



EXECUTIVE SUMMARY

Mission to Zero™: One plant's journey to carbon neutrality

Brian Nelson, Renewables Market Development Manager, ABB

APRIL 26, 2023

KEY TAKEAWAYS

- Investment in clean energy will continue to grow, driving adoption of electric power and renewables.
- The Inflation Reduction Act provides certainty to renewables developers, end users, and manufacturers.
- Environmental Product Declarations tell the environmental story of products.
- Integrity and transparency drive ABB's Mission to Zero.

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OVERVIEW

Global initiatives to achieve net-zero emissions are driving increased demand for and investment in renewables. As energy sources shift, so too will grid architecture and operations, to accommodate new energy requirements. The energy transition is being both supported and regulated by key policies that adopters of new energy should be aware of.

ABB has joined efforts toward decarbonization, launching the Mission to Zero™ initiative to achieve carbon neutrality across all operations by 2030. Mission to Zero serves as a blueprint for both ABB and its partners to achieve carbon neutrality using energy data collection, monitoring, and analysis in support of energy conservation measures. ABB's Senatobia, Mississippi, manufacturing plant serves as a showcase of the effectiveness of Mission to Zero, working to inspire utility, commercial, and industrial customers to start their own decarbonization journey.

CONTEXT

Brian Nelson discussed the energy transition and how providers can use Mission to Zero alongside ABB products and solutions to enable savings, efficiencies, and resiliency.

KEY TAKEAWAYS

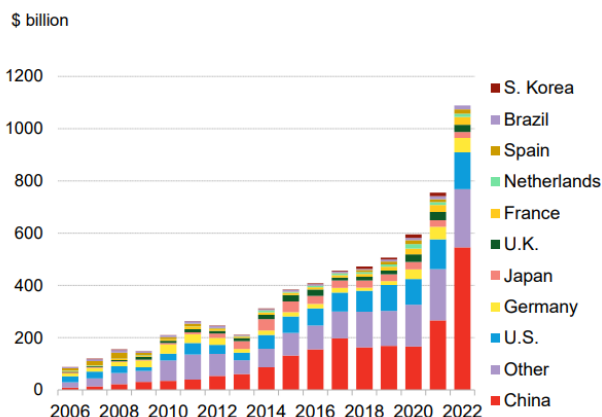
Investment in clean energy will continue to grow, driving adoption of electric power and renewables.

To combat global warming, the trend toward decarbonization is well underway and will continue to accelerate. The world's major economies—China, India, and the United States—make up approximately 42% of global emissions. All three, along with over 70 other countries, have set carbon-neutral goals: 2050 for the United States; 2060 for China and India. Over the past two decades, U.S. greenhouse gas emissions have dropped by 13.8% overall and by 35% in the power sector.

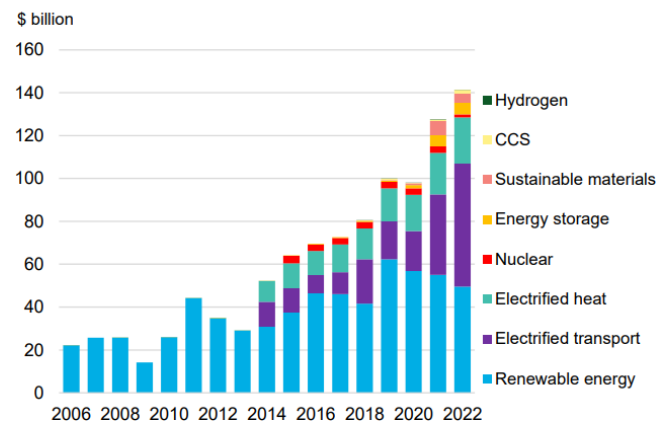
Since electricity production and transportation have historically been the primary sources of human-generated emissions, the decrease in greenhouse gas emissions by the power sector represents a positive beginning. At the same time, global investment in clean energy has grown significantly, increasing by \$27 billion last year in the U.S. alone. Fossil fuel investments are experiencing a corresponding decrease, down by 25% since 2015, as fossil fuel companies transition to clean energy.

