openinventionnetwork®

Open Source is Defining a New Era for Energy & Utilities

Open Source is driving sustainability innovation in energy efficiency, climate technologies, and environmental science. Many worldwide businesses across all industries — from banking to beauty — are cleaning up their carbon footprint and setting new standards.

By its nature, renewable energy requires the transition from centralized to distributed power generation. This creates challenges, such as system stability, voltage control, supply reliability and equipment control, to grid operators. The upcoming electrification of the mobility and heating sectors will also affect grids, by creating new power profiles and higher levels of power demand. Open Source Software (OSS) and its collaborative software development is facilitating the digitalization of energy systems and development of new grid solutions to address the world's challenges of distributed and renewable power. Open Source improves interoperability and compatibility between grid operators. In other words, embracing Open Source is a means of fostering the free exchange of knowledge and data in the energy sector to achieve the goals of transition to renewable energy.

LF Energy is leading the efforts for approximately 20 OSS projects to solve energy and climate change issues, as well as improve the power grid

LF Energy survey results of >400 energy industry stakeholders across North America, Europe and Asia Pacific:

43% believe the Energy Industry consensus is still key to increasing OSS adoption

64% say they use more OSS than closed source

51% see Information Technology (IT) and Operational Technology (OT) converging in their organizations with a shift towards using OSS

>76% have a clear strategic plan for digitalization and have begun implementation

Sources:

Allied Market Research // Bloomberg NEF // CEO Magazine // Data Center Knowledge // Federal Times // Linux Foundation (LF) Energy // MDPI // TS2

OPEN SOURCE IN ENERGY STATISTICS

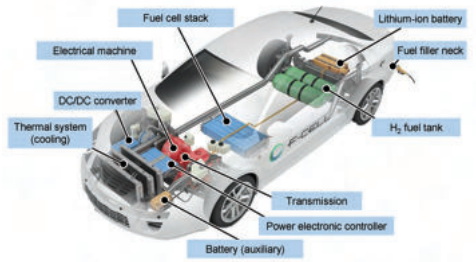
U.S. President Joe Biden has allocated $7.5 billion (USD) to build out America's Electric Vehicle (EV) charging network

- Another $2.5 billion has been earmarked by the Federal Highway Administration
- The goal is to bring the total number of public EV chargers in America to 1.2 million

The European Commission DG Energy estimates an investment of €40.7 billion for installation of 266 million smart meters — which measure and monitor the power exchanged by residential and commercial end-users relying on Open Source technologies – by 2030

An analysis found there are at least **388 Open Source Software projects** in the energy sector

Python — which is protected under OIN's Linux System definition — is the #1 programming language used in energy related Open Source projects and the primary language for 53% of projects



Renewable energy is the fastest-growing global energy source and is set to grow from $880 billion dollars (USD) to nearly $2 trillion by 2030

The National Renewable Energy Lab's Open Operational Assessment (OpenOA) has created the 1st-of-its-kind resource built on Open Source, helping wind energy communities assess wind plant performance

The power of Open Source is virtually limitless! It will power the Earth's largest and 1st-ever Artificial Intelligence (AI) geospatial Open Source foundation model

There are >20 Open Source Energy System Models in use to explore future energy systems and address questions involving energy and climate control

An estimated 70% of industrial electricity is consumed by electric motors. Battery management systems, variable speed motor drives, alternative powertrains and Electric Vehicles (EVs) — powered by Open Source technologies — are making a difference

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OIN COMMUNITY MEMBERS ACCELERATE CHANGE

Analog Devices, Inc. (ADI) — a global, high-performance semiconductor leader — is combatting climate change with accelerating Open Source breakthroughs in motor drives, industrial emissions and air & water quality monitoring systems among other sustainability efforts with Open Source.

Estée Lauder — a 3rd generation, family-owned business and one of the world's leading makers of more than 25 well-known beauty brands — reports it sources 100% renewable electricity across its operations. To reduce its carbon footprint, the company signed an agreement for 22 MW of wind power and has installed solar panels totaling 5 MW across various facilities.

Google has been powered by 100% renewable energy for 4 years and was the 1st company of its size to set such an ambitious goal. To conserve energy, the tech giant uses less to begin with while meeting its computing needs and plans to run its operation entirely carbon-free by 2030. Renewable energy projects are taking place across 4 continents, relying on wind and solar power.

Hitachi Energy is co-creating global and local solutions to solve the global challenge of an inclusive and equitable carbon-neutral future. It serves sustainable mobility, smart cities, energy storage and data centers.

Johnson Controls offers a portfolio of industry-leading technology energy solutions, including HVAC equipment, residential and smart home devices, and distributed energy storage. As one of its Open Source initiatives, the company uses an Open Source Energy Analysis Software for targeting building efficiency retrofits.

Pepperl+Fuchs relies on Open source tools to optimize its operations and reduce costs as a worldwide pioneer and innovator in electrical explosion protectionand sensor technology. Its sensors are used on wind turbines for photovoltaic solar arrays, solar trackers and position tracking.

A frontrunner in energy sustainability, **Schneider Electric SE** introduced its "Zero Carbo Project" in 2021 and is committed to minimizing operational carbon emissions by 2025.

SMA Solar Technology, a global energy equipment supplier headquartered in Germany, produces and manufactures new technologies, many of which use Open Source technologies — to help clients save on energy costs by relying on solar power.

Yaskawa Electric Corporation was one of the 1st major robot makers to support the Robot Operating System (ROS), a combination of Open Source algorithms, software, drivers and functions. Yaskawa also offers a variety of OSS and programming options for Yaskawa Motoman robots and uses OSS software solutions for its VIPA Controls.

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