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ACE the transition

A smarter playbook for grid investments

Contacts

The Netherlands
Dr. Paul Nillesen
Partner, Strategy& Netherlands
+31-61-003-8714
paul.nillesen@pwc.com

Menno Braakenburg
Partner, Strategy& Netherlands
+31-68-118-0151
menno.braakenburg@pwc.com

Fons Kop
Partner, Strategy& Netherlands
+31-62-030-2570
fons.kop@pwc.com

Austria
Dr. Johannes Schneider
Partner, Strategy& Austria
+43-664-815-6549
johannes.schneider@pwc.com

Middle East
Anthony Yammine
Partner, Strategy& Middle East
+971-4-436-3000
anthony.yammine@pwc.com

About the authors

Dr. Paul Nillesen is a partner with Strategy& Netherlands, part of the PwC network. Based in Amsterdam, he leads the Dutch energy and economics practice for Strategy& and PwC Consulting and is a member of PwC's Global Energy Leadership Team. He focuses on energy and utilities (including water and waste) and helps clients understand the changing market they operate in, adapt for the future, and realize value.

Menno Braakenburg is a partner with Strategy& Netherlands, part of the PwC network. Based in Amsterdam, he is a member of PwC's EU&R practice and focuses on strategy definition, cost optimization and operating model transformation programs for utilities, with a focus on T/DSO's across Europe.

Fons Kop is a partner with PwC Netherlands. Based in Amsterdam, he leads PwC's Capital Projects and Infrastructure team, which operates at the intersection of the public and private sectors. The team supports organizations with multidisciplinary expertise—financial, technical, legal, and tax-related—throughout the various phases of a project's lifecycle.

Dr. Johannes Schneider is a partner at Strategy& Austria, part of the PwC network. Based in the Vienna office, he advises executives in the energy and utilities as well as industrial goods industries, predominantly in the GSA region. As one of our leading practitioners for strategy and organizational design, supporting companies in mastering the energy transition is at the core of his work.

Anthony Yammine is a Partner with Strategy& Middle East, part of the PwC network. A member of the Energy, Resources, and Sustainability practice, he has extensive experience in the utilities sector. He advises clients on strategy, policy, transformation, and capital programs, helping utilities enhance performance, resilience, and sustainability across the region's evolving energy landscape.

EXECUTIVE SUMMARY

The electricity grid stands at the epicentre of the energy transition. Electricity demand is surging, renewables are reshaping supply, and aging infrastructure is struggling to keep up. Transmission and distribution system operators (TSOs and DSOs) face an unprecedented capital expenditure (CAPEX) agenda—European TSOs alone plan to invest more than €50 billion annually through 2045. Yet this investment imperative collides with two hard constraints: affordability and financial resilience.

Network charges already account for 15–30% of consumer electricity bills and further increases risk eroding public support for decarbonization and competitiveness of industry. Meanwhile, operators' balance sheets are under strain, with leverage ratios deteriorating and governments stepping in to provide capital injections and guarantees. Against this backdrop, cost discipline is no longer optional: it is existential for their license-to-operate.

This paper introduces a three-step approach to CAPEX optimization that can unlock up to 8% savings, without significantly impacting the energy transition:

1. **Structured identification of measures** using the PwC Strategy& ACE framework to surface the full spectrum of levers, from strategic recalibration to operational efficiency.

   - **Align the ambition:** Recalibrate all dimensions of the energy trilemma and align sustainability goals with supply-chain capacity, identify and prioritize (climate-) essential projects, and adopt risk-based reliability standards. These measures can deliver 4.0–5.5% savings (50–70% of total savings potential), though they require political courage and societal dialogue.

   - **Challenge the concept:** Redesign projects for value, not perfection; sweat existing assets, standardize specifications, and strip out "nice-to-haves." These measures typically deliver 1.5–2.5% savings (20–30% of total savings potential) and are faster to implement.

   - **Enhance the execution:** Industrialize delivery through integrated planning, modularization, procurement excellence, and digitalization. While individually modest, these levers collectively add 1.0–1.5% savings (10–20% of total potential) and sit firmly within operator control.

2. **Integrated prioritization:** Objectively rank measures by cost impact, feasibility, societal implications, and time-to-benefit. Focus on high-impact, low-friction levers first.

3. **Coordinated implementation:** Establish a central delivery engine with clear ownership, rigorous tracking, and embedded performance incentives. This ensures benefits are realized, not just forecasted, and institutionalizes learning across the organization. It also allows for accountability towards stakeholders.

Successful operators treat cost optimization not as a one-off campaign, but as a core capability – embedded in governance, culture, and decision-making. Those that fail risk spiralling costs, regulatory backlash, and diminished public trust. And ultimately erosion of their license-to-operate.

