COP31 BUSINESS FORUM

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Applications of AI have the potential to cut emissions across a wide swath of applications—through optimal operation of the grid, batteries, delivery trucks, or agricultural equipment, to name a few. The International Energy Agency estimates that existing AI applications could cut up to 1.4 gigatons of CO_2 by 2035, three to four times what the data centers running them emit. But at the same time, AI infrastructure can increase emissions, because data centers are among the fastest-growing users of electricity, not all of it clean.

For emissions reduction, adoption of AI still lags its potential. Even in managing electrical grids, where AI use is most advanced, it is not yet widespread. Tapestry, Alphabet's grid project, has moved beyond a pilot with Chile's system operator and is working with PJM, North America's largest grid operator, to connect new power generation faster, but such projects are rare.

Promising pilots exist in every sector, from AI agents that find and fix electric-vehicle chargers within hours to sensors that reduce water and fertilizer use on farms. Few have grown into large-scale deployments. The main obstacle is the markets around technology. Buyers seldom articulate the specific problems they seek to address, and meaningful connections among innovators, buyers, and investors remain limited. Finance and procurement functions are typically engaged too late in the pilot process, and few organizations are willing to serve as early adopters of AI deployments. Moreover, companies lack comprehensive frameworks that span the full spectrum of AI use cases, as well as robust methodologies for quantifying the cost savings and emissions reductions attributable to each. In developing economies, these challenges are compounded by constraints in power, connectivity, computing capacity, data availability, and technical expertise.

On the other hand, AI infrastructure is growing fast. Data centers are projected to reach $6.7 trillion of investment worldwide by 2030[5], and the IEA expects their electricity use to more than double over the same period[1]. Most of this capacity is not yet built, so there is opportunity to reduce the carbon intensity of future data centers. However, there is so far no shared definition of a responsible data center, and no penalty or reward for decarbonizing one. In a facility running on low-carbon power, the emissions associated with making its buildings and hardware can exceed 40 percent of the total[5]. Built to a high standard, data centers could push their suppliers of high-carbon materials including steel, concrete, chips, and cooling equipment toward lower-emission production.

01

Use AI well: scale proven AI use cases in energy, agriculture and green industrialization

Most of the AI-based technology for emission reduction already exists, and there are promising pilots in every sector. What is missing is a way to take them from pilot to full deployment. Successful pilots rarely lead to purchases, because sales cycles are long, contracts are negotiated case by case, data is fragmented, and finance and procurement teams are involved too late in projects. Energy has the best-measured results for AI use, but agriculture and industry face the same problem. For any claimed result, the key test is attribution: showing that the AI application caused the change, rather than, for instance, the weather or energy prices. Only then can investors and buyers rely on it.

Recommendations to the COP Presidency

Recommendation 1: Governments, development finance institutions and industry could build a case library for each sector. Each sector library would record proven AI use cases with their measured results, baselines, and business cases, and could be hosted by an existing organization.

- **1A Energy.** The energy library could cover grid optimization, renewable dispatch, demand response, and flexible demand. It could include standard pilot contracts, so that a new buyer could adopt a proven solution without negotiating from scratch. Utilities, appliance makers, and retailers could use it to offer households heat pumps, efficient cooling, and EV charging as bundled packages. Governments could complement these offers by funding targeted incentives, such as purchase rebates, to help households buy products whose AI features deliver verified energy savings. Lower upfront costs could broaden consumer adoption and generate the demand needed to scale these products.

- **1B Agriculture.** The agriculture library could cover uses such as precision irrigation and fertilizer application, yield forecasting, and spoilage reduction through demand forecasting among other approaches. Each use would be assessed on carbon, water, soil, and waste together. The library could reach farmers through farmers' organizations and national food and climate plans.

- **1C Green industrialization.** The industry library could cover uses such as real-time process control, reducing defects and scrap, and using resources more efficiently, each with its business case. Existing industrial decarbonization coalitions could be a natural home for it.

In all three sectors, finance and procurement teams could be involved from the start, and public bodies and large buyers could act as first customers where proven technology needs one. Proven use cases could be offered to developing economies on concessional or open terms.

