, distribution and sale of energy. Further analysis shows interesting trends: the largest single investment by major players, for example, went into decentralized energy, enabling greater flexibility in distribution grids and stronger emphasis on locally generated energy.

The third highest investment (just after large-scale renewables, and very much greater than battery storage) went into AI and data analytics. This reflects our view that management technologies, used for purposes as diverse as proactive maintenance, smart infrastructure management, right through to SaaS solutions for improved customer experience, are seen as central to long-term planning.

Other major investments reveal some interesting new priorities. As traditional infrastructure is gradually taken out of service (refineries, for example), so opportunities arise for changes in use, with reconfiguration for renewables being a top priority. We also see rapid growth in electric vehicle infrastructure investments, as energy companies engage more closely with new usage patterns across the wider economy.

Capital planning and new business models

Moving to a more sustainable business model often involves heavy investment, and energy companies need to manage their costs with the greatest of care, especially in view of labor shortages, rising costs of people, equipment and transportation.

We are seeing new forms of business partnership to encourage risk-sharing, use of IoT and Cloud to manage assets proactively (safeguarding existing and new investments, ensuring maximum productivity and reducing costly downtime). Given the more complex mix of assets under management today (gas turbines, wind turbines- many offshore, solar arrays, nuclear plants and all the cabling and substations within distribution networks) this can be extremely challenging.



Energy companies are looking actively for new business models and are moving capital into those that appear to have the most sustainable, long-term future. Emerging options include:

- All-electric mobility infrastructure, which may look very different from the network of filling stations and road networks we are now used to. Different partnerships are becoming viable (with leisure centers, for example, replacing roadside stations for charging vehicles), while growing EV fleets are leading to two-way energy flows (with large fleets acting as grid storage batteries when not in use).
- Public and private developments, with energy companies contributing cash and expertise into creation of municipal heat pumps, local power generation through individual solar panels, creation of virtual energy companies and better use of multi-directional energy flows.
- Advanced retail systems, with a strong focus on consulting, advice to consumers, commercial contracts and much richer and more effective levels of customer service.

Across this complex marketplace, therefore, the move to more sustainable models not only challenges existing methods, it also opens up remarkable and often attractive new opportunities. Energy companies need the ability to analyze options, understand the best opportunities for their own business, and be agile enough to move fast in exploiting them.

To do this effectively, they must have not only a more efficient physical infrastructure but a completely new approach to their digital infrastructure.

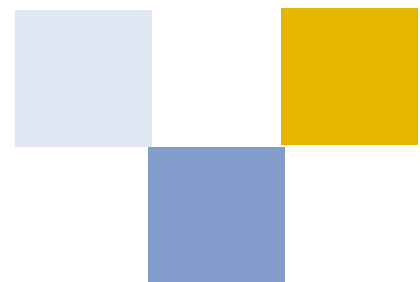


Digital transformation

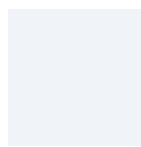
Digitization has been happening across the Oil & Gas industry, in particular, for decades, and one of the earliest applications for mass use of distributed sensors was in oil and gas fields. Combined with centralized control rooms, these systems enabled real time monitoring of production, early identification of issues and reductions in leakages and other environmental problems.

We are now seeing the entire extended and integrated energy value chain being extensively digitized, through initiatives related to:

- Distribution networks, with continuous monitoring of substation performance to optimize energy flows and manage rapid changes in demand to avoid outages.
- Customer-focused services, using smarter systems to ensure accurate measurement of power use, rapid response to faults and trouble-free billing.
- Smart city solutions, with energy use a key factor in managing everything from public transport to air pollution to essential public services.
- Planning, with use of digital twins to test scenarios and optimize future investments, identifying and maximizing the potential of new opportunities.



Energy companies were pioneers in use of strategic digitization, rightly seeing this as a key factor in driving greater operational efficiencies and making their businesses more resilient. As the market is constantly transformed and the drive for Net Zero becomes more urgent, so digitization is proving to be the most important of all strategic tools in managing this process of change.