SECTION 1 – PRESSURE FOR CHANGE ON GRID OPERATORS

1.1 Three forces shaping the CapEx imperative

Surging electricity demand
Global ambitions to decarbonize are triggering a historic transformation in electricity consumption. The International Energy Agency projects worldwide demand will more than double by 2050 under current policy trajectories and could climb 2.5 times higher if the world pursues Net Zero. This surge is not simply a function of population or economic growth, it reflects the accelerating electrification of transportation, heating, and industry, as well as the looming expansion of green hydrogen and the rapid rise of data-driven sectors such as artificial intelligence. These converging forces are pushing electricity consumption to unprecedented heights, necessitating expansion of the electricity transportation infrastructure.

Renewables reshaping supply
The architecture of the power grid is being upended by the proliferation of renewable, decentralized sources—wind and solar in particular. According to the International Energy Agency, the share of electricity generated by renewables will rise from 30% today to 60% in 2050 under current policy trajectories. The ascent of distributed and intermittent generation requires a larger, more complex grid, one capable of integrating power from geographically diverse and, often, challenging locations such as offshore wind farms. The inherent variability of renewables demands enhanced control solutions to ensure reliability, while lower transmission asset utilization rates present additional operational quandaries. Transmission System Operators (TSOs) and Distributed System Operators (DSOs) are thus compelled to invest in infrastructure that can flexibly accommodate supply volatility and maintain system stability.

Aging infrastructure
In mature markets, much of the grid infrastructure is approaching the end of its operational life, where some assets have been in service for half a century – a legacy of early electrification. This aging network poses escalating maintenance costs and heightened risk of asset failure. Climate change, geopolitical uncertainty, and the advent of sophisticated digital threats further compound these risks, forcing TSOs and DSOs to accelerate renewal and modernization efforts. The imperative to upgrade is not just technical; it is existential, as the energy system faces mounting threats and evolving demands.

1.2 The magnitude of the CapEx challenge

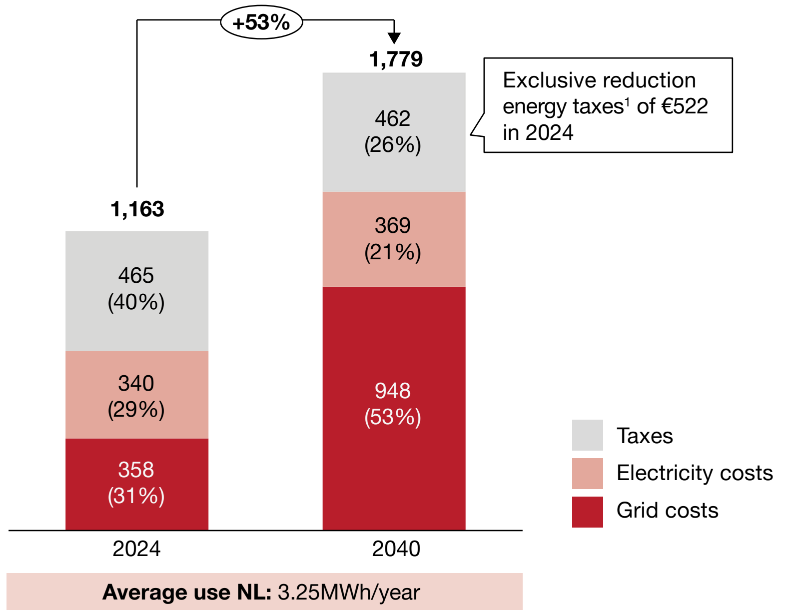
By 2050, global grid networks are expected to more than double in length, reaching 166 million kilometres; four times the circumference of the Earth. Advanced economies will see grid length jump by 50%, while emerging markets and developing economies (EMDEs) will witness expansions of over 150%. Yet this is a story of both growth and renewal: two-thirds of existing grid infrastructure will be replaced, a testament to the aging assets originally built to meet the demand of the last century. In advanced economies, more than 70% of transmission and distribution networks will be renewed; for EMDEs, the figure is approximately 60%. This massive expansion and refurbishment extends well beyond wires and cables and encompasses substations, transformers, switchgear, and control systems, all essential for grid integrity as the energy landscape evolves.

Inevitably, this translates into a formidable investment agenda. European TSOs alone will invest over €50 billion annually until 2045. Other regions are following suit, with China's transmission investments alone reaching nearly $80 billion in 2024. This surge in investment will reshape the financial architecture of grid operators. For example, Dutch TSO TenneT's asset base has already grown from ~€14 billion in 2015 to ~€53 billion today. Looking ahead, its balance sheet may need to expand by a factor of seven, reaching an estimated €384 billion by 2040.