Implementation and Examples

Initiatives. Rather than create new bodies, each library could be hosted by an existing organization. In energy, **EU AI.grids** could be a good fit. This consortium of about 48 partners, including 18 grid operators, is led by Fraunhofer and has been backed by the European Commission since June 2026. **EPRIDCFlex**, with more than 65 participating organizations, could help validate solutions. In agriculture, the **UN's Global Initiative on AI for Agri-Food Systems**, launched in July 2025 and led by the ITU and FAO with WFP and IFAD, is a possible host, with links to farmers' organizations and national food and climate plans[8]. In industry, the **Mission Possible Partnership** and the **Industrial Deep Decarbonisation** Initiative work on emissions and procurement but not yet on AI[9]. Businesses could propose adding AI production use cases to their agenda. A practical next step would be to explore these options with each organization after COP31, starting with energy.

Case: TTGV Target-Oriented Novel Programme (GÜP), Türkiye

Demand for climate technology exists, but industry prefers solutions that are already proven and bankable. As a result, technologies that have completed research and development often stall before they reach commercial use. GÜP is run by TTGV, a non-profit public-private foundation. It selects deep-tech solutions that have reached the experimental-development stage and are close to application and acts as the first customer for their first-of-a-kind demonstration. TTGV takes the initial risk and shares what it learns with the wider industry. The first call produced five signed demonstration contracts of about $500,000 each in clean hydrogen, green cement, battery materials, and insect-protein animal feed. One project is already a live pilot (October 2026). A second call opened on 20 October 2026 and includes a topic on using AI to optimize combustion in hard-to-abate sectors. To replicate the model elsewhere, a trusted body must be willing to take the first risk and to define demand around real industrial needs.

Case: Siemens eMobility, Sietria AI agents for EV charger faults (Türkiye and Portugal)

Six specialized AI agents read equipment alerts, diagnose each fault, and send it to the right engineer, while people still make the critical decisions. In the measured pilot, 453 faults were fixed in about six hours each, compared with six to eight days before. This recovered about 73,386 hours of charger uptime and saved about 39 tCO_2 net. Across 29,400 charging sockets, Siemens projects about 3.8 million hours and 2,024 tCO_2 net a year, although these figures have not yet been measured at fleet scale. The system runs on existing service software in Türkiye and has been validated in Portugal.

Additional cases shared by working group members, A.1 to A.8, describe further examples from Beta Enerji, Google with Energy Dome, Besler, Afresh, Ülker, Beko, İşbank with MEXT, and Baker Hughes.



02

Build AI well: a sustainability standard for data centers and sustainability by design

Global demand for data-center capacity could nearly triple by 2030, and data-center electricity use could reach about 945 TWh. Financing, permits, grid connections, and supply chains all limit how fast this capacity can be built. Developers must also respond to local concerns about grid strain, electricity bills, and water use. In the United States, local opposition blocked or delayed about $64 billion of projects in two years. Agreeing on one facility-level standard now, while most of the capacity is still being planned, would allow the whole industry to improve together instead of one site at a time. The working group makes two recommendations: a minimum standard that every operator can meet today (2A), and a stricter design target that also covers embodied carbon (2B).

Recommendations to the COP Presidency

Recommendation 2A: a sustainability standard for data centers (the floor)

- **Data-center operators**, supported by **governments, lenders and other third parties**, could agree on an industry-led standard based on metrics they already measure. The standard could combine power usage effectiveness (PUE) and water usage effectiveness (WUE), adjusted for climate and assessed across a campus or region. It could require clean power matched on the same grid, annually as a minimum and hourly as best practice, and waste-heat reuse wherever there is a user for the heat. It would apply to new facilities first, with a grace period for existing ones.

- **Operators** could start quickly with a voluntary cooling compact, then add a grid-support commitment. Under it, each operator could identify on-site or grid-side measures that make the grid more reliable. Grid operators and regulators could give faster or priority grid connections to facilities that deliver them.

