POSITION PAPER

Achieving Sustainability Goals with Automation

Balancing Economic Opportunity and Environmental Responsibility

Automation technology has changed the way we live and work – and has increased productivity, efficiency, and profitability for organizations and individuals the world over. Automation also has a significant role to play in achieving sustainability goals – offering new ways to accelerate environmental, social, and governance (ESG) activities across manufacturing, industry, and beyond.

SUMMARY OF RECOMMENDATIONS

Industry and government stakeholders must embrace automation technologies as a leading component of their sustainability goals and strategies:

- Optimize energy usage and energy efficiency with automation technologies, and rely upon automation to help reuse, refurbish, and recycle products and materials, particularly when undergoing a facility's digital transformation

- Promote sustainable materials and manufacturing processes in support of Industry 5.0 principles

- Utilize automation technologies to keep workers, communities, and ecosystems safe and protected, and train and upskill workers in automation processes and systems

- Rely upon the objective and unbiased data and analysis provided by automation technologies to meet governance and compliance needs

AUTOMATION CAN RAPIDLY ADVANCE SUSTAINABILITY GOALS

Automation provides transparency and accountability – ensuring that policies are safely followed, efficient, and well managed. Further, reliance on automation advancements will allow industry and government stakeholders to develop even more ambitious goals, strategies, and policies – taking sustainability initiatives to the next level, just as manufacturing advancements have been achieved through the application of these same technologies. Finally, a well-prepared workforce equipped with knowledge about the power of automation and digital transformation technologies will allow for these critical technologies to be applied in innovative ways – creating economic opportunities and fulfilling environmental goals.

The International Society of Automation (ISA), the leading professional society for automation, offers standards, training, credentials, conformity assessment programs, and other important resources that support efforts to use automation as a tool to achieve sustainability goals – for individuals, organizations, companies, and governments alike.

INDUSTRY AND GOVERNMENT STANCES ON SUSTAINABILITY

Over the past decades, many corporations have pledged their commitment to sustainability and environmental practices, with some making further commitments toward science-based targets, carbon neutrality, and net-zero targets. Shareholders and boards are demanding sustainability and social responsibility as key corporate values in addition to profitability, and Industry 5.0[1] looms large as the next strategic direction for industry and government.

Recently, United States regulators have shown strong support for sustainable manufacturing practices in the Inflation Reduction Act[2], and the European Union's Green Deal Industrial Plan for the Net-Zero Age[3] pledges to scale up capabilities to achieve net-zero energy consumption and net-zero carbon emissions.

A recent industry survey by PwC confirms that 60% of the world's largest companies have committed to a net-zero greenhouse gas (GHG) emissions target.[4] Even with the uncertainty of the current economic climate, sustainability promises will not be abandoned across the industry, and per J.P.Morgan[5] may matter even more in 2023 and beyond.

What is Industry 5.0?

Beyond advancements in manufacturing safety and efficiency, the concept of "Industry 5.0" aims to articulate the role and contribution that industry makes to society as a whole. With a focus on resilient, human-centered, and sustainable business strategies, Industry 5.0 includes the use of renewable energy sources, the reduction of waste and emissions, and the adoption of circular economy principles, which aim to eliminate waste and pollution, keep products and materials in use, and recycle and reuse to "regenerate nature."

THE ROLE OF AUTOMATION IN ESG

Environmental Pillar: Reduce – Recycle – Reuse

Reduce Automation leads to more efficient processes that make more efficient use of materials – reducing the amount of materials and energy needed to produce products. Further, as automation technology continues to improve, so too does quality, resulting in less material wasted on poor products and less energy, human effort, and money wasted on rework. As costs fall, manufacturers have access to more capital through higher margins or the ability to be more competitive with pricing.

Recycle More precise measurements and better automation have helped companies better understand the cost savings and the tools to implement recycling programs. A prominent example is the work being done to reduce water usage in the semiconductor industry using recycling, thanks to new water treatment processes. When less water is used and disposed of, companies can enjoy much lower utility costs, which can have a large impact on the bottom line.

Reuse The concepts of refurbish and repair are central to the automation industry, which has always sought to interface larger, older systems with state-of-the-art centralized control systems. This is particularly apparent in the paper and power industries, where production equipment such as paper machines and reactors can be decades old. Boilers can be retooled to accept alternative fuels, cooling tower outlet water can be reused for other purposes, and turbines may be refurbished to reduce heat rate, avoiding the cost of procuring new equipment.

