MODERNIZATION FOR RESILIENCE:

Unlocking Competitive Advantage through Life-cycle Management

DISCOVER →

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FOREWORD

In today’s ever-shifting industrial landscape, resilience is an operational necessity. A new global report from ABB, developed in collaboration with Sapio Research and based on a survey of 3,600 senior decision-makers across diverse sectors, reveals that 95 percent of industry leaders recognize the strategic importance of life-cycle management. Notably, 65 percent have actively modernized their assets within the past two years, through upgrades, retrofits, or replacements.

The financial risk of unplanned downtime is stark – with costs reaching as high as $169,889 per hour, and 70 percent of respondents highlighting the clear environmental benefits of retrofitting, including CO_2 reductions of up to 30 percent.

At ABB, unlocking efficiency, reliability, and environmental gains through modernization is one way we support our partners around the world every day. With our portfolio of upgrades, retrofits, and replacement solutions, specifically designed for motors, generators, and drives, combined with services that extend asset lifetime, we help industries outrun – leaner and cleaner.

– Oswald Deuchar, Global Head of Modernization Program, ABB Motion Services

UNDERSTANDING LIFE-CYCLE MANAGEMENT PRACTICES

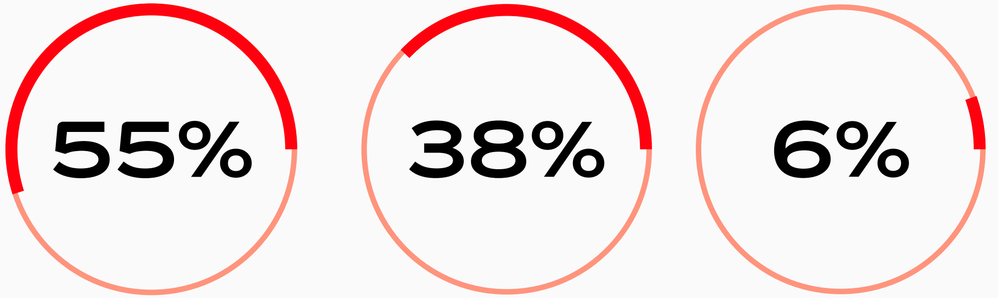
Life-cycle management of industrial equipment, such as motors and drives, is critical for operational efficiency, minimized downtime and waste reduction. But life-cycle management can look quite different depending on industry sector, region, and business size.

Familiarity with Life-cycle Stages

Our study shows that 95 percent of respondents have a good level of familiarity with the various approaches to life-cycle management. Of these, 55 percent are "very familiar", indicating a broad and strong foundational understanding necessary for effective equipment management, backed up by informed decision-making and innovative problem-solving.

% OF ORGANIZATIONS BY APPROACH AND WEEKLY DISRUPTION RATES

Approach to Modernization



Modernization Strategies in Place
Despite widespread familiarity with life-cycle stages, the existence of proactive modernization strategies is not ubiquitous.

Overall, 55 percent of respondents report having a proactive modernization strategy in place, while almost four in ten (38%) act on a case-by-case basis. Only 6 percent act reactively, highlighting that most recognize the value of modernization. That said, a significant portion could benefit from more cohesive planning to enhance operational resilience and mitigate downtime risks.

It is important to note, however, that merely having a strategy in place does not automatically guarantee better outcomes. In fact, the study reveals that organizations with proactive strategies sometimes experience higher rates of weekly disruptions (19%) compared to those with a case-by-case approach (7%). This does not suggest that strategies themselves create disruptions, but rather that strategy quality, robustness of planning, and expertise in execution are what determine success. Where modernization is rolled out without sufficient checks, governance, and the right partner to guide the process, disruptions can increase.

This is where ABB's role as a trusted life-cycle partner comes in: ensuring modernization strategies are not only in place, but are also carefully designed, expertly implemented, and consistently sustained throughout the asset lifetime to deliver resilience without added risk.

