

11. Energy Performance

Refer to Section 2.11 of the Guidance Note

11A. Present Situation

| Indicator | | Unit | Year of Data |
|---|------------|--------------------|--------------|
| Final Energy Consumption | 3 137 279 | MWh | 2010 |
| Final Energy Use/capita | 10001 | kWh/capita | 2010 |
| Share of Renewable Energies of Final Energy Demand | * | % | |
| Share of Locally Produced Renewable Energies of Final Energy Demand | * | % | |
| Energy Performance of Municipal Buildings | 45 621 727 | kWh/m ² | 2010 |
| Final Energy Usage /Sector | | | |
| Agriculture & Fisheries | | % | 2010 |
| Industry & Commercial | 21 | | |
| Transport | 11.82 | | |
| Domestic | 59.10 | | |
| Services | 0.61 | | |
| Other | 7.15 | | |
| Total | 100 | | |

* Data not available

Energy produced from renewable resources within Ostrava includes both heat and electricity. Heat is produced mainly by biomass boilers (burning wood, wood pellets, woodchips and wood pulp), solar thermal systems and heat pumps. Electricity is produced at small hydroelectric power plants, in cogeneration sources burning biogases, and additionally by roof-mounted solar panels.



Image 1: Solar panels on MS Region's roof

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| Fuel/energy | Final use sector | NACE category | 2000 | 2005 | 2010 | |
|---------------------------|---------------------------------|---|---|----------------|---------------|------|
| Photovoltaic | Residential use | Residential | | | 3.1 | |
| | Transport (buildings) | Transportation and storage | | | 43.4 | |
| | Industry | Manufacturing | | | 84.2 | |
| | Tertiary sphere | Administration and support service activities | | | | 38.3 |
| | | | Education | | 17.2 | 17.2 |
| | | | Human health and social work activities | | | 73.1 |
| Total photovoltaic | | | | 17.2 | 259.1 | |
| Hydro | Sources of electricity and heat | Electricity, gas, steam and air conditioning supply | | 23493.4 | 2739.6 | |
| Total hydro | | | | 23493.4 | 2739.6 | |
| Sum total | | | | 2366.6 | 2998.7 | |

Table 1: Electricity production at small power plants in Ostrava (MWh/year)

| Fuel/energy | Final use sector | NACE category | 2000 | 2005 | 2010 |
|-------------------------|-----------------------|----------------------------|------|-------------|-------------|
| Wood pellets, woodchips | Transport (buildings) | Transportation and storage | | | |
| | Industry | Construction | | 1500 | 1500 |
| Total wood | | | | 1500 | 1500 |
| Solar energy | Residential | Residential | 59 | 233 | 430 |

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| use | | | |
|---------------------------|---|-----------|-------------|
| Tertiary sphere | Arts, entertainment and recreation | | 98 |
| | Education | 207 | 222 |
| | Human health and social work activities | 1115 | 1720 |
| Total solar energy | | 59 | 1555 |
| Sum total | | 59 | 3055 |

Table 2: Total heat production at sources using renewable energy (GJ/year) – without the domestic sector

In 2000, besides the above-listed point sources, wood was also used as a fuel in the domestic sector (annual energy production 9760 MWh/year). By 2010 this consumption of wood had increased to 28 328 MWh.

