Strategic programme

ENERGY PROJECT

This includes all the activities carried out by the Energy Commission, established at Politecnico di Milano in 2012, with the aim of meeting the university's targets for economic savings, the conservation and conscious use of energy, and ensuring that the actions taken comply with current regulations in the field.

- **Energy saving and low energy buildings**
  Politecnico invests in building quality, focusing on the energy efficiency upgrading of existing buildings and the highest standards of performance and sustainability for new constructions. A pioneer in energy-efficient buildings thanks to the VELUXlab at Bovisa, Politecnico continues to invest in buildings that meet the most advanced energy efficiency criteria, becoming Nearly-Zero Energy Buildings (NZEB).

- **Smart Building**
  Following a long-running process of technological adaptation, a continuous monitoring system of many buildings is now in place:
  - the installation at Città Studi and Bovisa (La Masa Campus) of Smart Meters and their online monitoring
  - a thermal energy monitoring system for each building and a heating plan for Città Studi and Bovisa Campus (La Masa Campus)
  - installation of advanced automation systems in a number of buildings in order to test, for example, smoke detectors (Città Studi, building 25)
  - installation in Città Studi of a system (micro-grid) for the management of electricity production and consumption in island mode (underway)
  - optimisation of the district heating network in Città Studi: temperature verification to avoid network losses

- **Development of ETNA**
  ETNA is an innovative IT platform for the collection and analysis of energy data at Politecnico di Milano. ETNA collects data from the various monitoring systems located within the University and it is interconnected both with the BMS systems that control the thermal and electrical plants at Politecnico and with the smart meters deployed within the campuses. The platform also keeps a model of the campuses (buildings, thermal, and electrical plants) to associate data with the measured entities.

  The goals of the platform are:
  - to collect and process data from different sources developed by different private companies
  - to post-process the data, calculating key performance figures at different levels, from single machines that build the thermal and electrical system to buildings and campuses
  - to provide access simply and quickly to all of the University's energy data

  The awareness of actual energy performance of buildings is essential both for those who build new plants or renovate them, to identify the most energy-consuming areas and focus on them the improvement works, and for those who perform buildings facility management, who can use the data of the platform to optimize the management of plants.
• Efficient energy production
The university is equipped with two types of electricity generation: trigeneration and photovoltaic solar energy. Several buildings also have geothermal systems (heat pumps). The main source of energy production in Città Studi comes from a trigeneration plant, i.e. a combined cooling, heating and power (CCHP) system. The unit is located on the Leonardo Campus and meets the electricity, heat and partial cooling needs of the Campus. The plant’s electricity production is monitored through the Campus online metering system. The second trigeneration plant at the Bovisa Campus, with the same electrical power (2MW), is in the design phase and is scheduled to be installed in 2021.

Data

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<thead>
<tr>
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<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
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<tbody>
<tr>
<td>Total area of the campuses (land area, m²)</td>
<td>352,234</td>
<td>342,582</td>
<td>357,831</td>
<td>357,831</td>
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<tr>
<td>Electricity produced by renewable sources (kWh)</td>
<td>9,550,000</td>
<td>11,100,000</td>
<td>11,250,000</td>
<td>11,000,000</td>
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Teaching and research

The self-mapping initiative POLIMI4SDGs linked 8 teaching activities to SDG7 objectives, 5 out of this bunch appeared also as a result of the testing of the keywords-based mapping methodology. This latter process identified 74 additional course units equally divided into the School of Industrial and Information Engineering (34) and the School of Architecture, Urban Planning and Construction Engineering (37). Although minor, there is also a response in the School of Design (1) and in the School of Civil, Environmental and Land Management Engineering (2). A pivotal role in the breakdown of this SDG, both in the self-mapping and in keywords-based one, is played by the Energy Engineering degree programme; however, SDG7-related courses are widely disseminated throughout the whole University’s teaching schedules.

Here is a brief summary list of the most representative teaching courses from SDG7 perspective:

• Engineering and Cooperation for Development: this course gives an overview on cooperation history and energy context in less developed countries, particularly in Africa. Throughout the course, energy access and related issues are addressed detailing some of the main functional solutions.

• Smart Grids and Regulation for Renewable Energy Sources: the course focuses on studying the evolution of electricity systems needed to enable a significant supply from Renewable Energy Sources (RES) and Distributed Energy Resources (DERs).

• Energy Management Lab: This course is designed to provide students with the concepts and instruments necessary for assessing from an economic perspective the adoption of technologies in the renewable energy, energy efficiency and digital domains, understanding the impact of emerging societal, technological, economic and regulatory-political trends on the business models of companies in the energy value chain and understanding industrial practices in terms of their energy performance, identifying the potential of energy-efficient technologies and services within the energy value chain.
VELUXlab Zero-Impact Laboratory

Conceived as an experimental module, VELUXlab is a building that achieves high levels of energy efficiency. The shape and orientation of the building, combined with its bioclimatic architecture and innovative building shell, allow optimal use of solar energy as well as natural lighting and ventilation to ensure comfortable interiors without any energy consumption.

As an active laboratory of Politecnico di Milano, VELUXlab is a true living lab, whose mere presence raises awareness and educates Politecnico community. Indeed, the building is subject to continuous experiments, the last of which, completed in August 2019, led to it becoming one of the first buildings with a green roof in Milan.

Supporting bodies

- **Energy Commission**: the Energy Commission (EC) is principally tasked with defining the university’s energy strategies, supporting the Directorate General in achieving the objectives of economic savings and the conservation and conscious use of energy. The EC is involved in the design and management of energy systems and provides its opinion on contracts for the provision of energy-related services. The EC ensures the proper management and maintenance of the systems, liaising with the Administration Areas in charge of this, and is tasked with monitoring and controlling the consumption of energy and drinking water for all the university’s sites, as well as drawing up the final and forecast energy statements.

- **Energy manager**: a fundamental role in achieving SDG7 is also played by the energy manager. This figure mainly deals with the analysis, monitoring and optimization of the energy use of the University. All this is done in order to allow economic, energy and environmental benefits as well as benefits related to the production of goods and services.