OCTAVE

eBook

Accelerating energy transition projects

How energy sector organizations can expedite next-gen sustainable energy projects to meet growing demand, through advanced digital transformation

Contents

1	The energy transition imperative	04
2	Focus on renewables and nuclear power	05
3	Near term: What capabilities need to be built?	08
4	Longer term: How do we maximize efficiency and control?	10
5	Aligning digital transformation strategy with the energy transition	13
6	Introducing enterprise project performance	16
7	Power the energy transition with EPP	18

Introduction

Octave helps organizations plan, design, construct and operate more profitable, safe and sustainable industrial facilities.

For more than 20 years, Octave has worked with leading companies in the power and utilities industry, including power generators, transmission and distribution organizations, engineering, procurement and construction firms and equipment manufacturers, to deliver exceptional performance throughout the full lifecycle of projects and portfolios.

The energy transition imperative

The global power and utilities sector prepares for significant growth in electricity demand, driven by factors including population growth, electrification in the transportation and industry sectors and the rise of data centers to support next-generation AI use cases.

Power and utilities organizations must meet this demand while delivering on growing societal and business expectations for a clean energy transition. For instance, a study in 2024 by Climate Impact Partners found that 45% of Fortune Global 500 companies have now set a net-zero target, compared to just 8% in 2020[1].

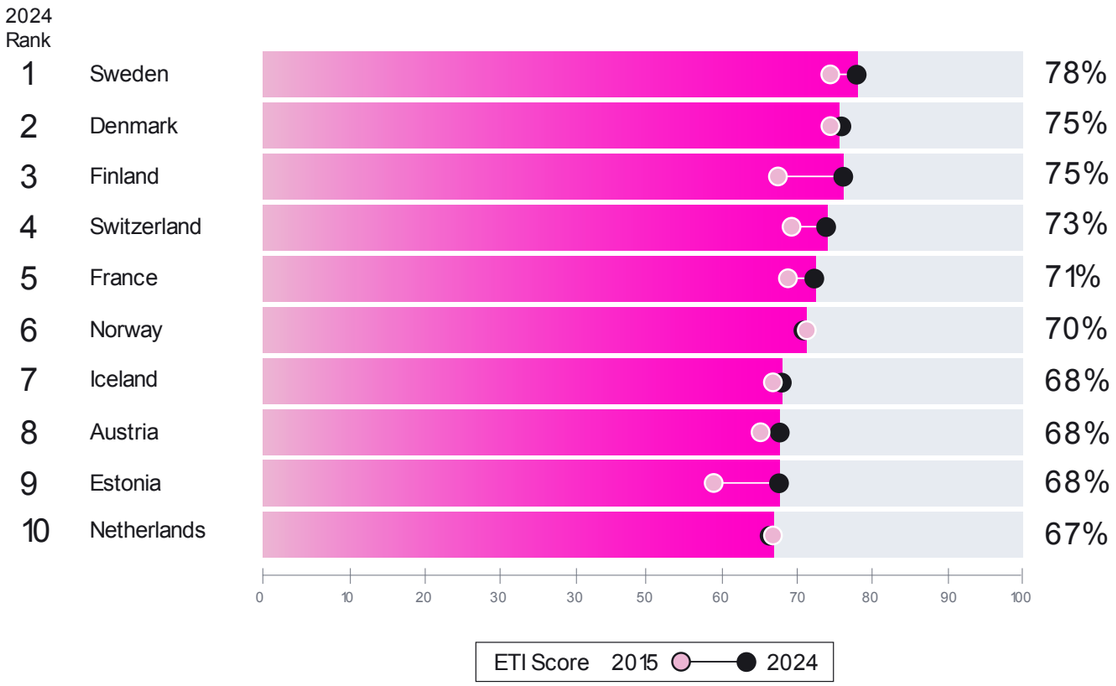
In terms of progress, the World Economic Forum (WEF) Energy Transition Index for 2024[2] notes that Nordic, Scandinavian and Western European countries lead the way in sustainable energy – setting benchmarks for others.