TECHNOLOGY AS A VALUE DRIVER

The global energy market is complex and influential. Without major transformational change in our power generation and distribution networks we have no chance of meeting Net Zero targets. What happens in this industry does not just affect shareholders, therefore, but all of us. We believe that effective use of technology will enable the entire Energy industry meet its challenging goals by delivering higher performance in every key area.

Focus on Production and Delivery

Energy production companies are adopting the same kind of "smart management" techniques that are now revolutionizing many areas of manufacturing. Using such tools as real-time data analytics, machine learning algorithms and automation driven by intelligent edge devices, producers can:

- Manage fleets of assets with exceptional efficiency, using AI-aided remote monitoring and management centers to optimize production across complete production landscapes.
- Use automation for a growing range of production stages. With machine learning algorithms and some forms of AI, we will see a transformation in clean productivity through automation in the near future.
- Ensure longer asset life through predictive maintenance and optimization, while also enabling proactive intervention when needed. Assets not only last for longer, they can be kept in best practice condition through updates and retrofits, further enhancing operational efficiency.

As networks become better connected and more responsive, with distributed intelligence throughout, so continuous fine-tuning and optimization will become the norm. The ability to use digital twins for scenario planning and testing will also enable future distribution grids to become more efficient, with potentially lower maintenance and management costs, even though capacity is set to grow.

The future networks on which the industry will be built should make integrated planning and management easier than in the past. Backed by continuously updated security protection, we expect to see a production and distribution environment that is increasingly efficient, much less wasteful and far greener.

Focus on Customer Management

Use of real time data has the potential to deliver a step-change in all aspects of customer services, and this is a key requirement for the energy market. Energy distribution, after all, is a branch of the retail industry and, for customer care, retailing rules must be applied. It has become easier for both household and business customers to switch suppliers, and in normal times, millions of them do exactly that across Europe, every year.

In the emerging world of bi-directional grids, of course, we are also seeing the appearance of micro-producers, including Virtual Power Companies, which not only buy power from the grid but also sell to it. The rise of large Electric Vehicle fleets, for example, means that some large businesses are experimenting with using their EV batteries as storage capacity for the grid when they are not in use. These developments are challenging the very idea of what it means to be an energy retailer.

In this less predictable, more dynamic marketplace, the questions for every participant remain: how to build loyalty, how to help customers achieve maximum value for money, how to enable more open participation in the market, and how to provide added value, premium services (which customers are happy to pay for) as a way of improving margins?

In light of the ongoing energy crisis across Europe, with prices at unprecedented levels and ongoing competition for gas supplies, it is also critical to help customers manage their use of power more effectively and ensure costs are kept to a reasonable level. Modern digital management systems can help by:

- Proactively helping customers to manage their energy usage and costs more efficiently, building loyalty and potentially growing service revenue.
- Use smart meter data to manage energy availability to customers, incentivizing them to use off-peak power, saving money and raising reliability.
- Transform customer relationships by understanding usage patterns in greater depth, while enhancing satisfaction through smart billing and practical advice.

Service is the key to loyalty in this market, and data analytics form the key to service quality. Cloud-based data collection and analysis can transform the quality of relationships in the market but, potentially even more important, it will lead to more sustainable supply and use of power, which is good for customers and suppliers, alike.



Platforms and Ecosystems

One of the major outcomes of moving to Cloud is a greater reliance on the use of “digital native” operational processes. These are based on platforms (rather than products), collaboration (rather than purely in-house working) and composable solutions (built from standard components, rather than proprietary systems).

This is a new way of thinking and behaving, which is affecting some markets faster than others. For the energy market, the ability to show greater flexibility by maximizing the potential of cloud will be a competitive indicator from now on. We expect to see energy production, distribution and retail businesses:

- Developing new service offers collaboratively, with partners, reducing their own costs and risks, while bringing new value propositions to market faster.
- Using digital twins based in the cloud to plan more efficiently, and test more thoroughly, optimizing grid design, enhancing the potential of everything from security management to cable layout.
- Make better use of IoT devices and Edge based automation to enhance performance of production assets, from wind turbines to substations, while extending asset life and improving availability.
- Use SaaS based tools and products to deliver improved, more responsive services to customers.