- **Regulators and lenders** could base disclosure on metered annual data that customers can verify. Operators could report once, through existing channels such as the EU Energy Efficiency Directive database, using standard indicators in data-center financing terms. Over the longer term, once the sector reaches sustained profitability, governments could consider a dedicated cap-and-trade system for data centers above a defined capacity threshold, modeled on emissions trading. Using verified data reported under the standard, the system could set separate aggregate caps for greenhouse gas emissions, energy use, and water consumption, with upper facility-level thresholds for each. Operators exceeding a threshold would have to buy and surrender allowances for the excess, while those below the threshold could sell surplus allowances, allowing market prices to emerge over time. The cost of buying allowances would make operators financially accountable for their environmental footprint and give them a lasting incentive to develop and deploy technologies that use less energy and water and generate fewer emissions.

Recommendation 2B: sustainability by design (the ceiling)

- Leading **operators** could support a center of excellence that recognizes them against a single limit on carbon per megawatt of capacity. The limit would cover both construction and operation and would decline over time, with embodied and operational emissions reported separately. These operators could also buy materials together to push chip and equipment suppliers toward lower-carbon production.

Implementation and Examples

Some regulations are starting to move this way. Data centers of 500 kW and above already report energy and water performance under the EU Energy Efficiency Directive. On 21 September 2026, the European Commission proposed a common A–G rating, with the first labels expected from August 2027. Some jurisdictions already require power flexibility. Ireland requires new data centers of 10 MVA and above to provide dispatchable generation or storage that matches their import capacity, and Texas Senate Bill 6 requires new loads of 75 MW and above to be curtailable in grid emergencies.

Initiatives. The cooling compact could build on the **COP28 Global Cooling Pledge**, which was launched with 63 countries and had more than 70 supporters by COP29. It could make closed-loop, near-zero-water cooling and controls on high-GWP refrigerants the expected practice for new facilities. The **AI Energy Management Alliance**, launched in September 2026 by Emerald AI, Google, and NVIDIA with 18 partners, could be a natural home for the grid-support commitment, which could be measured with EPRI Flex **MOSAIC**. The **Open Compute Project** is one option for hosting the standard itself. Independent facility-level data, such as **Climate TRACE**, could provide a check on what operators disclose. There is no direct precedent for a carbon-per-megawatt limit. The ceiling could borrow its mechanism from the EU Emissions Trading System, where a predictable, declining cap shifts investment ahead of the deadline. Sector leaders could decide whether to adopt it. A practical next step would be to test interest in the cooling compact and the grid-support commitment with operators at COP31.

Case: Emerald AI field demonstrations under EPRI DCFlex (United States and United Kingdom)

In Phoenix, working with Oracle, NVIDIA, Salt River Project, and EPRI, Emerald AI cut the power use of a 256-GPU cluster by 25 percent for three hours during peak grid stress, without reducing computing quality. In London in December 2025, with National Grid, Nebius, and NVIDIA, a cluster cut its demand by more than a third in under a minute. These were demonstrations, not fleet-wide operations. They show, however, that software can provide grid support and that the result can be measured on a common basis.

Additional cases shared by working group members, A.9 to A.13, describe further examples from Infinitum Electric, Google with NV Energy and Fervo, Baker Hughes, Microsoft, and Apple.

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28. Baker Hughes, member submissions to the working group (2025–2026): Florence HVAC pilot and US data-center CHP evaluation.
29. McKinsey & Company, “How Apple is helping unearth a path toward increasing the global use of circular materials”.

Additional Cases

Member submissions and co-chair inputs; figures as provided by the source.

A.1 Beta Enerji with academic partners: AI-based transformer life and carbon intelligence (Türkiye; area 1).
Grid transformers are often replaced because of their age rather than their condition. A framework supported by TÜBİTAK's TEYDEB 1832 program feeds condition data into an AI model that estimates each transformer's remaining useful life. It links this to an analysis of energy losses and carbon, to show when to maintain, extend, or replace a transformer. Pilots are under way on three transformers, and results will be reported when they finish.

A.2 Google with Energy Dome: long-duration storage at a former peat power plant (Ireland; area 1).
Through a partnership with, and an equity investment in, Energy Dome, Google is backing Europe's first bilateral commercial CO_2 Battery. The 23 MW, 200 MWh non-lithium plant can return power to the grid for 8 to 24 hours. It is due online in 2028 and will ease grid congestion and support Ireland's target of 80 percent renewable electricity by 2030.