Global shift

Globally, organizations adjust their capital and operational investments to align with sustainability goals. Emerging markets in Asia and Africa, for example, increasingly adopt energy transition objectives. In this eBook, Octave takes an in-depth look at the key challenges of the energy transition and outlines a future-fit technology strategy for accelerating progress.

Fostering effective energy transition

Energy transition index 2024: Top 10 countries



Note: The Energy Transition Index benchmarks countries on the performance of their energy system, as well as their readiness for transition to an equitable, secure and sustainable future energy system. ETI 2024 scorex on a scale of 0-100.

Source: World Economic Forum, Fostering Effective Energy Transition 2024. Read more at wef.ch/energy24.

[1] Quiet Climate Action, 2024, Climate Impact Partner
[2] Fostering Effective Energy Transition: Insight Report, June 2024, WEF

Focus on renewables and nuclear power

The WEF Energy Transition Index notes that power industry markets were previously largely driven by demand growth and infrastructure development, providing consistent work for power generators, transmission and distribution companies, equipment manufacturers and EPC firms.

However, the WEF observes that today's environment emphasizes sustainable investment, pushing power industry organizations across regions to pivot from expansion alone toward projects that prioritize efficiency, renewable energy integration and lower emissions.

In the U.S. alone, it notes, "companies have committed more than $242 billion in new investments to build the clean energy economy, including EVs, batteries and energy storage, clean energy manufacturing and clean power generation, among others."

The WEF also notes that nuclear power has a vital role to play in accelerating the energy transition. In its November 2024 article Meeting global climate goals requires a step change in nuclear investment[3], it comments: "Nuclear power is now officially recognized as crucial for global decarbonization, complementing renewables such as wind and solar."

It adds: "Tripling nuclear capacity by 2050 requires annual investments to grow... to $150 billion, driven by public-private partnerships and new financial mechanisms." In terms of current progress, the International Energy Agency's World Energy Investment 20244 report states: "Total investment in nuclear is projected to reach $80 billion in 2024, nearly double the 2018 level."

[3] Meeting global climate goals requires a step change in nuclear investment, November 2024, WEF
[4] World Energy Investment 2024, June 2024, IEA

Transformed business models

To truly accelerate the energy transition and take advantage of its fast-emerging opportunities, power organizations must reassess their strategies. In its 2024 study "Expanding and modernizing the power grid for a clean energy transition"[5], the Deloitte Research Center for Energy & Industrials identifies a need to "reinvent the electric company model." This, it says, can be achieved through:

01

Offering utility-as-a-platform services

Transforming utilities into platform providers, facilitating energy services beyond simple electricity delivery.

02

Adopting energy-as-a-service models

Enabling the adoption of a subscription model for personalized energy services, allowing businesses and consumers to pay for energy use without owning the infrastructure.

03

Aligning rates and contracts with real-time market dynamics through dynamic pricing models

Positioning power companies as central facilitators in an energy marketplace.