Organizations looking to implement sustainable automation solutions that prioritize environmental responsibility should consider:

Implement energy-efficient technologies
Energy-efficient technologies – such as LED lighting, solar panels, and efficient motors – and using variable frequency drives can significantly reduce the carbon footprint of automation. Automation can also help optimize energy usage by managing lighting, heating, and cooling systems.

Adopt circular economy principles
The circular economy is a regenerative economic system that aims to minimize waste and maximize the use of resources. Sustainable automation should be designed with the principles of the circular economy in mind, promoting the reuse, refurbishment, and recycling of products and materials.

Promote sustainable materials and manufacturing processes
The use of sustainable materials, such as bioplastics, renewable fibers, and recycled metals, can reduce the environmental impact of automation. Additionally, sustainable manufacturing processes, such as 3D printing and additive manufacturing, can help reduce waste and energy consumption.

THE ROLE OF AUTOMATION IN ESG
Social Pillar
Automation plays a key role in two critical areas of the social pillar of ESG: the safety of those working in an organization, and the safety of those around it.

In higher-risk jobs that involve applications that are dirty, dull, or dangerous, automation helps reduce the risks of injury to personnel. For example, advanced sensors help to reduce risk by determining whether an application is potentially unsafe or may be able to remotely isolate a hazardous process from personnel.

The safety assurances provided by automation can result in the protection of lives in the areas around a production site. Tightly monitoring and controlling the use of products in production can ensure that communities in proximity to a company are unharmed by the operation. This type of protection takes many forms, such as advanced continuous emission monitoring systems, spectral gas monitoring for wide area applications, and ever-evolving water treatment systems to ensure that hazardous material does not escape a site. This data can be displayed on a continuous basis to drive corrective actions and suitable alerts.

Automation also will have a social impact in upskilling the workforce and creating new jobs. Automation technology does not just create or destroy jobs, it transforms them to more meaningful, sustainable ones.[6] The World Economic Forum estimates that an additional 12 million new jobs will be created by 2025 due to automation and will indeed promote job growth as needs and technologies evolve.[7]

Governance Pillar

Accountability and transparency are fundamental to the governance pillar of ESG, and automation has a tremendous role to play in surfacing data and offering objective analysis.

Measurement is a great example of how automation can offer immediate, accurate monitoring directly in production, rather than in a laboratory facility – making it easier for companies and regulatory to monitor for compliance. Data is increasingly available and is transparent to stakeholders, often with a layer of analysis powered by machine learning or artificial intelligence to identify potential areas of concern. This removes the potential for bias in analysis – where one engineer's threshold differs from another's interpretation. It further produces data that focuses on the skills of employees rather than their identities – especially important as companies have increased their strategic efforts on diversity, equity, and inclusion.

SUSTAINABLE AUTOMATION IN ACTION

Automation improves the efficiency of warehouses and order fulfillment. Robots can pick and pack orders, which has helped to reduce the amount of time and energy required to fulfill orders.	Automation and process control support many of the steps involved in vehicle manufacturing and assembly, helping reduce the amount of pollution produced by the manufacturing process.	Retailers benefit from automation-based solutions to reducing and sorting waste produced by stores. On-site robots can sort and recycle materials, which has helped to reduce the amount of waste that goes to landfills.

CONCLUSION

Organizations and entities that focus their attention on sustainable automation will benefit tremendously. Cost reduction, increased safety, and greater workforce development opportunities are the immediately apparent benefits, but leaders must also recognize the opportunity to demonstrate their ESG leadership in a climate where environmental responsibility is fundamental to business success and growth.

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ABOUT ISA

The International Society of Automation (ISA) is a non-profit professional association founded in 1945 to create a better world through automation. ISA's mission is to empower the global automation community through standards and knowledge sharing. ISA develops widely used global standards and conformity assessment programs; certifies professionals; provides education and training; publishes books and technical articles; hosts conferences and exhibits; and provides networking and career development programs for its members and customers around the world.

RESOURCES

isa.org/standards	138+ standards for automation, cybersecurity, and more
isa.org/training	Unbiased, real-world training courses, personnel certifications, and certificates that help engineers and technicians take the next step in their automation career
isa.org/join	Membership in ISA offers unparalleled access to technical discussions and resources
isa.org/events	Network, hear best practices, and be part of the automation community dialogue at ISA events – both in person and virtual