

Schneider Electric

The best can always get better. The World's first ISO50001 building is today 3x more efficient than the day it opened.



Schneider Electric's global headquarters, Le Hive. Rueil-Malmaison, France

Case Study Snapshot

Industry	Electronics and Electrical Equipment
Product/Service	Energy Management and Automation
Location	Rueil-Malmaison, France
Energy performance improvement percentage (over the improvement period)	41% (over 2009-2021)
Total energy cost savings (over the improvement period)	\$USD 282,000/yr
Cost to implement Energy Management System (EnMS)	\$USD 135, 890
Total energy savings (over the improvement period)	133, 167 GJ (over 2009-2021)
Total CO₂-e emission reduction (over the improvement period)	5,814 metric tons (over 2009-2021), 88% reduction vs 2009

Organization Profile / Business Case

About Schneider Electric:

Schneider Electric is a multinational company providing digital energy and automation solutions for efficiency and sustainability, with €28.9bn turnover (FY2021) and 128,000 employees from more than 100 countries. It combines world-leading energy technologies, real-time automation, software, and services into integrated solutions for homes, buildings, data centers, infrastructure, and industries.

Recognized in 2021 as the world's most sustainable company¹ by the Corporate Knights in 2021, the Group is now a world corporate leader in sustainability and a key enabler for all stakeholders in its ecosystem to accelerate their own energy efficiency and sustainability transition. In 2021, it reported 70% of its revenue coming from sustainable solutions, while 73% of its investments are directed toward sustainable solutions. It keeps raising its own standards and has pledged to become carbon neutral in its operations by 2025, and end-to-end carbon neutral value chain by 2040, 10 years ahead of the 1.5 °C climate trajectory.

¹ Based on a rigorous assessment, Schneider ranked number 1 out of more than 8,000 public corporations (with revenue over US\$1 billion) assessed for 2021 Global 100 by Corporate Knights. Performance indicators include evaluations of how much renewable energy and waste companies generate. This year, they also included new indicators on sick leave, executive and board racial diversity, and clean investments.

Business Case

Buildings are a critical piece of our transition towards the Net Zero future: they are where we live, where we rest, and where we work – and are responsible for about 40% of global energy consumption and about one-third of global greenhouse gas emissions. The electrification of our world, combined with rapid digitalization, is what we call Electricity 4.0. This is the next technological revolution, bringing opportunities to unlock more energy efficient and sustainable buildings.

As a global specialist in energy management solutions, Schneider Electric leverages its own inhouse energy management solutions, EcoStruxure™ for Building to deliver energy savings and showcase for customers and business partners. Since 2005, the Group has fixed annual objectives for energy efficiency each year. Schneider met or exceeded its energy efficiency goals during the previous four Company programs (2009–2011, 2012–2014, 2015–2017, and 2018–2020), by achieving 10%, 13%, 10%, and 10%, respectively, totaling over 40% reduction from 2009 to 2021. The 2021–2025 Company program aims to reduce energy consumption by a further 15% over five years compared to 2019 (Exhibit 1).

Schneider Electric leverages ISO 50001 certification and deploy it at scale to drive energy excellence, focusing on the highest energy-consuming sites. ISO 50001 certification is complementary to ISO 14001 certification and enables us to define and sustain robust energy governance. With the support of this certification, our sites are equipped to understand and reduce their energy footprint. The Group aims to ISO 50001-certify all sites consuming over 5 GWh per year. By the end of 2021, 140 sites were already certified ISO 50001.

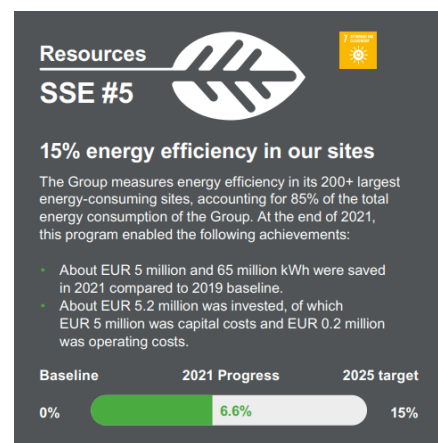


Exhibit 1

Le Hive office, the world’s first ISO 50001-certified building

Located in Rueil Mailmaison in the greater Paris region, the 14-year-old headquarters office building of Schneider Electric Group accommodates more than 2000 employees in a surface area of 35,000m². The name, Le Hive, is derived from the French acronym of ‘Hall de l’Innovation et Vitrine de l’Énergie’ (Hall of Innovation and Energy Management showcase) and reflects the Group’s commitment to the highest standards in energy management with its own building technologies.

