

ENERGY EFFICIENCY CENTRE

EEC

The basic activities of the Energy Efficiency Centre are in efficient energy use, long-term planning in energy and the reduction of greenhouse-gases (GHG) emissions. The centre is a focal point for the collection and transfer of energy-efficiency technologies to energy users, the state, energy service and equipment providers, and other interested agencies. At the same time it covers the environmental effects of energy use and conversion. The most significant part of the EEC's activities is thus cooperation with state institutions in the preparation of strategic documents and legislation in the field of efficient energy use, energy planning, distributed electricity production and emission trading. Nevertheless, it still remains strongly connected, by its consulting and training role in energy, with industrial companies and other institutions as well as also being increasingly involved in European research projects.



Head:
Stane Merše, M. Sc.

Energy and the environment

In 2019 the EEC with its professional work ensured high-quality support to ministries in the preparation of the strategic development documents and transfer of EU legislation. Energy efficiency is a priority field to achieve global climate and energy goals and in accordance with the Directive on Energy Efficiency (2012/27/EU) EEC report on the implementation of the Action Plan for Energy Efficiency for the period 2014–2020 was prepared. The EEC was leading the consortium for the preparation of the analytical basis and draft of the National Energy and Climate Plan (NECP) of Slovenia. and started preparation of the long-term renovation strategy to support the renovation of national building stock into a highly energy-efficient and decarbonised building stock by 2050.

Within the expert support of the Ministry of the Environment and Spatial Planning EEC activities focused on the preparation of the analytical basis and long-term GHG emission projection within the LIFE ClimatPath2050 project with the goal to contribute to better climate governance by enhanced monitoring and planning of GHG mitigation measures in buildings, transport, industry, agriculture, forestry and waste. The second Climate Action Mirror was prepared, which also presents a report on the implementation of the Operative programme of measures for GHG emission reduction until 2020 and the Local Climate Activity Scoreboard of Municipalities LIFE IP CARE4CLIMATE - Boosting greenhouse gas emissions reduction by 2020 with a view to 2030 started on 1st January 2020 where the EEC leads several actions on training, local energy planning and development of advanced instruments for sustainable buildings retrofit. The EEC was also involved in the preparation of the analytical basis for international reporting in the framework of the MMR. and continued preparation of the professional support for the design of National Air Pollution Control Programmes (NAPCP) prescribed by the NEC directive.

The EEC cooperates with the Statistical Office of the Republic of Slovenia, where, every year, it prepares a model calculation for fuels and energy use in households for the national energy statistics. Also in 2019, EEC continued with activities of the state referential centre for energy with the preparation of an expanded set of indicators for energy and the environment. For the Energy Agency EEC prepared “Report on the achievement of national goals in the field of RES and CHP for the period 2017–2018” and set new reference electricity generation costs for the support scheme for RES and cogeneration electricity production units.

Promotion of efficient energy use and energy consulting

In 2019 the EEC continued with its training activities where already the twelfth cycle of energy managers' training was successfully concluded within the European programme EUREM. Due to a very positive reaction of participants and their interest (in Slovenia there are already more than 240 energy managers with the EUREM

Research and development work of the Energy Efficiency Centre is an important contribution to the preparation of key documents in Slovenia in the field of energy development, energy efficiency, renewables exploitation and the transition of Slovenia to a carbon-neutral society, with training activities and support to industry it significantly contributes to an increase in competitiveness and development restructuring.

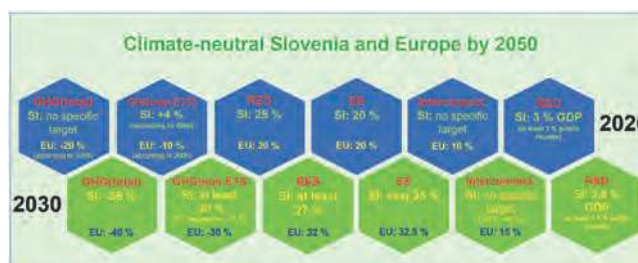


Figure 1: Local Climate Activity Scoreboard of Municipalities - The value of stimulated investments in energy efficiency and renewable energy in households per capita in 2018.