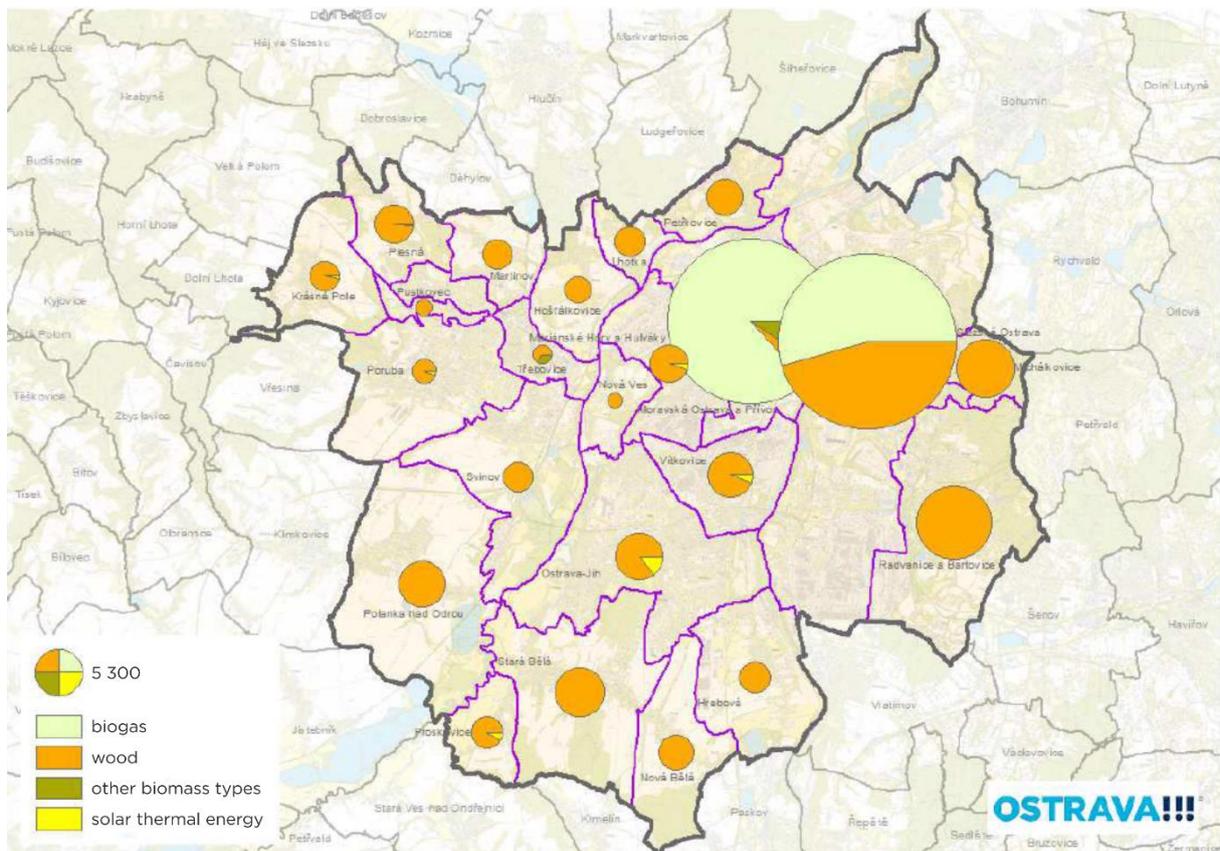


Figure 1: Use of renewable sources to produce heat and electricity, City of Ostrava, 2010

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Additional data are given in Chapter 1 of the EGC application. The text below gives only selected information:

As part of the City's membership of the Covenant of Mayors, in 2013 a Sustainable Energy Action Plan (SEAP) was drawn up; the SEAP included an emissions inventory for 2010. The SEAP was updated in 2016.

In September 2017, responding to the increased emphasis on climate change adaptation measures as part of the 'Mayors Adapt' initiative, the City completed its Sustainable Energy and Climate Action Plan (SECAP). The SECAP proposes projects whose aim is to reduce energy consumption. A number of projects from the previous SEAP have already been completed (see Past Performance), and other projects have been proposed as part of the newly approved SECAP. The implementation of the previous SEAP has brought significant energy savings (see Past Performance).