Upgrading and Retrofitting as a Strategy
Upgrading and retrofitting individual components as a modernization strategy is widely adopted: 44 percent do so regularly and 38 percent occasionally.

This makes sense, as retrofitting helps to extend asset life cost-effectively. However, just over a tenth (13%) understand the concept of retrofitting but haven't done so. Respondents who indicated that they retrofit occasionally report significantly lower weekly downtimes (7%), with a notable proportion facing downtimes only a few times a year (45%). It's easy to infer from this that even sporadic but well-targeted retrofitting can effectively contribute to maintaining operational stability.

These findings highlight that organizations performing even occasional retrofits experience marked improvements in operational continuity – a testament to the impact of well-planned interventions over purely reactive replacements.

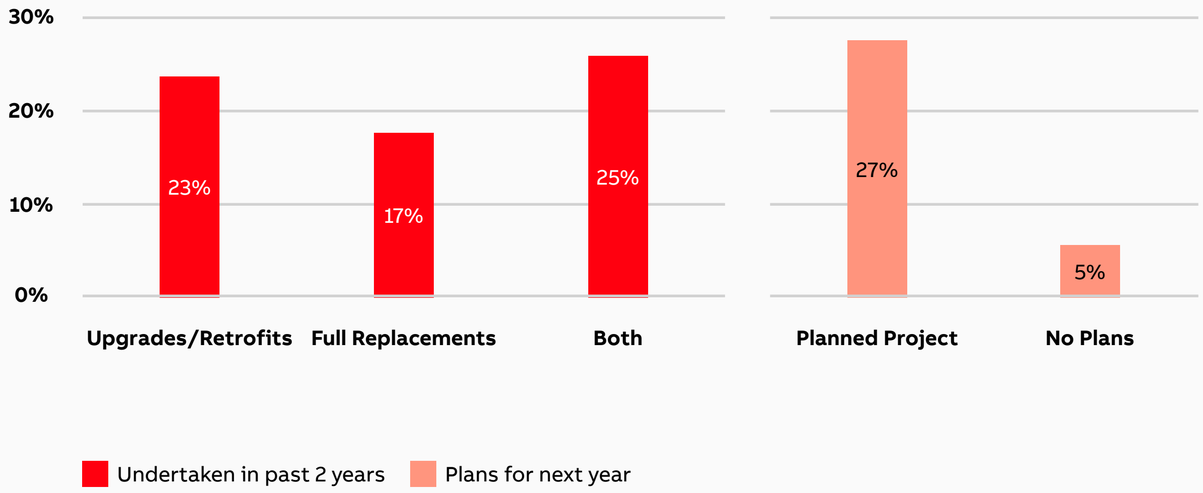
This tallies with ABB's experience. At Al Bardi Paper Mill, ABB's modernization of aged multidrives to the latest technology increased reliability by approximately 30 percent and extended the life of the asset by at least 12 years. The modernization was performed during scheduled stops, minimizing downtime, and has allowed integration with remote monitoring to prevent future unplanned outages. This demonstrates how periodic, targeted retrofits can strengthen reliability and digital readiness while minimizing waste.

Recent Modernization Projects

In the past two years, 65 percent of industrial players around the world have undertaken modernization projects, either through upgrades/retrofits (23%), full replacements (17%), or both (25%).

On top of that, nearly a third (27%) plan to initiate modernization projects in the next year, reinforcing a forward-looking mindset. Only 5 percent report no plans, underscoring the strategic importance of modernization.