Le Hive was the first building in the world to obtain ISO 50001 – Energy Management certification in 2011. Prior to reaching the ISO 50001 milestone, the building had obtained High Quality Environmental standard (HQE) Exploitation (rated Exceptional), ISO 14001, and NF EN 16001 certification. Over the years it has also gained ‘Outstanding’ status

“Buildings of the future need to be sustainable, hyper-efficient, resilient and people-centric. Technology is available today to achieve it. At Schneider Electric, we walk the talk. ISO50001 certification is the result of implementing our own energy management solutions, and we have set ambitious target to have 100% of our sites certified by 2025. We look forward to working with our ecosystem of partners to strategize, digitize, decarbonize and optimize their building portfolio, in order to accelerate the transition to a net-zero future.”

—Olivier Blum, Executive Vice President Energy Management -Executive Committee member, Schneider Electric

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of BREEAM in Use certification and Platinum status of LEED Ebom in its continuous strive for excellence in efficiency and sustainability.

Business Benefits

Since June 2011, when le Hive was first certified ISO 50001, the building has been through 3 re-certifications, i.e a follow-up every 3 years to ensure continuous improvement in building efficiency and sustainability metrics.

Substantial benefits have manifested themselves in the following ways over the period of 2009-2021 (2009 was the year when building entered its first full year of operation) See Exhibit 2: 1) Energy Savings: energy consumption reduced almost by half, with an average savings of 2, 845 Mwh per year (equivalent of 10, 242 Gj/yr, 133, 167 Gj total energy savings); 2) Reduced building carbon footprint by 8 folds 905 metric tons of CO2 equivalent to today 73 metric tons, a total of 3,568 metric tons CO2e saved since 2009; 3) Annual cost savings of €263,000 (\$USD 282,000), with ROI from active energy efficiency measures under 5 years; global payback (including all investments for efficiency and onsite renewable) of 9.7 years.

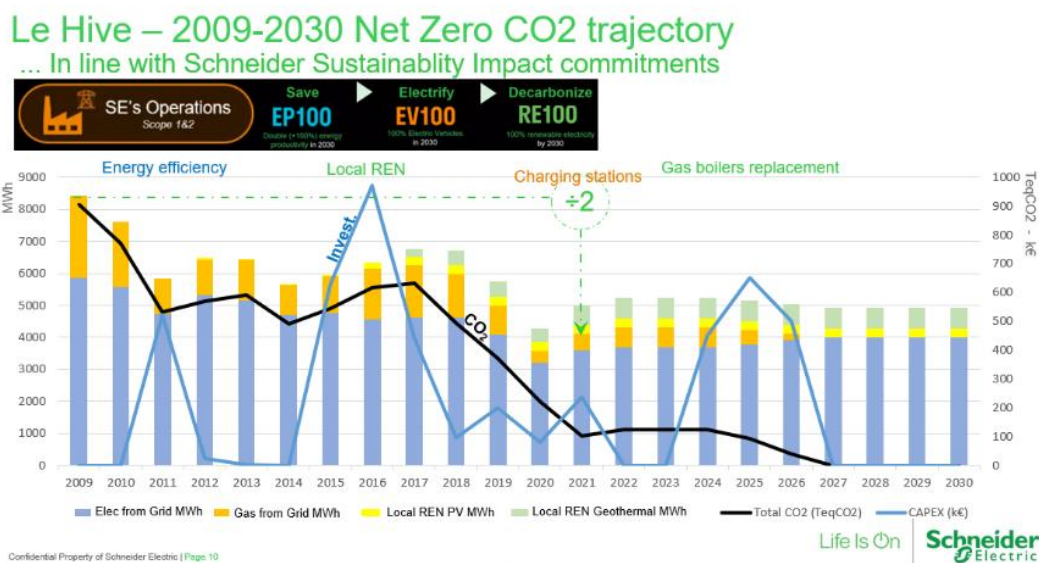


Exhibit 2: Le Hive's 2009-2030 Net Zero trajectory, In line with the Group Sustainability Impact commitments

This was achieved with a combination of energy efficiency measures and onsite renewable production, which include a Building Management System (BMS) with more than 3500 connected products, 30,000 points being controlled and monitored; 1300 m2 of photovoltaic solar panels on the roof and a geothermal system able to heat or cool the building all year long. Today, the PV production provides us with up to 10% of the conventional electricity consumption of the building and the geothermal will cover up to 60% of the needs in heating and cooling.