A.3 Besler: SAFER smart agriculture (Türkiye; area 1).
Sensors and drones monitor crops and soil, and AI turns the data into daily decisions on irrigation and inputs. Besler has applied the system to potato farming with an international innovation partner, a public research institute, and the World Farmers' Organisation. Field tests show lower water and input use, while supporting yield and quality.

A.4 Afresh (submitted by Just Climate): AI ordering that cuts fresh-food waste (United States; area 1).
A fresh uses AI to forecast demand for perishable food and recommend how much to order. It reports an average 25 percent cut in food waste among its customers and more than 200 million pounds of waste prevented, across more than 12,500 store departments in 40 US states.

A.5 Ülker: digital energy, water, and waste management (Türkiye; area 1).
Digital monitoring and automatic alerts identify losses as they happen, and waste tracking sends material for recovery. The company saved 12,000 MWh of energy and 26,759 m^3 of water and reached a 99 percent waste recycling rate, supported by investments of about TRY 88 million in energy and TRY 1.5 million in water in 2025.

A.6 Beko: CoolAdapt, AI that cuts the energy a refrigerator uses (global; area 1).
Household appliances account for about 45 percent of building electricity use. Through the HomeWhiz app, CoolAdapt learns a household's habits and adjusts how the fans and compressor run. It removes unnecessary cooling without affecting how well food is kept, and reduces each refrigerator's energy use by 20 percent.

A.7 Türkiye İşBankası with MEXT: twin transformation of 100 manufacturing SMEs (Türkiye; area 1).
Launched in February 2024, the program digitalizes production-line management, identifies energy-efficiency investments at each site, and finances them through İşbank loans. It helps SMEs exposed to the EU's carbon border tax become both more digital and greener. Results have not yet been reported.

A.8 Baker Hughes: AI optimization of building HVAC (Florence, Italy; area 1).
Heating, ventilation, and air conditioning account for about 60 percent of the energy used in Baker Hughes buildings. An AI model monitors and optimizes these systems in three pilot office buildings. Baker Hughes expects energy savings of about 35 percent when the system is active and plans to extend it across the campus.

A.9 Infinitum Electric (by Just Climate): efficient motors for data-center cooling (United States and Mexico; area 2).
Infinitum'smotor is built on a printed-circuit-board stator that uses 66 percent less copper, and it has built-in variable speed. At one US data center, 500 old motors and drives were replaced in four months. Energy use fell by 19 percent, saving about US$150,000 a year and avoiding 625 tCO_2, with a payback period of about two years.

Additional Cases

A.10 Google with NV Energy and Fervo Energy: Clean Transition Tariff (Nevada, United States; area 2).
Under a tariff the regulator approved in May 2025, Google pays a premium that gives Fervothe demand certainty it needs for 115 MW of enhanced geothermal power, while other customers are protected from the cost. In September 2026, Google and Fervo signed a 396 MW agreement for Cape Station in Utah.

A.11 Baker Hughes: combined heat and power for a US data center (United States; area 2).
Baker Hughes evaluated a design with twelve gas turbines whose waste heat drives absorption chillers, providing about 18,000 refrigeration tons of cooling. The design reaches about 55 percent overall efficiency and eases pressure on the grid. Under the proposed ceiling, its carbon intensity and its path to lower-carbon fuels would count toward the facility's carbon per megawatt.

A.12 Microsoft: microfluidic chip cooling (global; area 2).
Microfluidic channels carry coolant directly into the silicon and cool chips up to three times better than current methods. Microsoft is also using AI to optimize cooling and other energy-intensive data-center systems.

A.13 Apple with McKinsey: circular critical materials (global; area 2).
Apple has mapped where materials are lost at the end of their life and is building a recovery value chain through the WBCSD Critical Materials Collective. It has cut aluminum-related emissions by 76 percent since 2015, and in 2024, 24 percent of the materials shipped in its products were recycled.

Working Group Members

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