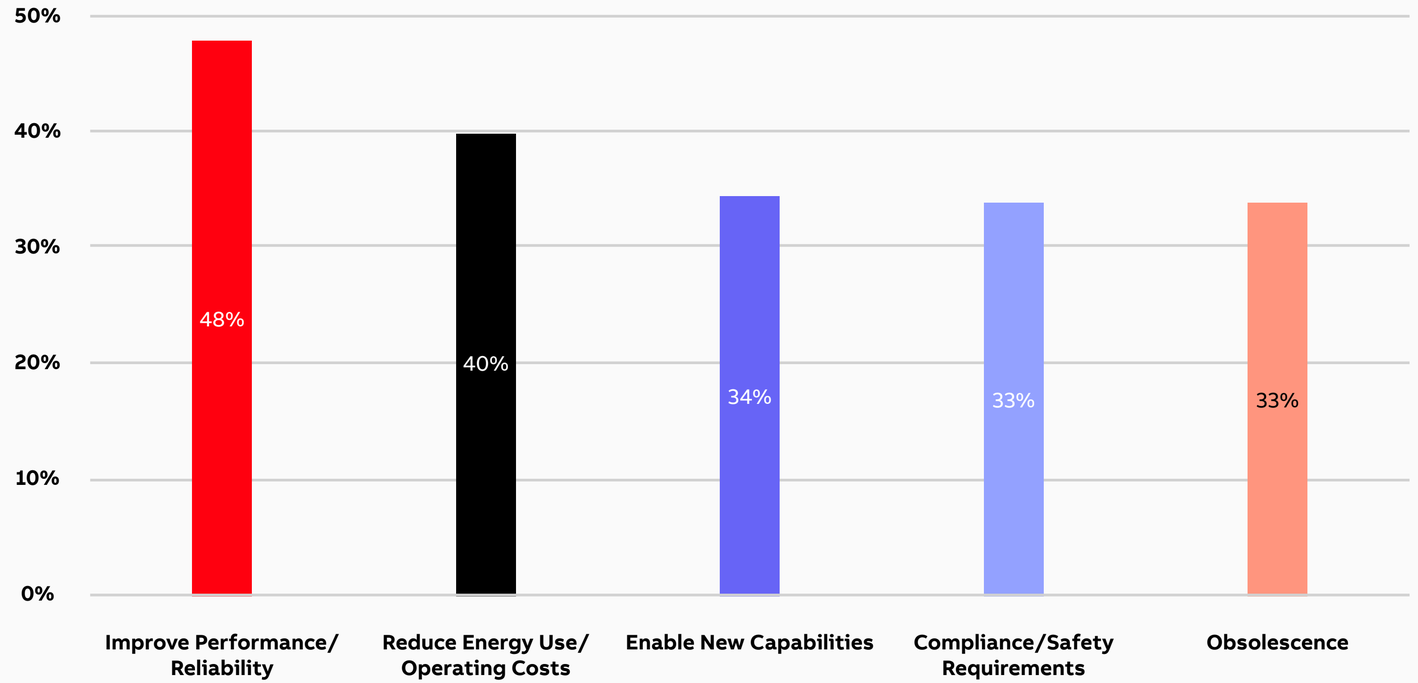
Notably, this high level of activity means that modernization is recognized not just as a best practice but as a strategic essential – especially given the high costs and risks associated with legacy equipment failure.



Motivations for Upgrading or Replacing Equipment
The primary motivations for undertaking modernization projects include improving performance and reliability (48%), reducing energy use or operating costs (40%), and enabling new capabilities (34%).

Obsolescence and compliance or safety requirements, both reported by one third (33%) of respondents, also drive modernization, highlighting the need for future-proof, regulation-ready systems.

While operational efficiency continues to be a key factor, the drive towards net zero and compliance is evidently factoring into life-cycle management approaches more and more.



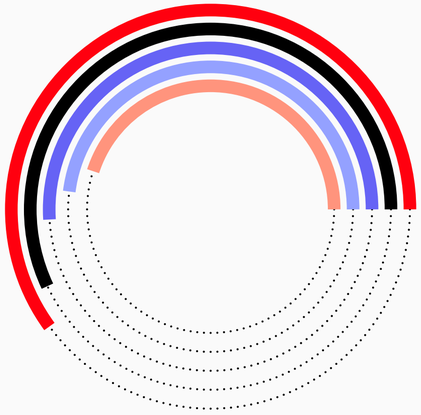
OVERCOMING BARRIERS TO PROACTIVE MODERNIZATION

So, what, if anything, is getting in the way of proactive modernization strategies and life-cycle management?