1.3 The financial challenge: scrutiny and efficiency

Network charges already constitute 15% to 30% of consumer electricity bills in many Western markets. As grid investment climbs, this share will inevitably rise, with direct implications for households and industry. For instance, network tariffs in the Netherlands are set to rise by almost 185% over the next decade. Escalating electricity prices worldwide mean that passing on higher costs to consumers risks eroding public support for the energy transition and undermining the competitiveness of energy-intensive sectors (*see Exhibit 1*).

EXHIBIT 1
Electricity costs for households in 2024 and 2040, with constant electricity use (€/year)



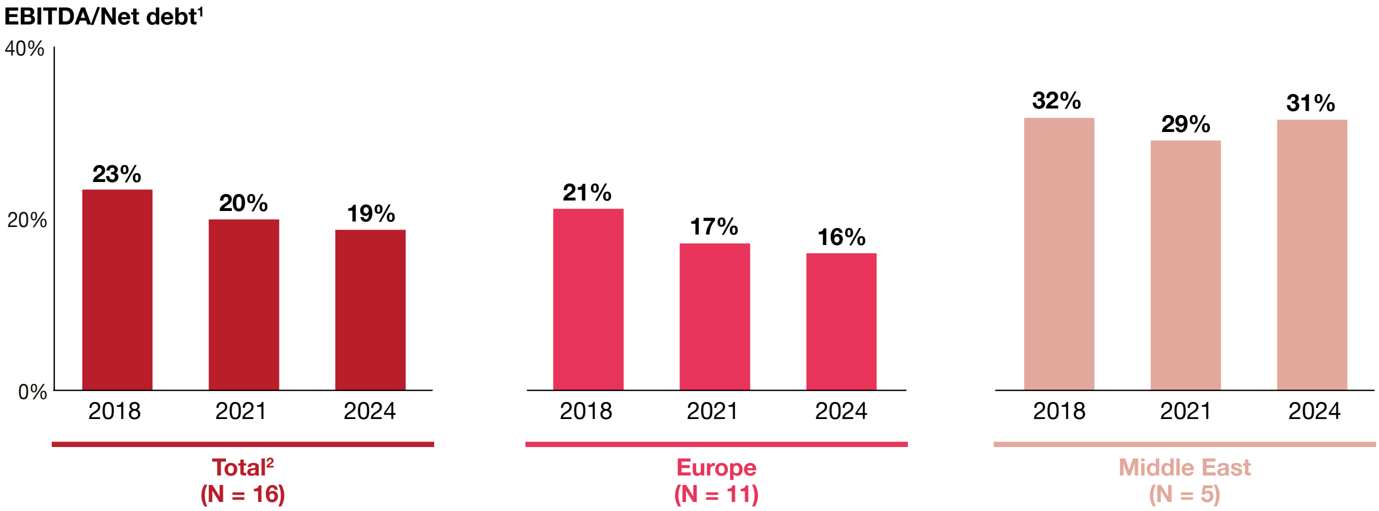
Source: Strategy& analysis
1 Yearly, a fixed part of the energy tax on electricity is exempted in the Netherlands, as this is considered a basic necessity. The presented number is before this tax-reduction

These formidable capital investments are only recouped over a long period in line with the technical life of most assets, placing pressure on the short-term financial health of grid operators. This mounting pressure can already be observed from key financial indicators, such as FFO to net debt, which deteriorated markedly in recent years. Credit rating agencies signal the risk of further pressure on credit metrics, with downgrades already materializing across several countries. TenneT, for instance, recently saw its rating drop from A- to BBB+, while Elia Group was downgraded from BBB+ to BBB in 2023. In response, several operators have proactively tried to bolster their balance sheets and safeguard credit ratings. For example, in Italy, Terna divested its Latin American transmission assets to CDPQ in 2022. In a similar vein, the Dutch government intervened in 2023 with a €1.6 billion capital injection for TenneT's Dutch division, and in 2025, it extended a state guarantee to secure favourable borrowing rates and sanctioned the sale of a minority stake in TenneT Germany to address future funding needs.

As electricity bills face mounting scrutiny and balance sheets are under pressure, TSOs and DSOs must rigorously review their spending, ensuring investments are optimized for long-term resilience and affordability. How they respond to these financial and operational pressures will shape not only their own future, but also the prospects of Europe's Net Zero ambitions.