As we have already seen, data is the key unifying factor in this highly complex industry. The priority task for every energy business today is to rationalize and strengthen its architecture so it can use the growing flood of data now available to improve operational efficiency, radically enhance planning and collaboration, deliver a step-change in environmental performance and also transform service levels.

The need for Transformation

Change is already transforming the energy market, and we are convinced that every business right across the industry will need to rethink key elements of their culture, organization, working methods, use of technology and business relationships to survive and prosper in a challenging environment as:

Markets evolve to address the climate crisis, with a rapid move to renewables, changes to distribution grids due to the rise of electric vehicles, and introduction of smart data analytics to provide new tools for planning and operations management.

Cloud transformation accelerates to ensure that energy companies carry out their own journey to cloud and then focus on making their applications, solutions and core processes truly digital native.

Organizations develop into a world of ecosystem-based collaboration, challenging long-established cultures and management norms.

There has never been more urgency about the need for change in all these different dimensions. NTT DATA has exceptional domain knowledge, cloud and networking leadership, and these capabilities are helping energy utilities face the challenge of transformation successfully today.

Finally, let's briefly summarize how this novel approach to transforming services relates to businesses in the three main energy segments: Production, Distribution and Retail.

In Production, this translates into better data analytics, which enables:

- Real-time monitoring and early alerts.
- Use of IoT networks to ensure better unified views of asset fleet condition.
- Use of Edge devices and hyperautomation to enable rapid intervention as and when needed (before issues turn into problems).
- Development of effective proactive maintenance regimes to reduce downtime and raise availability levels.
- Advanced levels of cybersecurity to safeguard assets against attack by bad actors of different kinds.

For distribution networks, better use of data includes:

- More accurate and effective advance planning, using digital twins, modelling and scenarios to test future requirements more accurately.
- Data analytics also permits rapid optimization of grids as they are today, while also ensuring that future grid development is as efficient as possible.
- Research from the University of Wuppertal project suggests that it is possible to expand grid capacity by over 50% in the next decade, while actually reducing total maintenance costs.

For retail and customer care, effective data analytics permits:

- Proactive service to customers, enabling them to optimize their own power usage, while providing more flexible support and payment options.
- The ability to improve efficiency and reliability of all support systems, from fitting of distributed renewables (small scale solar panels, for example) to smart meters and smart billing.
- Added value options include advice and hands-on support for energy efficiency, through to fitting of EV charging points.

In all these cases, the ability to analyze power availability and demand, together with advanced customer service techniques can be used to deliver on the broader goals set by regulators and the wider market.

To maximize the potential of data and advanced analytical tools, the entire energy utilities industry, in all its breadth and complexity, needs to develop ways to combine management of Operational Technology with core business systems. That is how we can deliver a unified view of the entire *landscape* to decision-makers and enable highest levels of operational efficiency.

A STRONGER CORE— WITH SAP

NTT DATA is a Platinum partner with SAP worldwide and is a leading innovator in developing practical, efficient and proven SAP-based tools for strategic decision-makers and operational management teams, alike. We build on and add value to the SAP vision for energy, which can be summarized in the following way:

SAP vision for Energy

SAP believes that the future for energy companies of every kind depends on five key factors:

Sustainable Energy Transition. As the move to renewables continues to accelerate so all power generation companies need to manage their own transition to more sustainable business models. This can mean everything from divesting from fossil fuels and investing in wind or solar power. It also means rethinking every element of their value chains to remove carbon at every stage.

We are also seeing a rise in new business models, as the downstream energy world moves from direct use of fossil fuels to an all-electric world, in which power grids need to double capacity and most of that energy will come from renewable sources. By making full use of SAP's integrated management platform, energy companies are identifying opportunities in transition for new value propositions.

For example, they can combine smart management of EV charging infrastructure with new value propositions directed at consumers, backed by seamless payment, loyalty and reward schemes, all based on the end-to-end processes enabled by the SAP core.



Digital Operational excellence. In production (in oil and gas fields, or wind farms and solar parks) through to generation and distribution, energy companies are using digital technologies as a key factor in driving higher levels of operational efficiency. As we have already seen, Oil Majors were early movers in the use of sensor arrays and centralized control rooms to manage their operations, and use of rich data and advanced automation options is driving higher levels of efficiency all the time.