Key Decision Factors

There are several critical considerations when deciding between upgrading, retrofitting, or replacing equipment. While upfront investment costs and expected downtime during installation are both very important, according to 45 percent and 48 percent respectively, the majority (60%) view long-term cost savings as the most influential factor.

Compatibility with digital systems (51%) and energy performance (57%) are also critical, signalling a shift toward smart, efficient systems.



60% Long-Term Cost Savings

57% Energy Performance

51% Digital Compatibility

48% Downtime During Installation

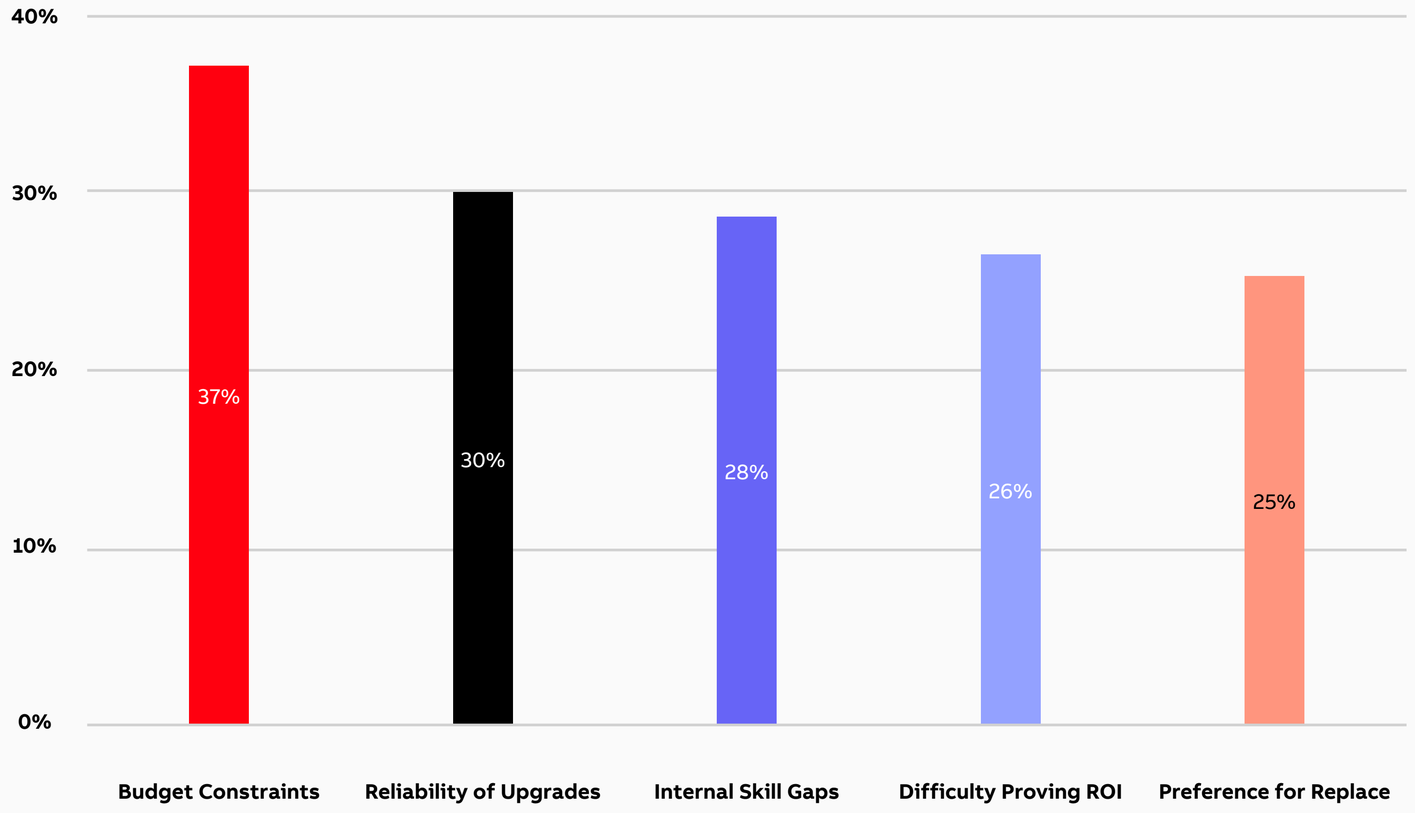
45% Upfront Investment Cost

Barriers to Modernization
Budget constraints pose the most significant barrier to undertaking modernization projects, affecting 37 percent of respondents. After that, concerns around the reliability of upgrades (30%), and a lack of technical skills and expertise internally (28%), are the most substantial challenges.

Difficulty proving ROI and a preference for full replacements also get in the way of strategic modernization efforts according to 26 percent and 25 percent respectively, which may indicate an issue of budget siloing.

While 65 percent find it easy to communicate ROI of modernization projects to senior leadership, 12 percent struggle. Improved tools and narratives that demonstrate the long-term value of modernization investments could bridge this gap, supporting investment cases.

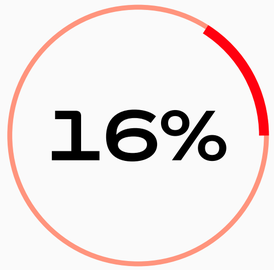
This was true for ABB's customer. Neste Porvoo Refinery opted for ABB's modernization services on three major compressor motor control panels that had supported a critical hydrocracking process for 15 years. This process depends heavily on uninterrupted hydrogen pressure. The upgrade, timed with a planned shutdown, introduced a dual automatic