EXHIBIT 2

Financial health of grid operators, expressed by FFO to net debt[1]



Source: Capital IO; Strategy& analysis

Note: 1) Net Debt/EBITDA is calculated as (Total debt – Cash and cash equivalents)/EBITDA

2) Based on a selection of 16 grid companies (TSOs) across Belgium, Finland, France, Germany, Italy, Lithuania, Netherlands, Norway, Portugal, Spain, Switzerland, Israel, Jordan, Oman, Qatar and the United Arab Emirates

SECTION 2 – STRUCTURED APPROACH TO CAPEX OPTIMIZATION

Most TSOs and DSOs grasp the affordability imperative and have launched cost saving initiatives. Yet, too many underdeliver. The culprits are familiar: ad hoc measures, narrow or overlapping scopes, limited visibility across programs, too much focus on historical performance and results and weak coordination with suppliers, regulators and policymakers. The remedy is a structured, integrated approach that surfaces the full menu of levers – strategic to operational – aligns stakeholders, and executes with discipline.

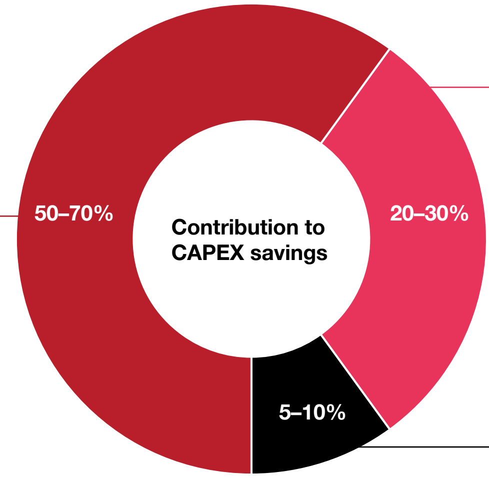
2.1 Structured identification of measures	Deriving measures in a way that "leaves no stone unturned". By using a framework that challenges network operators to critically examine cost-saving potential, even in areas beyond their immediate remit and control.
2.2 Integrated measures prioritization	Ensuring there is focus on key measures in terms of impact (financial and non-financial), feasibility, timing and degree of control assessing each measure through a holistic and objective approach.
2.3 Coordinated implementation approach	Setting up a centrally coordinated program to implement the prioritized measures and track/steer outcomes.

The methodology applies to both TSOs and DSOs, despite differing roles and regulatory contexts.

2.1 Leaving no stone unturned: the ACE framework

EXHIBIT 3
PwC Strategy& ACE framework

Align the Ambition
Fundamental re-evaluation of overarching energy transition and/or energy system ambitions, priorities and design with cost efficiency as central goal



Challenge the Concept
Revision of project design and setup for cost optimization, once the ambition levels have been agreed with policymakers

Enhance the Execution
Rethinking network operators' internal business processes in terms of way of working, technologies, business policies and management

Source: Strategy& analysis

> "Grid operators face rapidly increasing capital expenditures driving up cost for end-user electricity bills – the question is not why grid operators should optimize capital expenditures but how to do so."

EXHIBIT 4
PwC Strategy& ACE framework

	Contribution to savings	Description	Key levers	Examples
Align the Ambition	**4.0–5.5%** (50–70% of total)	Fundamental re-evaluation of energy trilemma with cost efficiency as more prominent goal	Align sustainability ambition with available capacity	Shifting of Netherlands offshore wind energy targets from 2040 to later
			Prioritize the essential; defer the desirable	Deprioritizing (projects that require) nature-positive measures, such as rerouting
			Rethink reliability thresholds	Calibrating security of supply threshold to current period of structural change
Challenge the Concept	**1.5–2.5%** (20–30%)	Revision of project design and setup for cost optimization and weighing trade-offs against non-cost considerations	Sweat assets harder before building new	Increasing load factor of offshore substations to transmit same capacity with fewer stations
			Opt for cost-effective technologies	Advocating for overhead lines instead of underground cables
			Strip out "nice to haves" and redundancy	Avoiding "pre-build" for future expansions (e.g., empty tunnels for future cables) Rationalizing R&D programs
Enhance the Execution	**1.0–1.5%** (10–20%)	Rethinking how network operators run projects and manage their broader organization. Most existing cost reduction measures fall under this category	Improved project planning and coordination with stakeholders	Enhancing collaboration between TSOs and DSOs (particularly in fragmented DSO landscape)
			Standardize and modularize	Introducing standard specification catalogues, modular, factory-built units and clear specification governance
			Procure like a platform	In-sourcing of specialist construction teams Expanding supplier base (e.g., to include sources which are politically sensitive) and early contractor involvement
			Digitization	Adopting enterprise project management software Incorporating central process repository (e.g., Signavio)

Source: Strategy& analysis

> "Operators can structure optimization idea generation using the ACE framework – It avoids ad hoc ideas, clarifies scope, and facilitates trade offs across various disciplines."