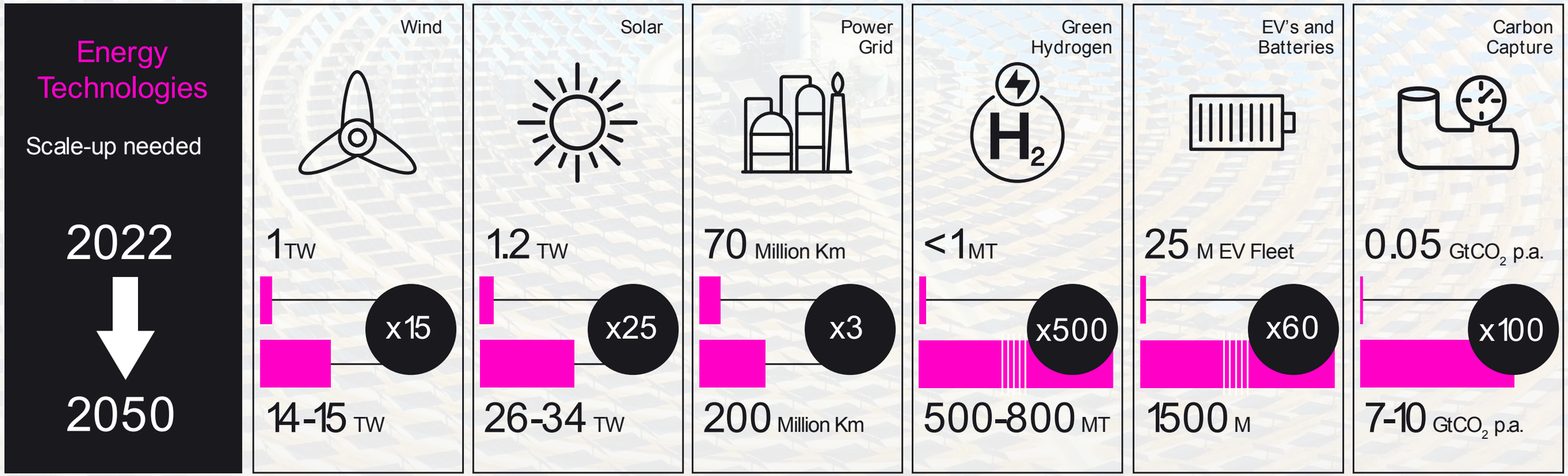
Getting this model right promises a future in which the industry has far greater positive influence on the environment than any negative impact of its operations. The Energy Transitions Commission, in its paper Material and Resource Requirements for the Energy Transition[6], shares a vision for an optimal clean energy system in 2050:

"A clean energy system will have the single biggest impact on limiting global warming and avoiding the environmental impacts of climate change. These avoided impacts are dramatically larger than the environmental impacts associated with a clean energy system."

> *"A clean energy system will have the single biggest impact on limiting global warming and avoiding the environmental impacts of climate change."*
>
> **Energy Transitions Commission**

[5] Expanding and modernizing the power grid for a clean energy transition, 2024, Deloitte Research Center for Energy & Industrials
[6] Material and Resource Requirements for the Energy Transition, July 2023, Energy Transitions Commission

The clean energy system in 2050



Note: Graphic from the Energy Transitions Commission (2023) illustrating the envisioned clean energy system of 2050. It highlights a comprehensive integration of renewable energy sources, advanced grid technologies, and sustainable infrastructure. The emphasis is on a shift toward solar, wind, and energy storage solutions - aiming for a carbon-neutral future. The system underscores the importance of innovation and strategic planning in achieving global sustainability goals.

Near term: What capabilities need to be built?

As they play their part in accelerating the energy transition, power and utilities companies will need the agility to continually face unprecedented industry changes that intensify competition and increase complexity.

Profit margins will continue to be pressured, and the margin for error further reduced. Across the industry, organizations must constantly adapt to survive:

Utilities companies

Utilities businesses will need to manage a broader and more complex portfolio of projects as the industry transforms. They must therefore update infrastructure for grid security and protection against cyber-attacks. Additionally, they need to continually demonstrate a strategy that meets clean energy expectations from customers and investors.

Renewables developers

As the industry's focus shifts further toward renewables, new entrants make the space increasingly competitive. Companies must be able to differentiate themselves to survive and grow. This means being able to identify and deliver projects that provide expected business benefits while furthering organizational strategy.

Equipment manufacturers

Equipment manufacturers must be flexible and efficient to secure their future place in the market. They need to be able to deal with falling demand in traditional power segments and an increased focus on renewables. Staying competitive means being able to provide the equipment required for today's projects, such as hydrogen-fueled gas turbines.

Engineering, procurement and construction companies (EPCs)

As power generation becomes more distributed, EPCs need to be able to deliver a wider range of project types. For many capital projects, EPCs drive process maturity. Developing strong processes and delivering future projects efficiently and consistently gives EPCs lasting competitive advantages.

Regulatory requirements

Power and utilities companies have long operated in a high-risk environment. They must remain in compliance with ever-evolving health and safety regulations. This can be a huge challenge, especially for global and integrated power companies. Each country and project type imposes its own regulations that can affect project planning and execution.