Figure 1: Investment in energy transition

Energy transition investment, by country



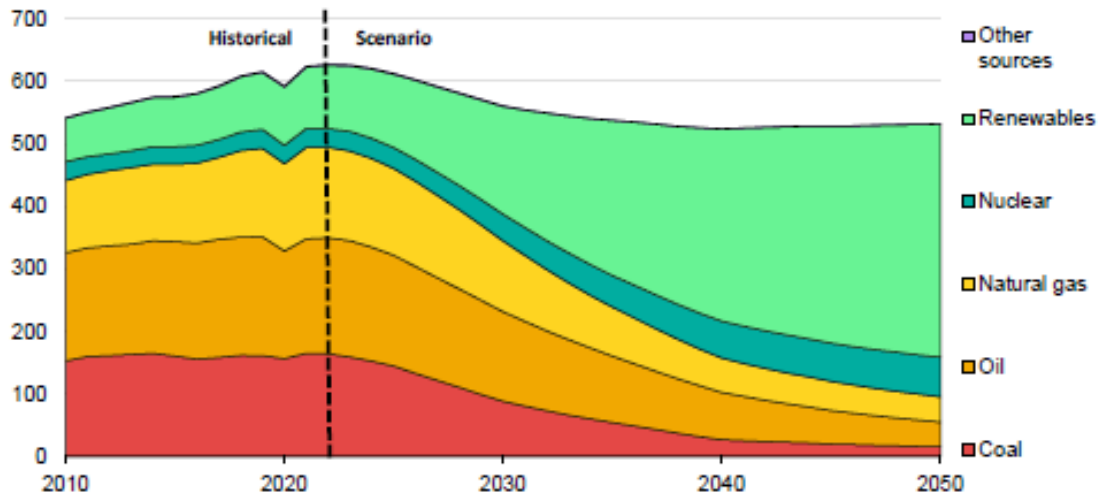
US energy transition investment, by sector



Source - BloombergNEF's Sustainable Energy in America 2023 Factbook

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Figure 2: Global total primary energy supply in the net-zero emissions scenario



Source - International Energy Agency (IEA) 2023 Energy Technology Policy Report

Lazard's Levelized Cost of Energy Analysis found that in 2009, solar photovoltaic energy cost \$359 per megawatt hour to produce. However, as of 2021 that cost has been lowered to only \$36—less than wind, gas, and others. These cost decreases, coupled with net-zero goals, will result in a skyrocketing demand for renewables, with electricity generation growth projections of 3.5% per year.

“We’re seeing a massive shift. We know [the market] is competitive, and we know it’s going to grow.”

- Brian Nelson, ABB

The Inflation Reduction Act provides certainty to renewables developers, end users, and manufacturers.

By offering two tax benefits, the Inflation Reduction Act ensures that the buildout of wind, solar, and energy storage will remain steady for the next 10 years. The two benefits are:

- **Production tax credit.** Usually tailored to wind, this production tax credit provides a tax benefit of \$.03 per kilowatt, with a multiplier up to five times if wage and apprenticeship requirements are met.
- **Investment tax credit.** Based on project investment, this tax credit starts at 6%, with a similar wage and apprenticeship benefit to the production tax credit.

The Inflation Reduction Act also offers bonuses, such as an extra 10% for domestic content thresholds met, and an extra 10% for projects sited in an energy community.

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One plant's journey to carbon neutrality

In the net-zero emissions scenario, by 2050, taking fossil-fuel assets, such as coal-burning plants, out of commission will need to happen at high speed to meet the goal on time. However, the speed of decommissioning will create an issue for the grid, as without these large power plants, grid stability might be impacted. Existing technologies, such as synchronous condensers and battery energy storage, will play a larger role in the ecosystem to help manage the grid. The Inflation Reduction Act also plays a role in this shift, decoupling energy storage from solar and allowing both technologies to benefit from tax credits.

Within the Inflation Reduction Act, there is an Advanced Manufacturing Production credit offered to manufacturers of solar modules, wind components, batteries, inverters, and more, whose products are built in the United States. And the benefits of U.S.-made panels go beyond the financial—U.S.-manufactured panels have been shown to reduce CO₂ and energy consumption by 13% compared to 2020.

Environmental Product Declarations tell the environmental story of products.

Looking ahead, the SEC is expected to release rules related to climate disclosure by publicly traded companies, captured in scope levels 1, 2, and 3.