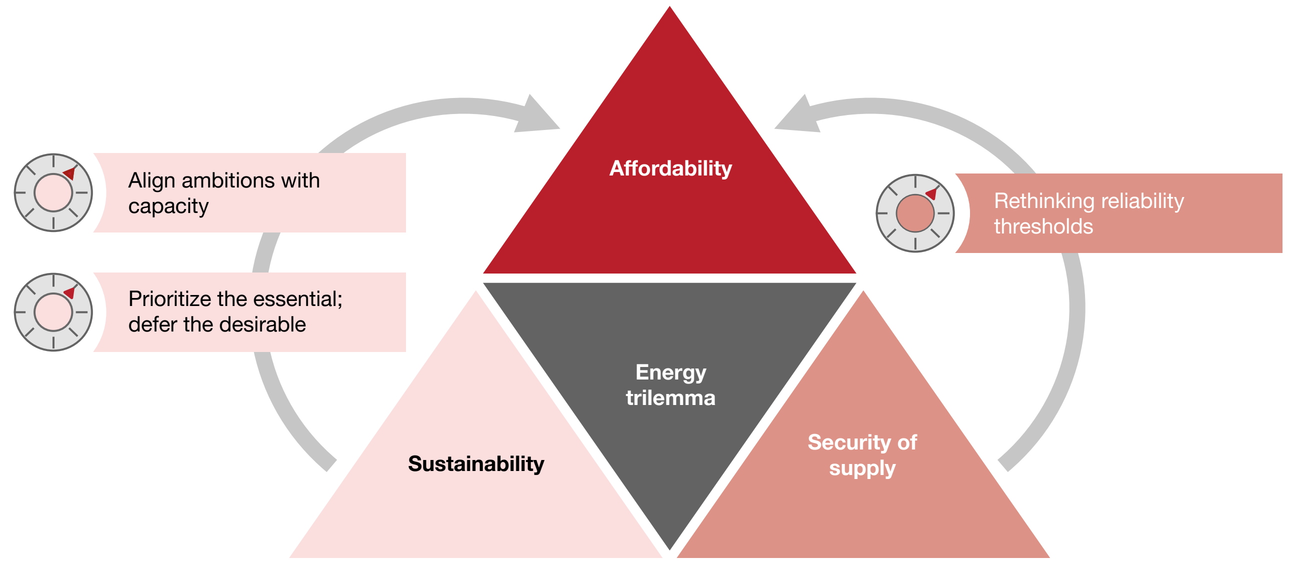
Operators can systematize idea generation by adapting the **PwC Strategy& ACE framework** to their context. It avoids ad hoc ideas, clarifies scope, and forces a holistic view of trade offs.

Align the Ambition

Repricing the energy trilemma: bending the cost curve without breaking the transition
Policymakers have pushed hard on sustainability while insisting on rock-solid security of supply. Affordability, meanwhile, has slipped to the back of the queue. Grid operators are now being asked to deliver all three. For much of the past five years, the investment agenda of Europe's grid operators has been shaped by an unambiguous political signal: accelerate decarbonization and hit climate milestones, but do not compromise reliability. That focus has propelled CAPEX to unprecedented levels. Affordability has become the pressure valve, released in the form of higher system costs, tender inflation and growing bottlenecks across critical supply chains.

One way to curb the bill is deceptively simple: Align the ambition. That means reconsidering the goals, priorities and design parameters that define the transition, and consciously elevating lower-cost pathways as a primary objective rather than a secondary constraint. Ambition measures can account for 4.0–5.5% of total saving potential and requires grid operators to step beyond their historical "builder–operator" identity and act as strategic advisers; framing the options, quantifying the trade-offs and helping governments make choices in full view of their consequences.

EXHIBIT 5
Recalibrating focus of energy trilemma can help to improve affordability



Source: Strategy& analysis

Align sustainability ambition with available capacity

Climate targets are the prime mover of the energy transition, and they transmit directly into CAPEX. The faster and larger the transition, the more grid reinforcement, interconnection and digital orchestration are needed. Yet the scale and timing of current programs have outstripped the capacity of supply chains, from high-voltage equipment to offshore platforms, creating a demand-supply imbalance that drives prices up.