In the U.S., for example, the Federal Energy Regulatory Commission has varying requirements depending on the project. Hydropower projects are subject to specific licensing, safety and inspection compliance guidelines. The National Association of Regulatory Utility Commissioners controls the placement and construction of power-generating plants and transmission lines. Renewables projects that receive funding from the office of Energy Efficiency and Renewable Energy must produce quarterly, annual and final reports on progress and financials. And, of course, organizations must always be ready for more regulatory shifts as governmental leadership changes.

In Europe, meanwhile, the EU's Energy Efficiency Directive requires all energy companies to achieve yearly energy savings of 1.5% of annual revenue, and individual EU countries can implement additional measures such as CO2 taxes.

Power and utilities organizations need future-fit systems in place to efficiently and accurately calculate project risks, assess business case and resource scenarios and continually comply with regulations.

Strong organizational change management capabilities are a must for operating with agility and flexibility in such a climate, ensuring consistent changes across the enterprise where applicable.

"Power organizations need future-fit systems in place to efficiently and accurately calculate project risks, assess business case and resource scenarios and continually comply with myriad regulations."

Longer term: How do we maximize efficiency and control?

To accelerate development and fully realize the benefits of the energy transition for the long term, power and utilities companies will need consistently high project performance.

That means making better use of capital spend, evaluating and prioritizing potential projects and selecting those that will provide the greatest benefit. Then, deliver all projects efficiently and in a way that enables accurate comparison to one another.

Many power and utilities organizations have a vast number of concurrent projects in planning and execution, sometimes more than 10,000. To achieve high project performance at scale, there needs to be consistency in data, work processes and best practices across regions, departments and business units. That way organizations will:

1. Maximize the efficiency of people, processes and tools across the organization.
2. Provide stronger governance and controls to prevent cost and schedule overruns.
3. Manage resources effectively across projects and portfolios.
4. Ensure all projects contribute to organizational goals.
5. Improve project predictability.

Power and utilities companies must also create lasting value from newly emerging sustainability and distributed energy resource strategies. That means being able to execute new types of projects at high performance as well.

For example, as the industry executes more non-hydro renewables projects, project controls will become more important than ever. With higher up-front investment costs and greater public interest, companies cannot afford overruns (see graphic on the next page for projections of project cost rises to 2040, from the 2020 baseline).

A centralized project performance system

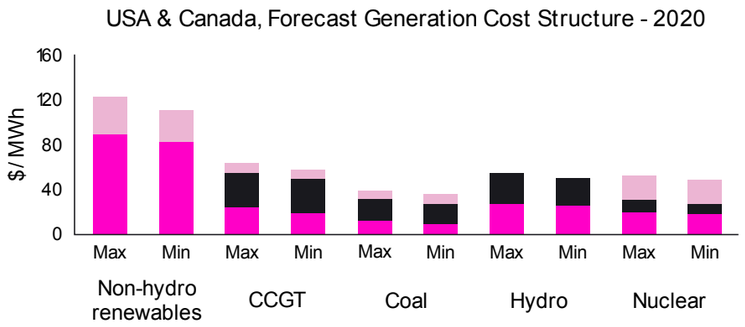
Using a single centralized project performance system enables you to score, select and execute projects that align with long-term strategy. It simplifies portfolio management and allows you to constantly reevaluate your portfolio to ensure you are optimizing your mix of projects to best meet business goals. It also provides greater visibility and control across all projects for more informed decision-making to optimize resources and capital plans.