- **Scope 1** refers to direct emissions that come from sources owned or controlled by the company, such as furnaces, boilers, and power plants.
- **Scope 2** refers to emissions from the generation of purchased electricity consumed by the company for purposes such as cooling, computers, or operating machinery.
- **Scope 3** refers to indirect value chain emissions from upstream and downstream operations of the company, including emissions from the use of sold products, waste generated in operations, employee commuting, and more.

While legal challenges are expected, a version of these rules is likely to be put in place in the near future, resulting in a shift in how public corporations assess emissions risks. In the meantime, ABB has already begun the work of meeting these anticipated SEC requirements through the development of an Environmental Product Declaration (EPD).

The EPD tells the life cycle story of a product in a single, comprehensive report, providing information about a product's impact upon the environment, such as global warming potential, smog creation, ozone depletion, and water pollution. EPDs can be developed after a product life cycle assessment is conducted and are based on applicable product category rules. ABB has already produced EPDs for many of its products, with the goal of creating EPDs for all products over the next few years.

Integrity and transparency drive ABB's Mission to Zero.

Mission to Zero is ABB's strategy to reach carbon neutrality in its own plant operations by 2030. ABB practices integrity by "walking the talk" to reach a low-carbon future, putting practices in place to decarbonize. ABB strives to be a transparent partner on the journey to carbon net-neutrality.

ABB found that its Mission to Zero initiative enabled savings, efficiencies, and resiliency; increased eligibility for potential regulatory and tax benefits; and supported energy independence. As a result, Mission to Zero now serves as a blueprint for partners around the world to achieve the same benefits.

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Figure 3: ABB's Mission to Zero™



Case Study: Senatobia Manufacturing Facility Expansion

Senatobia, Mississippi, is an ABB factory that manufactures a variety of circuit breakers. In 2019, the factory was looking to expand significantly, more than doubling production. ABB decided that Senatobia would be the first site in the U.S. to embark on the Mission to Zero journey and identified three primary goals:

1. Reduce energy consumption costs and associated carbon dioxide emissions (>25%).
2. Use more renewable energy and energy storage (shifting 87% of energy usage to renewables).
3. Establish a showcase for ABB products for customers to observe in application.

The project also employed ABB's various digital technologies to make the site a micro grid, using PV solar and ABB's energy storage system. ABB began the \$1.5 million project by gathering data on energy consumption, carbon footprint, and energy cost to set a baseline. Using this starting point, ABB evaluated the impact of an addition of a micro grid and a more energy-efficient building addition to meet established goals.

To get the data required, ABB upgraded the metering equipment in the old building to understand resource usage in real time. In the new plant buildout, new switchgear was installed, which used the ABB Emax 2 breaker produced at the Senatobia facility. With built-in digitalization and technology on the breaker that allows real-time data and condition-based maintenance through the EPiC application, the ABB Emax 2 is critical to a project such as Senatobia's Mission to Zero factory expansion.

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The company purchased an additional three acres of land to build a solar farm, with power entering the new plant footprint immediately adjacent to the energy storage system, which provides approximately two hours of backup power if needed. Smart lighting and a metered, variable speed drive HVAC system further increased facility efficiency, and an on-site DC fast charger encouraged electric vehicle adoption among workers.