Lever 1	Consider the Netherlands and Germany. Both have signed up to the Esbjerg Declaration and are now targeting around 140 GW of offshore wind potential by 2050, with ambitious targets of 21 GW and 30 GW for 2030. TSOs are racing to build the transmission systems that will bring that power ashore, notably offshore DC substations. But substation manufacturing is not a tap that can be opened overnight; capacity expansion takes time, because of skilled labour scarcity and factory tooling lead times. The result: over-heated tender books, scarcity premia and sharp price escalation.
Lever 2	Distributing the same ambition over a longer, more predictable cadence, with flexible intermediate goals that cater to available capacity can reduce CAPEX in two ways. First, it directly lowers near-term investment volumes. Second, it relieves short-term pressure on constrained suppliers, tempering price spikes and enabling more efficient, competitive procurement.
Lever 3	It should be noted that adjusting offshore wind targets must be done in a predictable, long-term fashion. While it may seem prudent to dial back short-term ambitions in response to market constraints, doing so abruptly can increase costs. The offshore supply chain—particularly for DC substations and high-voltage components—is already strained. Sudden changes in demand can lead to delay costs, as suppliers struggle to reallocate resources or ramp up production on short notice. A steady, transparent cadence of development allows suppliers to plan capacity expansions more efficiently, reducing scarcity premiums and avoiding the stop-start dynamics that inflate CAPEX. In this context, predictability is not just a planning virtue—it's a cost-control strategy.

> "The demand for grid reinforcement and expansion has outpaced the capacity of supply chains driving prices up – aligning the timing of investments with available capacity can yield real results."

Prioritize the essential; defer the desirable

Aligning the ambition is not only about "how much" and "how fast," but also "what first." A disciplined portfolio lens allows policymakers and grid operators to prioritize projects that directly advance climate targets, while postponing those that improve secondary objectives at disproportionate cost.

Take nature positive measures such as rerouting lines to avoid ecologically sensitive areas. These can be laudable and, politically, often popular. But they frequently add complexity, cause delays and add material costs without directly moving the needle on decarbonization. Under a sharpened ambition, such projects could be sequenced later, once core transition assets are secured, rather than competing for scarce capital and engineering talent in the crunch years.

Rethink reliability thresholds

Security-of-supply thresholds in many Western systems are calibrated for a world of stable demand and dispatchable generation. In a period of structural change, such thresholds may be over stringent relative to what society is willing to pay. Accepting marginally lower certainty, in specific geographies or time windows, can unlock significant CAPEX reductions by avoiding the last, most expensive tranche of reinforcement.

This is not a counsel of recklessness. It is an invitation to risk-based reliability: define where the stringent thresholds are truly worth it, and where smart demand management, flexibility markets and targeted backup can deliver equivalent social value at far lower cost. The choice need not be binary between "gold-plated" reliability and fragility; it can be a portfolio of calibrated tolerances.

The size of the prize—and the price of politics

Measures that refine ambition are not marginal. In observed cases, they can account for ~4.0–5.5% of the total CAPEX reduction potential. Yet they are also politically fraught. Resequencing programs, resetting reliability thresholds, or rescoping environmental routing brings visible trade-offs. Benefits (lower system costs, healthier supply chains) are often diffuse and long-term; the friction (local objections, perceived backsliding) is immediate.

That is precisely why TSOs and DSOs must evolve from execution contractors into strategic partners. The operators who succeed in this transition are those who translate engineering realities into policy choices, present scenario-based options with quantified impacts and create a shared investment agenda.

C hallenge the Concept

Redesigning the blueprint: How smarter project conception cuts costs
If ambition sets the destination, conception determines the route, and the cost of the journey. While recalibrating national targets can deliver the biggest savings, it is politically fraught and slow to materialize. By contrast, design choices sit largely within the operator's control and can unlock meaningful efficiencies without rewriting climate law.

Conception measures typically account for 1.5–2.5% of total CAPEX reduction potential. They are faster to implement than ambition shifts, but they require a willingness to challenge ingrained norms and negotiate trade-offs with regulators, suppliers and even employees.

Design for value, not perfection
Too often, projects are conceived with "gold-plated" specifications—features that add cost without advancing decarbonization. A more disciplined approach asks: **What is essential, what is optional, and what is indulgent?**

1

Sweat assets harder before building new

Building on the offshore wind example, increasing utilisation of transformer platforms by just 25% can eliminate the need for an entire platform—saving 1–2% of total CAPEX for a single operator. The principle is simple: optimise what exists before pouring concrete for the next asset.

2

Opt for cost-effective technologies

The most contentious trade-offs often involve aesthetics and social acceptance. Germany's SüdOst-Link corridor illustrates the point: underground DC cables, mandated for visual and societal reasons, cost significantly more than overhead lines. Reopening such design choices could yield major savings—but only through transparent engagement with policymakers and communities.