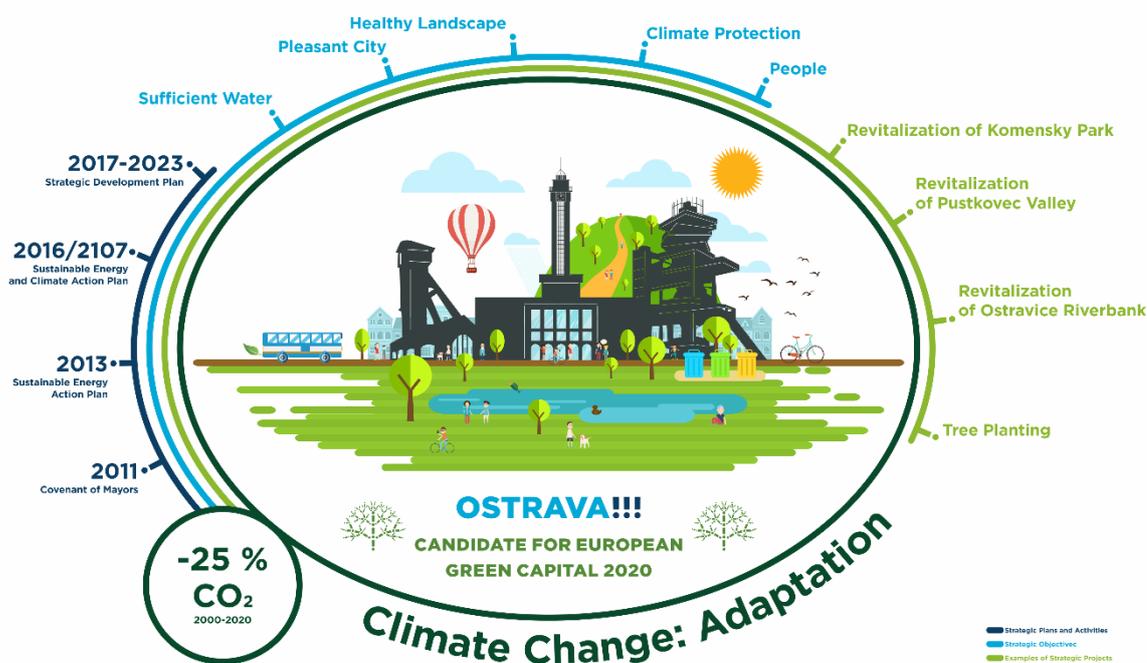


Image 2: Summary of Plans, Key Objectives and Example Projects in Adaptation

Introduction of an Energy Management System

Creation of a new position: City Energy Manager.

A new position – City Energy Manager (EM) – was created at the Ostrava City Authority in order to coordinate the systematic implementation of the SEAP and monitor progress towards its goals. The EM's tasks in connection with the City's involvement in the Covenant of Mayors are:

- to design and systematically implement measures and standardization in connection with the City's energy management system;
- to design and introduce comprehensive database systems facilitating effective administration and energy management by the City and its organizations;
- to implement ongoing monitoring of fuel/energy costs, including evaluation of operating costs at City-owned buildings and facilities;
- to evaluate the benefits of already-completed energy efficiency projects;

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- to devise and plan projects and to seek out suitable subsidy programmes for the implementation of new measures and the operation of already-introduced systems or systemic measures;
- to monitor the implementation of the SEAP.

The EM is currently also responsible for the pilot introduction of ISO 14000 standards for the City Authority building as an integral part of the City's energy management system.

11B. Past Performance

The measures implemented to reduce energy consumption also bring reductions in greenhouse gas production. For this reason the measures are described both in this chapter and in Chapter 1 of the EGC application.

The evaluation of the first two years of implementing the SEAP measures (2014–2015) has already been completed; the results of the evaluation were published in the monitoring report issued in 2016. A further evaluation (including a new emissions inventory) was conducted as part of the planning process for the SECAP (2017).

Energy savings in public buildings

In 2014–2015 the following major measures bringing energy savings were implemented. Energy audits were conducted for these projects; these form the basis for the reported energy savings.

- Set of measures 'Ekotermo II A' – insulation and revitalization of 9 City-owned buildings (primary schools, preschools, senior citizens' home, fire station, library).
- Set of measures 'Ekotermo III' – insulation of 6 City-owned buildings (primary schools, preschools, senior citizens' home).
- Set of measures 'Energy consumption reductions at Ostrava Zoo' – insulation of 6 buildings, including animal houses and technical buildings.
- Set of measures 'Energy savings at Ostrava City Hospital' – insulation of 8 buildings at the hospital site.

The potential energy savings achieved via the above-listed sets of measures total **27 000 GJ/year**.

Besides the above-listed large-scale projects, other individual projects were also implemented during the period 2014–2015 to reconstruct and revitalize City-owned buildings, improving their technical condition and increasing energy efficiency. Energy audits were not conducted in these cases; reductions in energy consumption were estimated by experts. The total savings achieved by all implemented measures (i.e. projects with energy audits and those with expert estimates) are at least **42 400 GJ/year**.