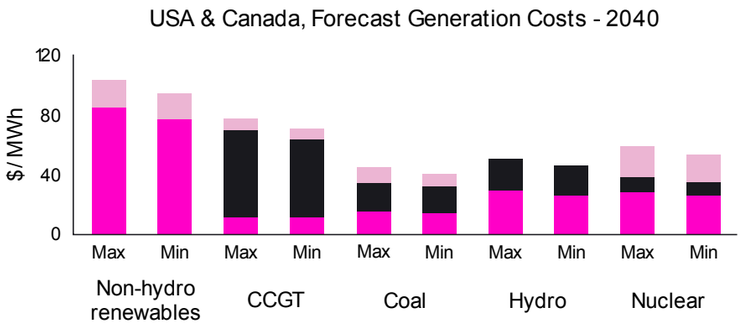
Too often, only large projects experience appropriate structure, governance and controls, leaving small projects to use manual processes such as Excel spreadsheets. As a result, small projects are more likely to overrun. A 10% overrun on a small project might seem minor, but multiplied across thousands of projects, the impact adds up fast.

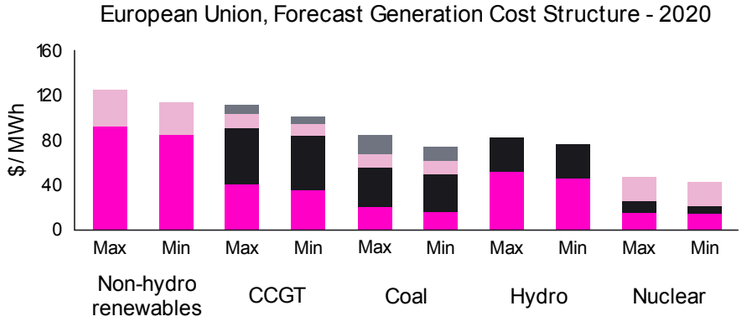
A single system for project data also allows you to standardize best practices across projects to ensure efficient project execution from small maintenance projects to new facility mega projects. You will also be able to collect and view valuable project data to support continuous improvements to future estimating and benchmarking processes.

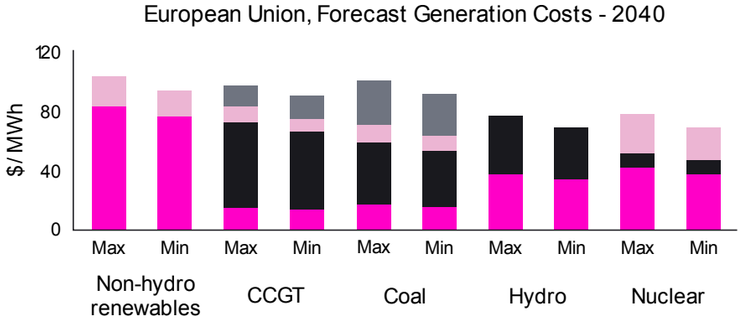
"When done right – that is, by focusing on the biggest risks and rethinking where dollars are spent – we estimate that utilities can deploy their capital as much as 20 % more efficiently."

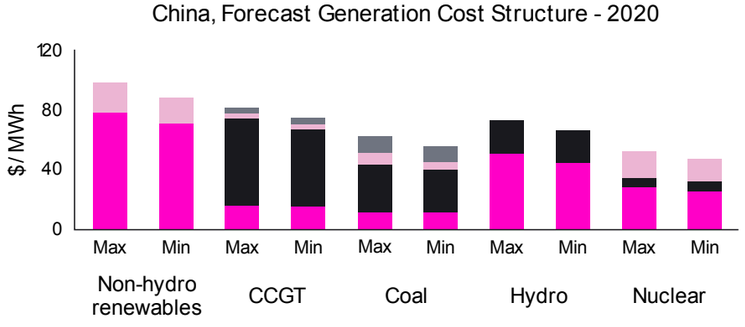
Generation cost structure in different areas (2020 & 2040)

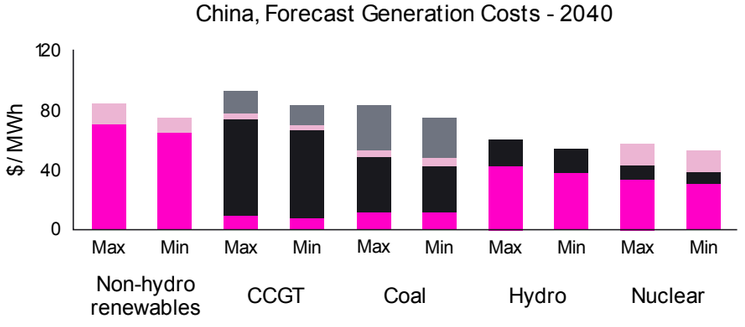












Note: Source: Deloitte Spain, "The Future of the Global Power Sector - Preparing for Emerging Opportunities and Threats"

"Leading-edge digital capabilities are a must for companies that aim to capture value in a more flexible and volatile market. For example, only companies with strong digital capabilities will be able to capture a portion of the growing value pool tied to managing customer energy demand.