From this site, we would like to demonstrate that by deploying active energy efficiency solutions it is possible to considerably improve and sustain the energy performance of buildings without affecting their structure and occupant's comfort. In other words, we are demonstrating that the global challenge of being 3 times more efficient within a few years is achievable in existing buildings.

Taking learnings gained over the years, the Group recently opened a world-class new R&D flagship building, [Intercity](#). Located in the scientific area of Grenoble, France, the the 26,000 square meter smart office park is accomodates 1,500 employees yet aims to consume just 37 kWh/m² each year — nearly 10 times less energy than the average

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European building. Other signature sites are being replicated across geographies such as the Group's [East Asia HQ in Singapore](#), [Boston One Campus](#) in the United States.

Plan

Energy efficiency and sustainability are an integral part of the Group's strategy and encompasses every aspect of the organization. Energy and environmental performance are reported and discussed during leadership meetings of concerned entities, including Global Supply Chain leadership meetings, Sustainable Innovation Taskforce with business units, the Board Audit & Risks Committee, Board of Directors, Executive Committee, Human Resources & CSR Committee, and Group Sustainability Committee.

At le Hive, Management Commitments on energy and environmental performance is displayed on the site and updated every year. Management reviews take place twice a year with the site management team and the stakeholders EnM system, with topics including last year performance and budget review, regulation updates, and new objective setting for the coming year. Resource allocation to improve energy and environmental performance is evaluated based on 3 key criteria: No interruption of activity, scalable actions, and short payback.

Listening the stakeholders is also an important part of the objective setting process. A survey is conducted every November with all le Hive residents covering a range of topics such as environment, safety and security, services available on site, comfort in the building and energy solutions running in the building.

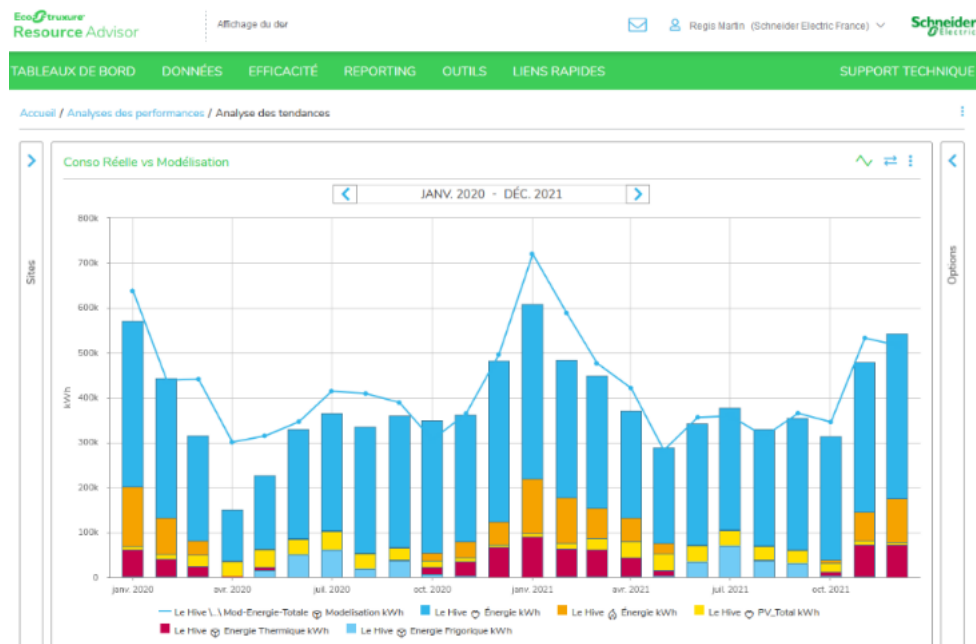


Exhibit 3: Resource Advisor to ensure consistent energy monitoring

The role of Energy Manager was initiated in 2011 (and has been replicated to other sites) designating someone responsible for managing the energy performance of the building, and annual energy performance targets are being monitored continuously and vigorously. This includes i) revisiting objectives and targets, plans and actions; ii) monitoring energy usage trends; and iii) reviewing the monthly energy usage analysis report which gives actionable insights to prioritize resources and improve actions.