Image 3: Insulation of ZOO entrance building (left) and residence buildings in Ostrava

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Costs of energy efficiency projects in public buildings

The investment costs of the energy-audited projects (see above) total approx. 11.5 million EUR. The total costs of installing insulation as part of complete reconstructions of City-owned buildings in the past two years (with expert-estimated reductions in energy consumption) was a further 17.3 million EUR. (This sum also includes necessary investments where increases in energy efficiency were not the sole purpose of the investment.)

Ecological improvements to local heating sources

The Moravian-Silesian Region (MSR) has suffered from poor air quality for many years; one measure implemented to improve the situation has been a scheme financing the replacement of obsolete household boilers (or boilers no longer meeting emissions standards) with modern low-emission boilers. The program was co-funded by subsidies from EU structural funds (EUSF), the MSR and the City. Solid fuel boilers have been replaced by more modern systems (including gas boilers and heat pumps). In 2012–2015, a total of 266 boilers were replaced via this programme. In December 2015 a new call for applications was announced in the MSR; a total of 359 boilers have so far been replaced in Ostrava households as part of this call. This figure is not yet final, as the current call remains open until June 2018 (422 applications have been received to date). A total of 625 boilers have thus been replaced so far as part of all completed calls and the current call; this number may well increase in the future.

Thanks to this support from the City of Ostrava, households are able to replace boilers almost free of charge; this makes the programme very attractive to citizens and accessible to people on low incomes, who would not otherwise be able to afford it. It has, besides reduction of emissions, also reduced energy consumption (the modern boilers are more efficient) and thus also CO₂ emissions. Solar thermal systems can also be installed as part of the replacement.

The replacement of the first 226 boilers in Ostrava households brought savings of approx. **21 000 GJ/year** up to 2015. Including the 359 boilers replaced as part of the following call, total savings were **58 000 GJ/year**.

Note: The figures for energy savings are expert estimates based on the change in fuel type.

Savings in public lighting

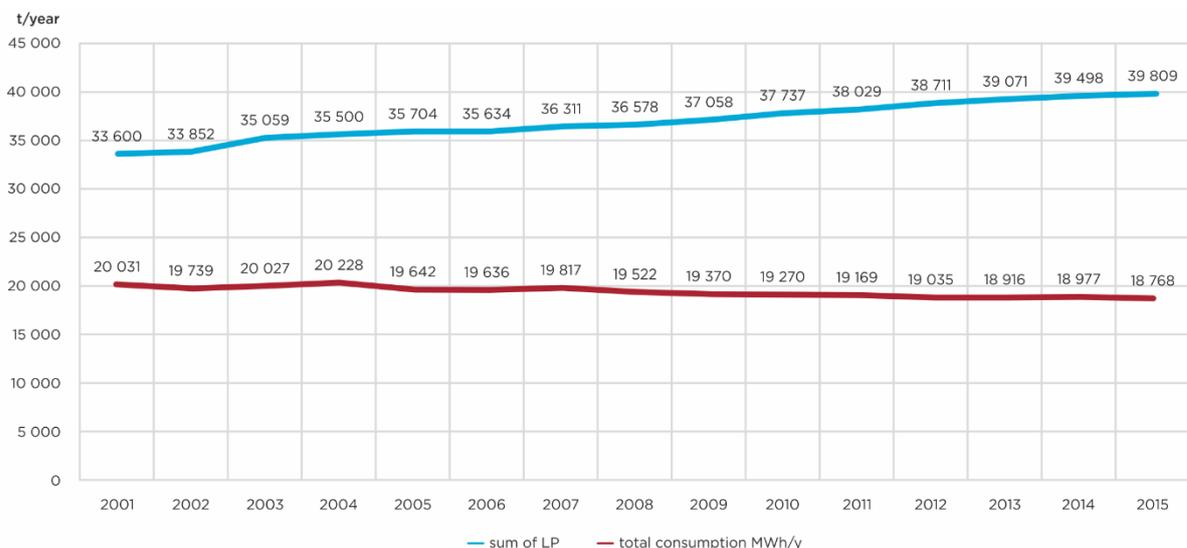
In accordance with the SEAP, work has continued on the modernization of Ostrava's public lighting (street lighting) system – including the installation of LED technologies. Since 2014, only LED lamps with integrated power regulation have been installed as part of this process (the first LED lamps were installed in 2010).