3

Strip out "nice-to-haves" and redundancy

Some design choices are driven more by aspiration than necessity. R&D programs, for instance, can become disproportionately expensive when pilots are scaled prematurely or tailored too specifically, adding cost without clear deployment pathways. Similarly, speculative provisions for future expansions, such as empty tunnels or oversized substations, often tie up capital that could be better used elsewhere. These features may be well-intentioned, but unless their value is demonstrable and time-bound, they risk inflating budgets without advancing core grid objectives.

Enhance the Execution

Once ambition is set and designs are lean, the final frontier is execution: how projects are delivered and how organizations operate. The question shifts from what to build to how to build: faster, cheaper and with fewer interfaces. Here, the savings are incremental (typically 10–20% of total CAPEX), but they are within the operator's direct control and can be realized quickly. Four levers can be considered.

Plan once, build fast

In countries with fragmented grid operator landscapes, e.g. Germany and Austria, overlaps and hand-offs between TSOs and DSOs regularly inflate cost and time. The remedy is a single, integrated planning cadence across owners and contractors:

- **Joint planning fronts** that align outages, grid connections and corridor access in the feasibility phase, not after tenders are let.
- **Integrated master schedules** with shared critical paths, so mobilization happens once, sequencing is disciplined and competing projects do not bid up the same scarce crews and equipment.
- **Shared resources** where practical (e.g., construction teams, heavy cranes, logistics hubs), avoiding parallel mobilizations for adjacent works.

The effect is cumulative: fewer idle days, cleaner interfaces, less rework and a lower risk of late stage surprises that drive costly changes. Coordination may not be glamorous, but it is the cheapest hedge against overruns

Standardize and modularize

Multiple technologies, such as onshore AC transformers are mature enough for tight specification and repeatable design.

- **Standard specification catalogs** reduce bespoke engineering and shrink tender complexity.
- **Modular, factory built units** shift work offsite, shortening installation windows and improving quality.
- **Specification governance** curbs over engineering, aligning design to function rather than habit or legacy standards.

For operators, the benefits are threefold: lower design and approval costs, faster procurement and commissioning, and reduced maintenance complexity across a more uniform asset base. Over time, standardization also means less steel and copper per megawatt, not just cheaper drawings.

Procure like a platform

Project by project buying squanders bargaining power. A cross-portfolio procurement strategy, with pooled volumes, stable specifications and multiyear visibility shifts the price–risk balance.

- **Framework agreements** with options and capacity reservations lock in supply for critical components, reduce risk premia and discourage speculative pricing in overheated markets.
- **Outcome-linked incentives** (e.g., weight, material or design simplification targets) align supplier economics with operator goals.
- **Early contractor involvement** improves constructability and reduces change orders; done well, it brings suppliers into the value engineering process without ceding cost discipline.

Suppliers benefit too through forecast certainty and smoother factory loading, creating the basis for collaborative cost-out rather than transactional squeezing.

Digitize

Digital is no longer a nice-to-have; it is the operating system. The tools enterprise project management, automated reporting, model-based design are familiar, but their impact hinges on consistent adoption.

- **Automated cost and schedule controls** flag slippage early and support fact-based steering, rather than post hoc rationalization.
- **Digital permitting and document workflows** compress administrative lead times and reduce the error rate inherent in manual hand-offs.
- **Model based engineering and constructability reviews** (including clash detection) reduce redesign, change orders and waste on site.
- **Predictive analytics** on schedule risk and supplier performance help prioritize interventions where they matter most.

The return is fewer human errors, shorter decision cycles and better utilization of scarce technical talent.

While each lever is modest on its own, together they deliver 1.0–1.5% savings with fewer external hurdles than strategy or design resets, bringing affordability back into the energy trilemma without slowing the transition.

2.2 Prioritizing the cost reduction portfolio

By adapting the three-pillar framework to their operations, network operators can derive a range of cost reduction measures. Leading network operators in particular store these ideas in a central repository to maintain an overview of explored vs. potential future ideas.

The next step for network operators is to align on the key levers to prioritize. Given resource and time constraints, it is unlikely that network operators can pursue all measures at the same time. Moreover, being able to justify why a measure is prioritized is also critical when engaging external stakeholders. An objective and fact-based approach towards which levers to prioritize is therefore imperative.

To support network operators with prioritizing key measures, it is important to assess each measure for its pros and cons. Typical factors used include (*see Exhibit 6*).

By assessing measures across these dimensions, it is possible to distinguish which levers have the highest potential to reap most benefits with fewest trade-offs.