voltage regulator (AVR) configuration, with built-in redundancy and advanced protection – enhancing reliability and proactively preventing costly downtime. If one AVR fails, the other immediately takes over, avoiding production cuts and safeguarding operational continuity. This exemplifies the value of tailored, well-engineered modernization solutions.



Inclusion of Downtime in Investment Decisions
For 82 percent of respondents, potential downtime is a key consideration in their capital investment decisions, being "always" or "often" included in business cases. This majority highlights industry awareness of the significant operational and financial repercussions associated with disruptions (see next chapter).

However, 16 percent only "rarely" include such considerations, exposing themselves to higher operational risks. This correlates with research showing that comprehensive assessment of downtime risk is associated with lower occurrence of structural disruptions.

Always/Often Include Downtime



Rarely Include Downtime

THE BUSINESS CASE FOR MODERNIZATION

While the inclusion of downtime risk in investment decisions is now commonplace, our findings demonstrate that the strength and maturity of life-cycle management approaches are what truly influence operational and financial outcomes.

Strategic Modernization and Process Disruption
Organizations with a proactive modernization strategy experience varied impacts on downtime. Somewhat counterintuitively, those with strategic plans sometimes report a slightly higher rate of weekly disruptions (19%) compared to those handling modernization on a case-by-case basis (7%). This finding should not be interpreted as modernization strategies themselves causing disruption. Instead, it underscores that strategy quality, change management, and roll-out discipline matter more than simply having a plan on paper.