Companies should also develop capabilities to remotely update products and harness AI so that they can pivot in response to market changes as available data signals that these changes are occurring."

Boston Consulting Group [7]

[7] Turbocharging the energy transition by boosting customer demand, September 2024, BCG

Aligning digital transformation strategy with the energy transition

To accelerate the energy transition, power sector organizations are aware they must accelerate their digital transformation. The sector already shows strong momentum in this area. McKinsey and HBR[8] conducted a digital maturity analysis across 22 sectors and found that energy and utilities outpaced the average rate of digitalization across 7 of 9 factors – gaining a digitalization score of 3.5 against the average of 3.025.

The digital transformation challenge continues to shift. A 2024 study by Deloitte Digital[9] found that 87% of IT leaders consider the nature of digital transformation to be changing in the wake of AI, and 95% report integration issues that impede AI adoption.

Overall, 98% of leaders report facing challenges regarding digital transformation. The key drivers include the persistence of data silos (81%) and the fragility of tightly coupled and highly dependent systems (72%). In the face of these challenges, top executives need to take greater control of digital priorities and set the conditions for successful transformation.

"Companies increasingly need each employee to bring greater digital skills to bear on every activity. That's the only way to unleash innovation and capture efficiencies at an institutional level. For executives, the first step is to identify digital priorities, keeping in mind the overall business transformation needed to maintain a competitive advantage."

Harvard Business Review

[8] Digital Transformation & Tech Adoption by Sector, 2024, WhatFix
[9] 2024 Connectivity Benchmark Report, Deloitte Digital

Addressing key transformation challenges

Management consulting business Oliver Wyman surveyed C-suite executives from leading companies and found that, while 100% attempted a digital transformation in the previous three years, only 25% succeeded.[10] Based on its findings, the organization put forward these six pieces of advice for digital transformation success:

01

Create a clear vision

The Oliver Wyman research indicated nearly half of companies with fully successful transformation efforts rallied the organization behind the need to change. Fifty-six percent of companies with unsuccessful efforts reported that their transformations lacked purpose and a shared vision.

02

Equip the workforce

Organizations successful in their digital transformations actively identify workforce requirements based on the new tools and techniques they need to deploy, over-indexing on the skills necessary to achieve future strategic objectives.

03

Share accountability

The Oliver Wyman study notes: "When organizations hold both the technology executive and business owner accountable for the transformation, the odds for success increase significantly. We call this model 'two in a box.'"

04

Focus on small goals

Organizations that establish pragmatic, bite-sized deliverables to achieve trade-offs in the context of the larger vision remain more successful. This approach demonstrates early wins, which earn buy-in for future funding and support across the organization.

05

Prioritize the highest-impact initiatives

The report notes: "Successful organizations… understand which features, processes and functions are most correlated to the business outcomes they are trying to achieve and can establish a plan focused on those that drive the greatest value, while tracking others in a backlog for future execution."

06

Ensure rigorous program management

Oliver Wyman found that most firms with successful transformation efforts highlighted significantly better program management, adding: "Executives must establish a strong program discipline that includes tracking and reporting, change management, communication strategies and escalation avenues."

As we'll discuss next, a study by EY shows how power and utilities sector leaders are looking to ensure digital transformation success can support best practices with centralized performance management.

[10] 6 steps for achieving a successful digital transformation, December 2023, Oliver Wyman

A centralized project performance management solution delivers outsized value for power organizations (see graphic, right). Connectivity between project data and achieving a single source of truth can significantly improve efficiency and data accuracy. Eliminating manual processes and errors can help organizations make better decisions faster, and lead to consistently high-performing projects. When you run thousands of concurrent projects, the impact can be gigantic.