Integrating multiple ERP systems on a single SAP platform has been proven to deliver cost reductions of at least 10% across all operations. Using SAP Industry 4.0 solutions, based on cloud-enabled S/4 HANA, simplifies and accelerates core processes, using machine learning algorithms and distributed intelligence on Edge devices to automate increasing numbers of process stages. This enables energy companies to manage inventory, optimize use of assets, ensure availability, reduce risks and improve ROI: all as a result of digitization.

Customer Intimacy. We have already seen how important it is to manage customer relationships in a liberalized energy marketplace, where customers are free to move to new suppliers that act as retailers, which makes it vital to prioritize customer understanding and customer satisfaction as a way of avoiding giving customers a reason to move. This is not simply about providing good service: it is also about the quality of Customer Experience. We believe that energy retailers need to build an entirely new form of relationship with their end user customers, who may number millions in some cases, through effective use of automated tools, simple to understand self-service and proactive management, enabled by technology. The ultimate goal is not simply to achieve higher levels of efficiency but to deliver a better, more satisfying experience to every customer.

By combining smart meters, evaluation of usage patterns and intelligent billing, it is possible for retailers to help customers achieve the best outcomes for their own interests, making sure they do not overpay and make use of all options for everything from off peak sales to insulation. By integrating data analytics with CRM and billing, we can deliver a win-win approach, ensuring better cashflow and fewer debtors for the service provider. By making more creative use of online technologies and digital systems, we can deliver much more high-quality experiences to the customer. This delivers better value for money, combined with ease of use and satisfaction. These are the true keys to loyalty.

Competing as an Ecosystem. As the industry moves towards a circular economy model, so the need for better management of ecosystems increases. In particular, large enterprises are now more accountable for activities right across their supply chains than at any time in the past. The transition to sustainable sources means that major energy companies will move from being (for example) integrated Oil & Gas companies to multi-energy conglomerates, in which they will exercise indirect, rather than direct operational control over large parts of their value chains.

Ecosystem working will increasingly be based, not simply on ad hoc agreements between individual businesses, but on shared use of core infrastructure. Those businesses collaborating on management of assets across a large distribution network (to give one example), will share access via role-based management to a “shared” IT system. This enables one collaborative partner to plan for maintenance, a separate specialist partner to use the same system for planning asset update, a manager in the distribution company to plan for the required downtime, and an individual engineering team to update the shared environment once the work has been completed.

This use of a shared-access business network, enabled by SAP, delivers better collaborative working, enabled by rich data flows, real-time analytics and high levels of automation, all made possible by the seamless end to end processes. The role of an SAP-enabled core in this form of agile, ecosystem working is extremely important, enabling better planning, scheduling, budgeting, operational control and security.