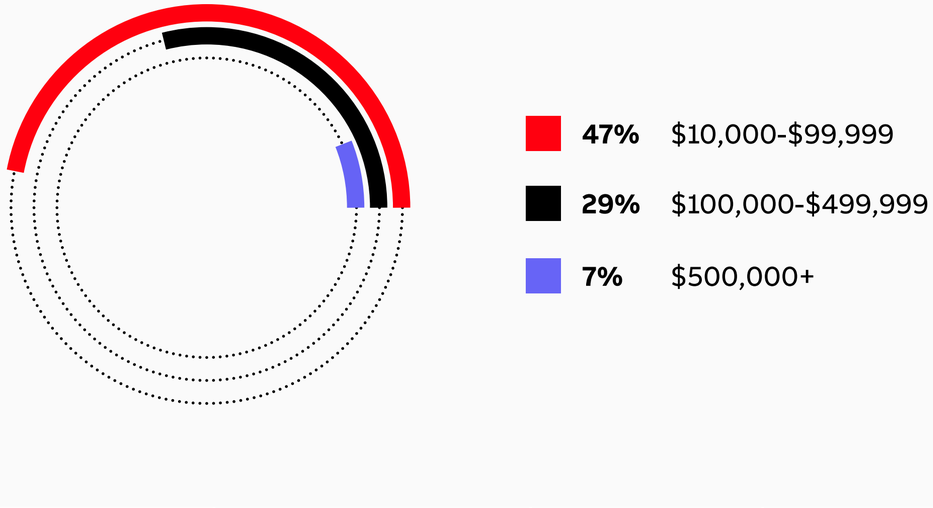
In other words, a poorly designed or hastily executed modernization strategy can actually cause operational friction if not handled with the right expertise. Conversely, a well-supported, carefully sequenced modernization plan provides resilience over the long term.

This point is reinforced by the fact that organizations without any proactive strategy at all face significantly higher disruption rates a few times per year (50%) – evidence of the vulnerabilities created by reactive approaches.

The takeaway: having a modernization strategy is a starting point, but its true value comes only when it is well-structured, expertly executed, and aligned with operational goals. With ABB's proven frameworks, domain expertise, and life-cycle support services, customers can embed modernization programs that strengthen operations while minimizing disruption risks over time.

HERE'S THE BIG STAT. THE FINANCIAL BURDEN OF UNPLANNED DOWNTIME IS ESTIMATED TO BE, ON AVERAGE, $169,889 PER HOUR.

Cost of Downtime
Most respondents face disruption costs ranging from $10,000 to $99,999 (47%), but 29 percent encounter costs between $100,000 and $499,999. Notably, 7 percent suggest that it could cost more than $500,000 per hour – a shocking suggestion.



Perception of Modernization Benefits

Despite the substantial costs associated with unplanned downtime, our findings reveal a notable say-do gap: while 91 percent of respondents acknowledge that modernization helps reduce unplanned downtime over the long term, nearly half (45%) only "somewhat agree" with this statement rather than strongly affirming it.

This ambiguity suggests that, even in the face of clear financial and operational advantages, the critical role of modernization in delivering operational resilience is not yet fully embraced. Bridging this perception gap – and translating awareness into decisive, well-executed modernization action – remains a pressing opportunity for organizations seeking to safeguard uptime and drive long-term value.

ENVIRONMENTAL GAINS THROUGH LIFE-CYCLE OPTIMIZATION

Life-cycle management is not just about the bottom line, it's also about environmental impact.

Sustainability Goals
The main sustainability goals of respondents include reducing energy consumption (63%), minimizing waste through life extension and repair (59%), and reducing carbon emissions (59%), as well as a focus on both efficiency and compliance with environmental regulations (53%).

ABB's studies show that modernization significantly cuts CO_2 emissions. When you compare the environmental impact of modernizing an ACS800 drive with precision – replacing only the required components – to that of replacing the entire drive with ACS880 series, including the cabinet, the data speaks for itself:

- 50–57 percent CO_2 savings per unit compared to full replacement, depending on customer location and transport logistics
- 820–1560 kg CO_2e emissions avoided per upgraded drive – equal to driving a car 3,500–6,500 km
- Reusing cabinet parts (e.g., sheet metal, busbars) reduces raw material use and waste

The LCA also showed that transportation factors (shipping distance and mode) play a significant role in the overall footprint. By modernizing locally and reusing substantial elements of installed cabinets, additional emissions from logistics are avoided. By reusing existing components, ABB helps customers lower both embedded carbon and supply chain-related emissions.