“The ISO 50001 certification (and the periodic audits carried out since 2011) have enabled us to engage le Hive site in a continuous improvement process, allowing us to go beyond the results in terms of reducing energy consumption and emissions of CO², to analyze our practices, look for areas of optimization and benchmark ourselves with other Schneider Electric sites, to move towards the carbon neutrality of our headquarters.”

— Luc DE CREMOUX, Safety, Environment and Real Estate Director - Parisian sites, Schneider Electric

Schneider Electric energy management solutions are deployed onsite to ensure a continuous improvement process: Its IoT architecture for buildings (EcoStruxure™ Building) enable analytics of Building Management System (BMS) data alongside space, utilization, and comfort metrics. For example, the site’s energy and environment performance reporting and monitoring is delivered through Schneider Electric’s enterprise-level software EcoStruxure™ Resource Advisor (Exhibit 3), which aggregates energy and sustainability data in a single cloud-based platform. Its data visualization and analysis application allows site leaders to actively benchmark and develop occupancy and facility management strategies to ensure continuous right sizing of its footprint and site occupation, to keep energy consumption and resultant emissions to a minimum while reducing costs and improving employee experience.

Do, Check, and Act

The implementation of energy performance improvement for Schneider Electric’s headquarters has seen key milestone actions to achieve our goal of being 3 times more efficient within 10 years:

- **2008, inauguration of new head office building:** Schneider Electric decided to group the people coming from 10 different sites in Paris in one single new building under lease agreement. We cut total energy use by 2 primarily due to passive efficiency measures (passive insulation, windows, air ventilation systems)
- **2009 - 2014, implementation of active energy efficiency:** the energy manager was not satisfied with the value of 150 kWh/sqm/yr² and believes further efficiencies can be released. The main opportunity identified was to fine tune the major consumer - HVAC - through installation of our own Building Management Systems. With more than 3,500 connected products such as controllers, sensors, valves, speed drivers capturing building data, and measuring energy by use, by activity and by sector, but also the occupancy rate, temperature, weather, dissatisfaction, etc. By 2014, the energy use per square meter had been cut by half from 150 to 74 kWh/sqm/yr.
- **2016 -2017, introduction of onsite renewables:** To go further without altering the comfort of people working here, we introduced onsite renewables - 1300 m² of photovoltaic panels on the roof of le Hive in 2016 and one year later a geothermal system able to heat or cool the building all year long.
- By 2019, the building energy efficiency has been improved by factor of 3 at only 43 kWh/sqm/yr (from 150 kWh/sqm/yr 2009 baseline)

“We show on this site that, by deploying active energy efficiency solutions, it is possible to considerably improve and sustain building energy performance without affecting its structure. ISO50001 Energy Management System through the planning, action plan and Energy review provides a great tool to structure our execution to deliver our goals for continuous improvement.”

— Régis Martin, Energy Manager for Le Hive Building, Schneider Electric

² Normalized data value on building conventional energy use, include HVAC, Lighting, Production of hot water, and it is adjusted with the climate conditions (ref year = 2010)

Since 2011, the certification and recertification of ISO 50001 follows a 3-year cycle. The follow-up is done through Schneider’s monitoring tool "Resource Advisor" software. For example, it is calculating the energy consumption of the site vs the baseline model to give visibility across sites of the energy performance against group objectives (Exhibit 4). For the latest Schneider Sustainability Impact targets, the corporate baseline is fixed at group level and is calculated from the overall consumption of 2019.