EXHIBIT 6
Measure assessment factors

Cost impact	Level of cost reduction realized within a certain timeframe (e.g., upcoming 10 years), factoring potential uncertainties and extent to which savings are concentrated vs. spread out over time
Feasibility	Extent to which prerequisites are in place to successfully start and realise each measure today, both within network operators (e.g., resource availability, technical know-how, capacity of suppliers) as well as the external factors (e.g., political support, legal/regulatory framework)
Societal impact	Overall net effect on broader society from executing on a measure, particularly trade-offs along key factors such as sustainability, security of energy supply and societal well-being
Timeline	The expected time needed before savings from a measure start being realized (e.g., within 1-5 years, 5-10 years, +10 years), due to factors such as design implementation lead time, time needed for alignment between stakeholders and availability of resources
Degree of grid operator control	Extent to which lever is directly in network operators' control; typically, current measures predominantly pursued by the sector are those with high degree of grid operator control

Source: Strategy& analysis

2.3 From intent to impact: Building a central delivery engine

Once the priority measures are set, the challenge shifts from **what to how**. The operators that successfully turn savings on paper into savings in cash run a single, structured program, with clear owners, time bound targets and transparent reporting.

Why a central program matters:

One single source of the truth	Given that there are measures running across departments, projects and functions, a central program helps aggregate progress of all individuals measures into one overarching picture. This particularly helps determining overall progress of implementation measures. If there are delays or roadblocks in the program, this can be effortlessly identified and appropriate actions to steer progress back on track with relevant owners can be made in due course.
No double counting and conflicting measures	Measures often have strong interdependencies with each other and scopes can overlap. This usually leads to confusion and conflict amongst measure owners, particularly allocating savings. A central program helps avoid issues such as double counting of benefits and resolves potential conflicts objectively.
Institutionalized learning	Best practices are generated as measures are implemented throughout the organization. To avoid potentially missing out on cross-organizational "learnings effects", a central program can help facilitate this. By continuously interacting with teams owning different measures, a common repository of information can be gathered and distributed throughout the rest of the organization.

Setting up a central program typically entails five steps

1.	**Catalogue the CAPEX reduction levers**	Make an inventory of all levers that can be employed to reduce or postpone CAPEX including societal impact, feasibility, criticality (strategic, tactical, operational) and whether lever is in network operator's control
2.	**Set up the program**	Mobilize a dedicated program team with strong backing from the executive-level. After the team is setup, team is responsible for: 1. Initial quantifying of key levers 2. Setting baseline and targets 3. Checking for dependencies 4. Aligning on lever objectives and scope 5. Summarizing needed inputs (information, resources, etc.) 6. Building the aggregated benefits view for the portfolio
3.	**Assign owners to each lever and implement**	Start implementation of CAPEX lever by defining owners and responsibilities, setting reporting structures and communicating way of working, ambitions and the "rules of the game". Once launched, it is critical to continuously monitor progress, intervening and steering decisions to ensure timely realization of measures
4.	**Hard-wire into performance**	Embed the program in performance management, through live dashboards and incentives that reward delivered savings, not effort. Align rewards and consequences across functions so cost discipline survives beyond the first quarter
5.	**Support CAPEX benefit realization and spread best practices/ learning**	Provide ongoing support to convert forecasted savings into realized ones, through benefit assurance, post-implementation reviews and a community to share playbooks, tools and lessons learned. Keep the pipeline fresh by continuously refreshing the lever register as conditions change

But technical structure alone isn't enough. Many grid operators operate in a legacy culture where costs were rarely questioned, largely because regulators allowed most expenditures to be socialized. Introducing cost sensitivity is not just a procedural shift; it's a culture shift. Embedding a culture of cost discipline requires confronting long-held assumptions, retraining teams, and aligning incentives with value, not volume.

CONCLUSIONS

The energy transition is non-negotiable; its cost trajectory is. TSOs and DSOs can deliver the build out the system demands without breaking the bank only if cost becomes a design constraint, not an afterthought. The route is clear. First, **align the ambition** where it matters most: align sustainability goals with supply chain reality, sequence the essential before the desirable, and adopt risk based reliability standards. Then **challenge the concept** by redesigning projects for value rather than perfection; sweating existing assets harder, reopening costly design choices, and stripping out "nice to haves" are prime examples. Finally, **enhance the execution**: plan once across owners and contractors, standardize and modularize, procure like a platform, and digitize through integrated planning, modularization, platform procurement and digital execution. Taken together, these moves can unlock 5–8% CAPEX savings across the ACE spectrum, without slowing the transition.

The operators that win will treat CAPEX optimization as a core capability – embedded in governance, culture and cadence – not as a one-off campaign, but driven by a central delivery engine. Predictability is a cost control strategy; transparency is a currency with regulators, suppliers and society. The prize is twofold: a more affordable transition for consumers and a more resilient balance sheet for operators. The challenge ahead is to deliver more system for every euro invested, proving that affordability and ambition can coexist in the energy transition.

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