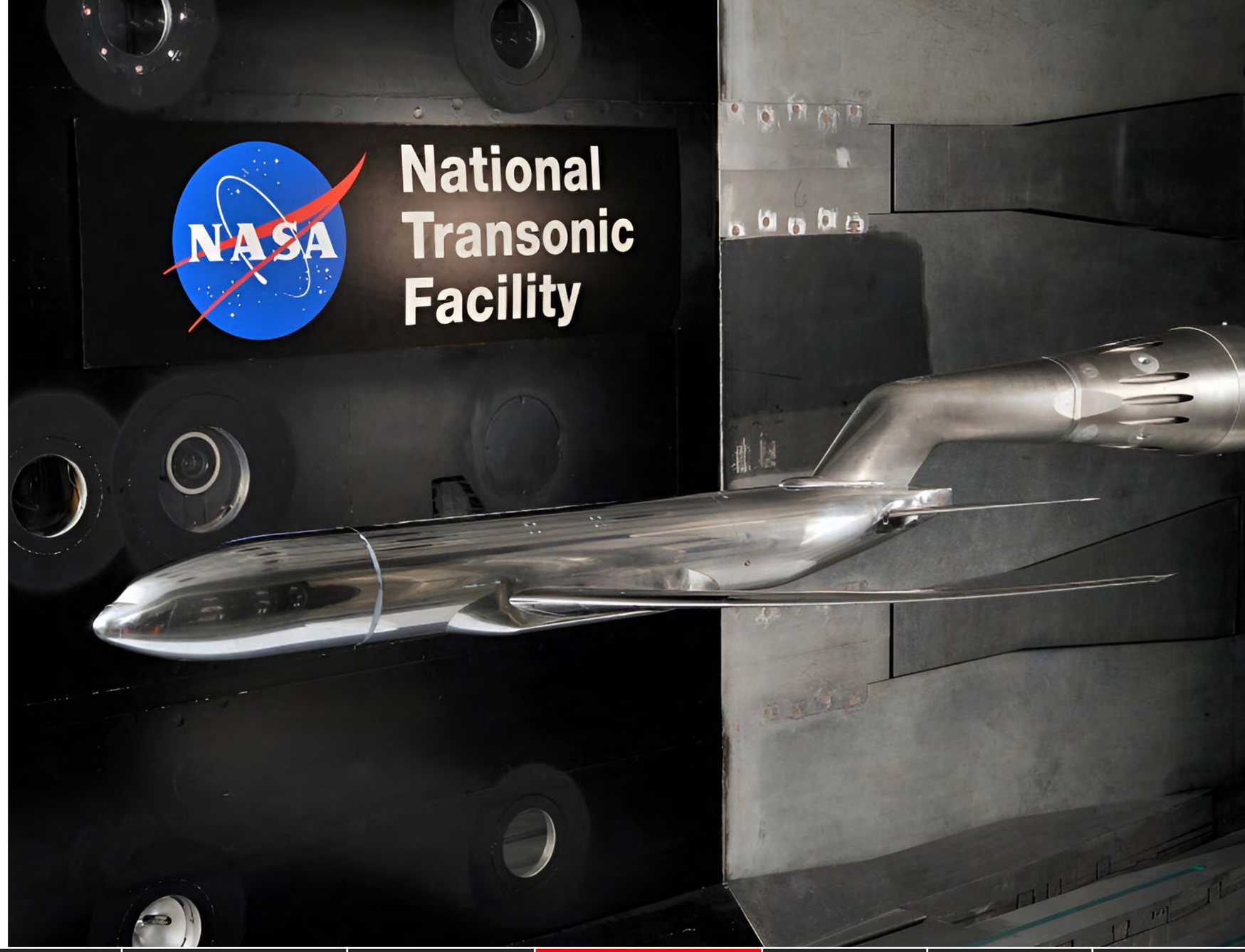
Reaching those Goals through Retrofitting
The data reveals a broad consensus on the environmental benefits of retrofitting compared to full replacement, with 70 percent of respondents estimating that retrofits can lead to CO_2 reductions of 10-30 percent or more.