Conversely, relying on manual processes and spreadsheets becomes a costly liability. One power generator discovered a costly $24 million copy-and-paste error in a spreadsheet. Unfortunately, this is an all-too-common occurrence. JP Morgan suffered approximately USD $6.5B in losses and fines because of several faulty equations in a spreadsheet.

These kinds of stories highlight the fact that trusting your projects to disconnected, manual processes and siloed data borders on irresponsible. It is evident that something must change.

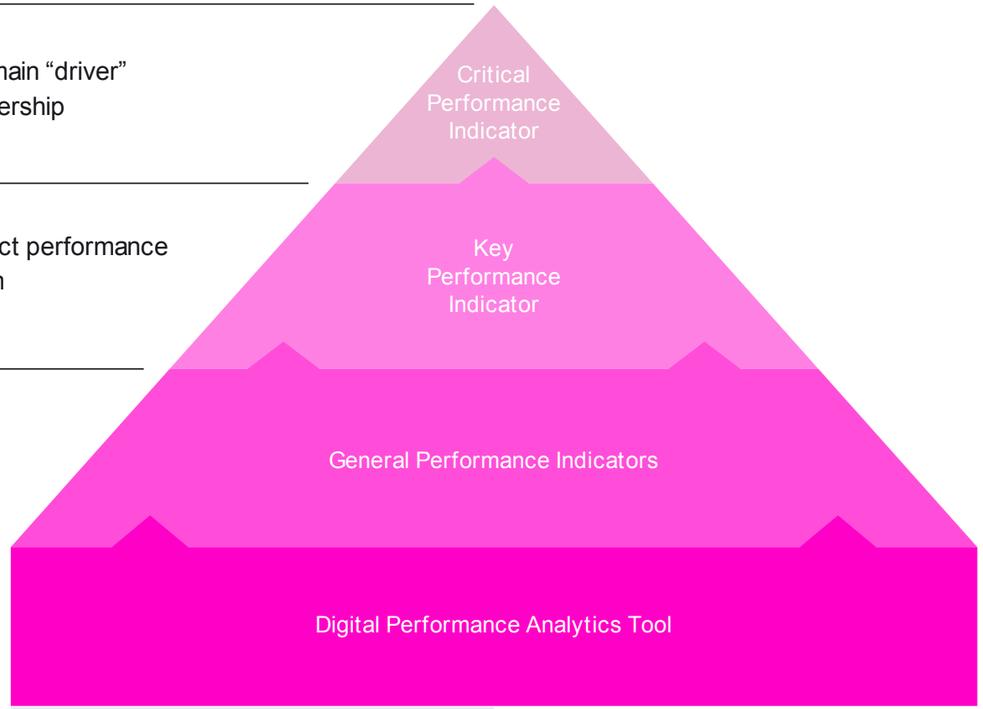
Project Oversight
Aggregated, real-time project performance for main "driver" CPI insights with commentary from project leadership

Project Leadership
Aggregated, real-time advanced analytical project performance KPI insights with commentary from project team

Project Team
Independent, transparent and detailed project performance metrics and forecast analytics across all 14 project performance areas

Advanced Predictive Analytics
Used to create a three-point forecast of possible performance outcomes

Project "Performance" Data Cube
Project performance data is extracted in real-time from all 14 principle project information systems and aggregated into a common format creating "big data"



Cost Management	Construction Management
Schedule Management	Health/ Safety Management
Change Management	Configuration Management
Risk Management	Stakeholder Management
Quality Management	Interface Management
Design Management	Document Management
Contract/ Claims Management	Resource Management

Note: Source: EY. Digital connectivity and advanced digital analysis establishes a single version of the truth about project performance.

Introducing enterprise project performance

How do you bring it all together to manage thousands of projects at peak performance?