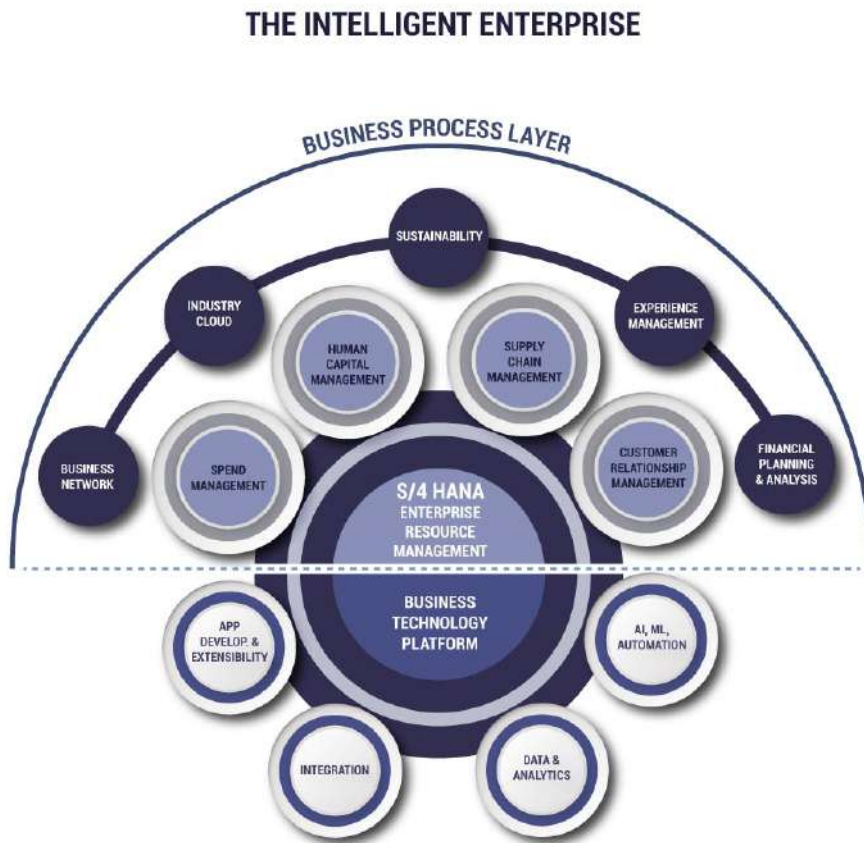
Use Technology to unlock new revenue streams. The future energy industry will be enabled by physical and virtual technologies, from IoT and Edge devices (key drivers for data collection and automation) to integrated processes that enable more responsive management of everything from assets to billing and payments. Perhaps even more significant is the way that data analytics and automation is being used for predictive and proactive intervention to cut downtime, extend asset life and improve operational performance. It is now quite normal to cut unplanned downtime by around 15% and reduce maintenance costs by a further 10%. Potentially that adds a lot of money to the bottom line.

NTT DATA works closely with SAP to deliver maximum value from existing and future investments in core SAP-based systems. Our approach builds on SAP to deliver an integrated data-enabled architecture, which has strongly “digital native” characteristics, together with an increased role for automation enabled by intelligent Edge devices. This approach is outlined below.



The Enabling Architecture

The NTT DATA / SAP joint architecture is shown in the diagram below:



This architectural model is adapted for the energy sector from the Master (Top-Level) approach developed by NTT DATA for implementing S/4 HANA and using this to manage all back-office systems. This schematic representation focuses on the Commercial Macro Process (which is where differentiation by industry is most important) and does not include such functions as HR and Supply Chain in detail, which tend to remain standard across industries.

The model includes four main areas of specialized activity:

Process Management. This is where all core processes are collaboratively developed, managed and delivered into the market. These include product definition, billing, customer experience, planning, capital management and many others. In this area, Applications workflow and User Interface tools are included to enable customization for specific corporate needs. We call this the *Intelligent Front Office*.

Applications. The core SAP layer is located here, based around S/4 HANA for Utilities. We use what is known as the “orbital approach”, with S/4 HANA for Utilities at the center. This forms the finance and operational core, with some industry-specific tools (such as Convergent Invoicing or Contract Accounting) built in. Orbiting the center is a layer that includes industry-specific standard SAP applications, such as SAP Asset Intelligent Network or SAP Cloud for Energy, which carry out highly specialized activities (asset management or data gathering and analysis from meters).

In a further orbital layer, there may be process-specific applications, including Qualtrics for customer experience management, or CRM for marketing a commerce. Some businesses also require an additional layer for other macro-processes (such as Human Capital Management), and could include SAP Success Factors or SAP Concur. The Industry Cloud is also at this level, providing interfaces with partner applications and managing experiences, security and sustainability. Systems of record are based here in the Intelligent Back Office.

Core Technology. This is where we base all enabling tools, including Master Data, Real Time Analytics, Integration tools (APIs and Microservices), process orchestration and exception management. We are likely to base this on SAP Business Technology Platform (BTP), which acts as the Extensibility and Integration platform for the entire environment. This is also where we will base the growing range of emerging enabling tools, such as RPA, Machine Learning and Advanced Analytics.

Hosting. Energy customers have the option to host within an NTT DATA or SAP datacenter (if they are not yet ready for a wholesale move to cloud) or within a secure environment at a hyperscale center. In each case they will receive a “cloudlike” service that enables the agility, scalability and speed they require, but with the security provisioning and management that is best for their specific needs.