However, not everyone agrees, in fact 4 percent believe there is minimal impact on CO_2. This illustrates varying confidence in the environmental benefits of retrofitting, indicating that communication of measurable outcomes remains vital to win full stakeholder support. When change management is effectively implemented, the benefits of retrofitting speak for themselves.

CASE STUDY

ABB has the experience to prove it. A recent example comes from NASA's National Transonic Facility (NTF) wind tunnel, where ABB upgraded a variable speed drive to extend the operational life of this critical asset by at least 10 years. Instead of replacing the entire system, ABB's team modernized key drive components using the latest efficient power electronics, while retaining much of the original infrastructure.

This approach minimized waste, reduced the project's environmental footprint, and maximized equipment uptime – ensuring reliable, high-performance testing for NASA's aerospace programs. By modernizing within the existing footprint, ABB unlocked NASA's circular edge, leading to reduced resource use and boosted asset lifespan, for long-term competitiveness.



Similarly, by partnering with ABB, Swedish utility Jämtkraft extended the life cycle of their assets, enhanced their performance and – as a result – accelerated its sustainability goals. Established over 125 years ago, Jämtkraft provides renewable energy services to residential and business customers. The company began its collaboration with ABB in the 2000s by purchasing motors and drives. Over the years, ABB has delivered service solutions tailored to the customer's needs, including a modernization intervention that allowed Jämtkraft to retain the existing infrastructure of its legacy equipment and replace only internal components.

This approach helped avoid premature scrapping and reduce waste, resulting in approximately 10 tons of CO_2 emissions saved compared to full asset replacement. For reference, this is equivalent to a gasoline-powered car driving about 57,000 km – or roughly five years of average use.

ABB’S VIEW

As this research shows, proactive life-cycle management and modernization are essential levers for enhancing industrial resilience and competitiveness, while driving down emissions and preserving resources. Industry executives across the globe understand that operational efficiency and environmental safeguarding are inseparable from business success. However, it is equally clear that simply having a strategy is not enough.

To unlock the full value of modernization, organizations must focus on the quality of their execution – aligning modernization efforts with digital transformation, effective downtime risk management, and clear ROI communication to leaders.

This is where ABB comes in. Working side by side with customers, ABB helps shape modernization strategies which best support each asset and lifetime stage – ensuring the optimal balance of cost, reliability, and long-term performance.

- Retrofits deliver cost-effective interventions that extend equipment life, improve efficiency, and prepare assets for digital integration – without the disruption of full replacement.
- Upgrades introduce the latest ABB technologies to maximize reliability, safety, and energy performance, ensuring that legacy systems meet today’s operational standards.
- Replacements, when necessary, renew end-of-life equipment with future-ready solutions that align with sustainability targets and evolving compliance frameworks.

To protect their investment, industrial players can also opt for ABB Motion OneCare service agreements, enhancing the productivity and reliability of motors and drives throughout their lifetime. Preventive maintenance and tailored implementation plans minimize the risk of unforeseen disruptions and reinforce operational resilience – while lowering costs and securing output.

THE BOTTOM LINE: MODERNIZATION ISN’T OPTIONAL – IT’S A STRATEGIC IMPERATIVE.

It’s how industries outrun downtime, cut waste, and lead in a leaner, cleaner future – with ABB as a committed partner at every step of the life cycle.

METODOLOGY

This research was conducted in partnership with Sapio Research in July 2025, and surveyed 3,600 senior decision-makers from the following industry sectors:

- Food and Beverage
- Energy/Power
- Oil and Gas
- Metals
- Utilities
- Chemical
- Heating, Ventilation, and Air Conditioning (HVAC)
- Mining
- Plastics/Rubber
- Rail
- Marine
- Water/Wastewater
- Wind
- Other industry sectors

And from the following countries:

- Australia
- Brazil
- Canada
- China
- Finland
- France
- Germany
- India
- Italy
- Saudi Arabia
- Singapore
- South Africa
- South Korea
- Spain
- Sweden
- Turkey
- United Kingdom
- United States