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Image 4: Public lighting in city centre

The mean energy consumption per lighting point decreased between 2013 and 2015 from 0.485 MWh to 0.471 MWh. This decreasing trend in energy consumption by Ostrava's public lighting network is a result of the application of modern LED technologies combined with policy of using lighting systems which reliably meet stipulated quality parameters (in terms of technology, light quality, lifespan and design) without compromising on lighting performance.



Graph 1: Total Sum of lighting points and energy consumption (2011-2015)

11C. Future Plans

In accordance with the current development vision set out in the Ostrava City Strategic Development Plan 2017–2023 (and on the basis of the City's successful achievement of its current targets), the City plans to commit to a new reduction in CO₂ emissions of 40% by 2030. The new target has been incorporated into the recently finalized SECAP for the period up to 2030, which incorporates the City's current and planned future commitments.

Benefits of the planned energy management system

The total energy consumption of City-owned buildings (schools, preschools, health care and social services facilities, etc.) has not previously been monitored via a single integrated system at the City Authority level. One of the expected key benefits of the City's planned energy management system is the evaluation of all City projects or other activities in terms of energy consumption – and also in terms of the energy benefits or synergies that the project/activity could bring. Another measure will involve the introduction of a centralized monitoring and information system for energy consumption, which will collect and evaluate data on energy consumption and other operating parameters. These measures will also form part of the planned introduction of the ISO 50000 standard and the award of ISO certification for the City's integrated energy management system. This will enable the City to better monitor its energy consumption, and thus manage reductions in consumption.

The next phase of the household boiler replacement programme

Applications for the replacement of obsolete household boilers can still be submitted (until 30 June 2018). A total of 422 applications have been received as part of this call, and just under 360 boilers have been replaced so far (see Past Performance). The next call in the programme was announced in June 2017, and applications were accepted from September 2017; so far, 428 applications have already been received as part of this call, and more applications may still be submitted, as the call remains open until 31 December 2018. Based on the number of boilers replaced as part of previous calls (625) and the number of applications from the latest call (428), the total number is 1053; this is the number of boilers that are currently set to be replaced by 31 December 2019 (when the latest call ends). However, this figure may yet rise in the future, as the calls are still open. Out of the total number of solid fuel boilers in detached houses in Ostrava (2429), at least 1053 boilers will thus be replaced by 31 December 2019. The success rate will therefore be at least 43% (based on data valid as of 15 September 2017). If the expected 428 boilers are replaced, this will bring an additional approx. **40 000 GJ/year** in energy savings besides the savings/reductions achieved in the previous period.

Centre Energy Units for Utilization of Non-Traditional Energy Sources (ENET)

One of the research centres developing the future of non-traditional energy sources in Ostrava, as well as on international level, is the Centre Energy Units for Utilization of Non-Traditional Energy Sources (ENET), established in Ostrava by the Technical university of Ostrava in cooperation with the Ministry for education (responsible for R&D) and other partners. ENET is involved in the research and development of technologies for fuel transformation, especially of waste products and alternative fuels, into heat energy and electric power and their further effective use. The objective is the research and development of technology and energy units for treatment of both waste and other alternative fuels, intensification of transformation into heat energy and electric power with parallel ensuring of purity of combustion products, monitoring of quality and quantity of final products and monitoring of possibility of energy accumulation and parallel or serial cooperation of various resources.



Image 5: Technical University research zone: Centre Energy Units for Utilization of Non-Traditional Energy Sources (ENET)

11D. References

EGC Ostrava: <https://egc.ostrava.cz/>

Covenant of Mayors/SEAP Ostrava:

http://covenantofmayors.eu/about/signatories_en.html?city_id=3583&seap

Local Heating Programme: <https://dycham.ostrava.cz/kotlikove-dotace>

ENET: <http://cenet.vsb.cz/en/informace/o-centru/160/centrum-enet.html>