The answer is to implement an enterprise project performance strategy. Enterprise project performance (EPP) is the philosophy that you can only sustain high capital efficiency by considering how all projects and resources contribute to business objectives, which requires connecting business strategy with tactical project execution.

EPP software helps power and utilities organizations, EPCs and equipment manufacturers to achieve this by combining project portfolio management, project controls and project management software all on one platform. EPP software integrated with key financial and other project data sources provides an enterprise-wide perspective into what drives business success.

With total visibility into each and every project, stakeholders can quickly and confidently assess performance across the entire lifecycle of their capital projects and identify opportunities for improvement.

Key processes improved by EPP software

Portfolio planning and control

Prioritize and select the right mix of projects to meet business objectives. Simple project portfolio management allows you to easily report on portfolio performance.

Resource planning and management

Compare resource capacity to demand across the entire portfolio, then allocate your available resources to the projects providing the most value to the portfolio and growth of the business.

Capital budgeting and planning

Manage long- and short-term capital budgets and plans. Gain greater accountability and measurability of investment decisions. Communicate plans to stakeholders. Increase visibility and reduce friction when changes in the macro environment require a pivot in capital spend.

Cost control

Manage and control thousands of projects of all sizes and types consistently within a single solution.

Progress and performance management

Full visibility into projects allows for better transparency and accountability, helps you identify performance trends and makes it easier to take corrective action.

Budgeting and forecasting

Create accurate budgets and avoid surprises with built-in metrics and robust forecasting capabilities. Be more predictable, avoiding overruns and make forward-looking decisions with confidence.

Risk, issue and change management

Create simple but powerful risk scoring mechanisms to identify and mitigate project risk. Comply with changing regulations with strong change management capabilities.

The ability to drill down into any detail of a project enables power companies to go beyond recording and reviewing progress toward milestones and deliverables. The right tools will allow you to measure improvements in terms of efficiency, predictability and control.

Over time, these observations can be applied to new projects, helping to avoid previous pitfalls and improve efficiency. At a time when investment has been reduced, EPP offers substantial financial benefits, as highlighted in a study by Forrester:

- 20% reduction in project cost overruns.
- 25% increase in project controller productivity.
- 50% productivity recapture rate for employees.
- 85% return on investment.

These significant savings free additional funds for the next energy transition project, which is particularly useful as budgets tighten amid wider industry pressures.

How to get started with EPP

An EPP platform is designed to enable an enterprise project performance strategy. Without a strategy, power and utilities companies will be unable to leverage the technology across their organizations to achieve maximum impact.

Because this concept spans multiple project and portfolio disciplines, some power and utilities industry players will lack the relevant knowledge and experience to build a workable strategy. EPP is therefore an obvious candidate for assistance from a trusted partner.

They can help you develop a plan that identifies gaps, integrates and improves your business processes and prioritizes steps along a pathway to most quickly realize the financial benefits detailed above.

Power the energy transition with EPP

The power sector remains under pressure, with demands to reduce costs, adopt renewables, reduce emissions, increase customer retention and maintain profitability. Capital projects are essential to delivering on these priorities, but are simultaneously becoming increasingly complex.

Switching to an EPP strategy will allow power companies to accelerate the required digital transformation and energy transition by using a far stronger toolkit for managing uncertainty and delivering projects on time and within budget.

By bringing technology and project data together in one place, EPP software empowers companies to solve problems. And as a repository for all project performance information, it provides metrics that can be applied to future project plans, for greater predictability and reduced waste.

With a trusted partner and a suitable EPP platform, power and utilities businesses can confidently align project selection with organizational strategy, while realizing significant project savings.

An uncertain future requires bold decision making. EPP can help to reduce the risks as power and utilities companies make those decisions and drive forward the energy transition, to the benefit of all.

About Octave

Octave is a leader in enterprise software, turning data into decisive action and intelligence into your edge. Our software solves for and simplifies complexity, from the design and build to operations and protection of people, property, and assets– for any scope, at any scale. For decades, we've partnered with customers to sharpen performance, elevate efficiency, and amplify results. From factory floors to entire cities, our solutions are tuned to scale up what's possible from day one onward.