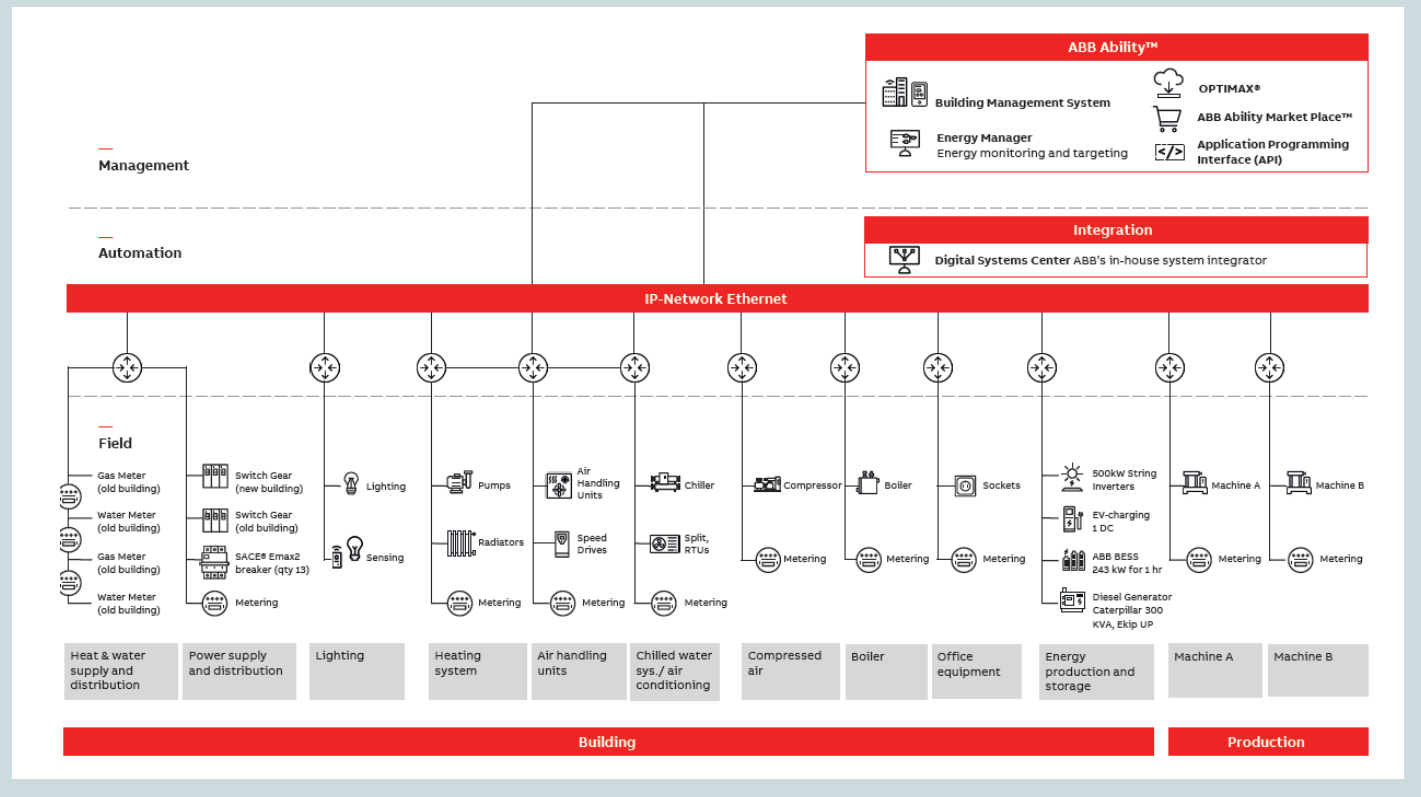
Using ABB smart switches, relays, and breakers, operators gain visibility into energy consumption on each line in real time. The data from these smart components support more informed decisions on when a line should run, when to do maintenance, and troubleshooting.

ABB's in-house systems integrator helped pull the components together with ABB's Energy and Asset Manager and OPTIMAX® applications from the ABB Ability™ Energy Management Suite. The new facility is now up and running, with an anticipated 20-year payback.

“When we’re talking about this type of collaboration, every project is going to be different, and every project is going to have its own complexities . . . By doing our own plants with our own equipment, [ABB] can start to provide a blueprint for our contractors . . . and end users as they also try to decarbonize their plants.”

Brian Nelson, ABB

Figure 4: Senatobia factory architecture



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ADDITIONAL INFORMATION

ABB Mission to Zero™. To learn more, visit global.abb/topic/mission-to-zero

BIOGRAPHY

Brian Nelson

Renewables Market Development Manager, ABB

Brian Nelson has 15 years of account management and business development experience in the energy industry, with a focus on electrical utilities and the renewables market in the United States. He joined ABB in 2009 and has held several roles in marketing and sales with a short stint in logistics. Currently Brian is the renewables market leader for ABB's Electrification division, responsible for segment growth in the areas of solar, wind, and energy storage. He also serves on the board of ABB's Encompass Pride Employee Resource Group as the Partnership Chair. Brian has a B.S. in Electrical and Computer Engineering Technology from Purdue University and is based in Denver, North Carolina.