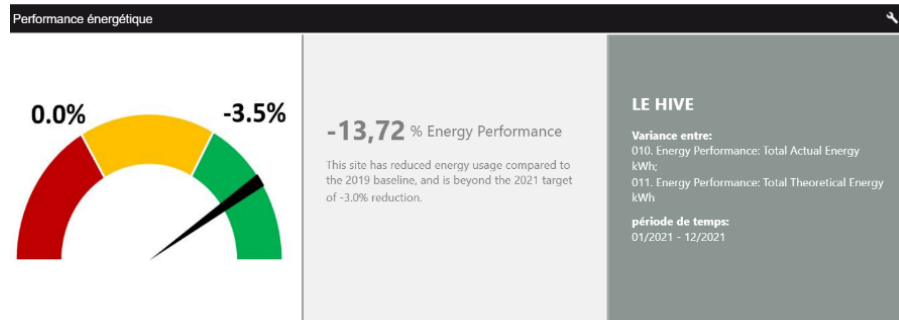


Exhibit 4

The reporting figures are double checked thanks to our analytics software (Resource Advisor) processing calculations automatically, plus a classic Excel spreadsheet reporting the results before filling the final Energy Review datasheet. The site management team reviews the energy data monthly during monthly critique meetings and holds the team accountable for achieving the energy targets.

All the physical meters (200+ electric and gas) are validated for a certain number of years (5 to 15years). They are organized in a 4-level hierarchy and the software calculates the gap between the value for the meter level 1 and the sum of the values for meters level 2 => if the difference exceeds 5%, then it raises an alarm. The software collecting the meter data raises an alarm as soon as there is a communication issue, or other applicative criteria occurs such as energy consumption outside working hours, equipment abnormal behaviors.

Note on methodology for determining energy performance improvement used this case study:

- **Baseline period:** Year 2009, the first year of the building entered full year operation. Before start of ISO 50001 energy management system (2011)
- **Reporting period:** Year 2009-2021, it covers the entire cycle of prior to ISO 50001, during the implementation and 3 recertifications.
- Indicators used to monitor and assess improvement of energy performance:
 - **Total energy consumption:** actual energy consumption of any use inside the building, which include the consumption of electricity, gas, onsite solar (from 2016) and geothermal (from 2017). The reporting is done in MhW, for the case study we have converted to GJ (1 Mwh = 3.6 GJ).
 - **Total CO2:** in metric tons of energy related CO2 equivalent
 - **Conventional Energy consumption:** scope include HVAC use, Lighting and Hot water production, adjusted with the RT2005 French regulation conditions (working hours, temperature, setpoints in winter and summer). Energy consumption is also normalized with the climate of 2010.
- For the ISO50001 audits, comparison of actual versus expected energy consumption are used to show energy improvements; conventional energy consumption and its related indicators (e.g per degree day, per square meter per year) are also being monitored and communicated which allows us to benchmark with other office buildings.

Transparency

The corporate headquarters site hosts more than 20,000 visitors each year from around the world, including high level government officials, business customers and students. Visitors are provided an in-depth view of energy management solutions. During the tour we will systematically introduce the certifications we obtained including ISO 50001, which are displayed at the entrance hall of the building.

One of the building's more popular features is an energy dashboard that displays the building's annual energy consumption. The information displayed on the dashboard illustrates energy consumption by type of use on a daily, monthly, and annual basis.

The reporting is also consolidated as part of Group's report – the Schneider Sustainability Impact report and is disclosed quarterly to its investors and public.

To our own employees, the energy performance is disclosed via screens every quarter. A newsletter is sent out every 2 weeks with communication regarding certifications: new version of our Management System politics, new objectives, tips regarding energy efficiency or environment actions, information on the coming ISO audit and results after the audit.

What We Can Do Differently

Schneider Electric's Le Hive head office is the first building in the world to be certified under the international ISO 50001 energy management standard. Since 2011, we have received 3 recertifications, and are in the process of pursuing our 4th certification in the 2nd half of this year. The recertification process brings best practices and lessons learned at each step, thus making our energy and sustainability improvement more robust. A few key areas have been identified to further improve in the future:

- **Improvement of collaboration with broader stakeholders within the organization:** For example, bringing in teams from global supply chain for alignment of energy and environment metrics, informing the way we buy energy and office supplies
- **Identify training opportunities:** technical trainings to enhance site EnM team's ISO50001 competencies; promote overall awareness of ISO50001 by collaboration with HR teams to include in company sustainability & energy management training modules
- **Further improve measuring hierarchy** to aim for higher accuracy in real time. Adding few additional meters at key points in the installation would make it possible to avoid consumption estimates or calculations for certain secondary uses.



The Energy Management Leadership Awards is an international competition that recognizes leading organizations for sharing high-quality, replicable descriptions of their ISO 50001 implementation and certification experiences. The Clean Energy Ministerial (CEM) began offering these Awards in 2016. For more information, please visit www.cleanenergyministerial.org/EMAwards.