Our architecture delivers a wide range of benefits, right across the industry:

- By interfacing with specialized software offers and services, it is possible to integrate OT-focused solutions with core business services. This accelerates and simplifies planning, testing and integrated management, without compromise on security.
- By creating an integrated architecture, we simplify straight-through processing for even the largest businesses, giving decision makers and operational management a single version of the truth in real time and across their entire systems landscape.
- Because our approach is inherently modular, the model can integrate with specific components delivered by other software vendors. We can therefore enable an agile, efficient and simple to use approach to customer services.

- We then provide customers with a growing menu of easy-to-use service options, which they can select, customize and adapt to their exact- and always evolving-needs.
- For distribution and generation enterprises, SAP provides the management environment they need to plan and execute business strategy, while also delivering the essential interfacing needed for secure data flows from their OT environment.

NTT DATA uses a range of tools and enablers, provided by suppliers such as Qualtrics, as well as SAP's own Asset Intelligence Network and Business Technology Platform (BTP). Taken together, these platforms and application suites provide a solid enabling core that integrates processes and data from right across the extended business ecosystem. NTT DATA builds on this solid foundation to provide customized, highly capable solutions precisely crafted to the needs of individual businesses.



PART FIVE: NTT DATA AND SAP

NTT DATA is not only an SAP Platinum partner but also one of a small number of Global Service Partners, defined by leading analysts as a global leader in the field. Thanks to our industrial heritage, as part of the wider NTT Group, we are also a major researcher and innovator in our own right. In particular, we have exceptional capabilities in managing both IT and OT (Operational Technology) systems, enabling us to provide integrated solutions across what has always been a major divide, and one that still presents challenges to more narrowly focused systems integrators.

NTT DATA is a major player in the energy field as an SAP partner, with award-winning performance in a large number of key focus areas. The real market examples given below provide just a few of the many projects that illustrate the range of our capabilities.

Digital Operational Excellence. The *Avangrid Technical Inspection* system is a key example of our work in this area, winning the 2022 SAP Innovation award. Working with a major US based sustainable energy company, NTT DATA used the full capabilities of SAP's Business Technology Platform (BTP) and Edge device intelligence to create an inspection solution that uses high resolution cameras to inspect assets and connections. The manpower requirement has been cut, while diagnostic accuracy has increased dramatically. Efficiency is now 30% higher, time required is cut by 40% and overall diagnostic reliability is up by 70%.

Customer Intimacy. We worked with one of the world's leading integrated energy businesses, with interests that range of oil exploration to managing a national and international fuel retail network. We implemented our highly scalable *Qualtrics* tool to collect both structured and unstructured customer feedback, providing the most detailed analysis of customer views, leading to major changes designed to enhance customer experience and improve competitive performance.

Unlocking Value with Technology. NTT DATA has worked with local government and utilities on the popular island of Rønø in Denmark to manage scarce and costly water supplies. By using IoT sensors and real time analytics, all enabled by the SAP BTP, we are able to measure, predict and prepare for water usage with much greater accuracy than before. This has enabled active management of resources, leading to a more than 18% reduction in water use by "nudge" techniques. This experience shows how important data analytics and active management can be in saving resources of every kind.

Sustainable Energy Transition. Finally, we know that sustainability is the greatest of all challenges facing the energy industry today. Our *Umbiombu* tool enables businesses to track CSR initiatives of every kind, making it easy for employees to get involved and play a personal role in performance improvement. It is one example of how NTT DATA invests in sustainability itself and simplifies participation by all its own customers.

The Energy marketplace is exceptionally broad in scope and strategically vital to every aspect of our lives. The fact that it is going through a period of change unprecedented in speed and scale is necessary but also comes with risks that may affect us all. NTT DATA partners with SAP to ensure evolutionary change with the lowest possible risk of disruption, while delivering greater energy security to business customers and society as a whole.

We are fighting for the future of the planet and the energy industry is right there, on the front line. We need to transition to a low carbon future as fast as possible, for everyone's sake. The partnership between NTT DATA and SAP is delivering solution today that will ensure a better tomorrow for us all.



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COO CZ, Head of Utilities Solutions



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NAOYA SATOMI

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