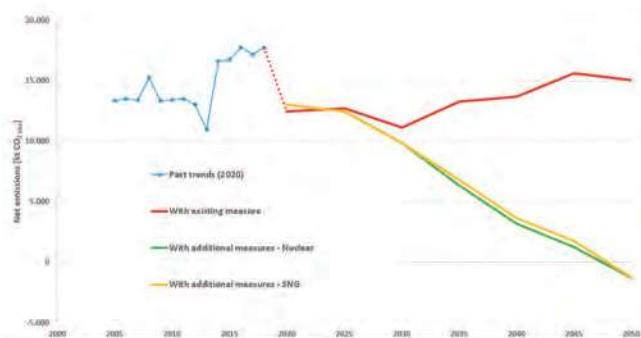


Figure 2: Net GHG emission scenarios for the transition to a climate-neutral society within the analytical basis for the Long-Term Strategy (Life Climate Path 2050)



Figure 3: Awarding of prizes to the 12th generation of EUREM energy managers.

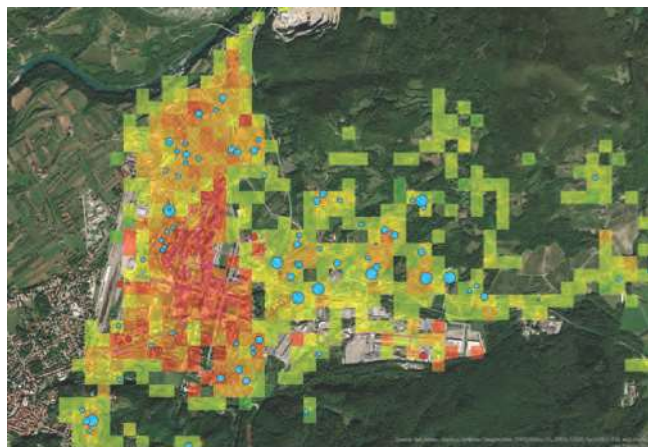


Figure 4: Heat-map application for City Municipality of Nova Gorica for 2020

licence), it is clear that there is a great need for such training. High-quality knowledge in this field is namely of key importance for the execution of efficient solutions in practice.

In 2019 the EEC continued its intensive development work in the field of district heating (DH) and began preparing a Benchmark Study of District Heating Companies, where a detailed analysis of the operation and development of 13 DH systems in Slovenia was made. In cooperation with a Geological Survey of Slovenia analysis, the “Exploitation of shallow geothermal energy in the district heating system of the city of Maribor” was prepared for the company Energetika Maribor. An intensive development of the GIS tool for the spatial analysis of heat consumption in buildings (“heatmap”) – Heat maps of Slovenia (Figure 4).

Together with the company ELEK, a study “Possibilities and cost scenarios and the own price of synthetic natural gas production in Slovenia (Power to Gas)” was prepared for the company Plinovodi. The EEC started preparation of the “Strategy for energy and material efficiency and sustainable development of DARS d. d. by 2030”, where energy and environmental impact assessments of the removal of motorway toll stations was prepared (Figure)

The professional cooperation with steel company Metal Ravne in field of waste-heat utilisation continued with preparatory activities for the installation of a pilot plant in 2020.

The EEC prepared the programme for the 21st conference “Energy Managers Days”, the annual meeting of energy managers with more than 200 participants confirms the quality and public profile of the EEC professional work.

International cooperation

In 2019 the EEC carried out as many as 9 international projects, financed from the European Union resources in the framework of LIFE and HORIZON 2020. Projects cover activities in the fields of:

- Slovenian mid-century climate path (LIFE ClimatePath2050)
- Boosting greenhouse-gas emissions reduction by 2020 with a view to 2030, (LIFE IP CARE4CLIMATE)
- Heat-pipe technology for the waste-heat recovery in industry (ETEKINA),
- Driving investment in energy -services through quality assurance (QualitEE),
- Monitoring of indicators of for energy use and energy efficiency in the EU – (ODYSSEE MURE),
- Improving the Performance of District Heating Systems in Central and East Europe (KeepWarm)
- Making heating and cooling for European consumers efficient, economically resilient, clean and climate-friendly (REPLACE)
- carrying out the EU directive on energy efficiency (CA – EED),
- carrying out the EU directive on renewable energy sources (CA – RES).

Projects include cooperations with research and development organisations from Europe, with a strong emphasis on concrete applications and the promotion of energy efficiency. In the framework of each project the EEC staff took part in numerous foreign professional meetings and visits.

Some outstanding achievements in the past three years

1. Preparation of several key support documents for the government of the Republic of Slovenia in the field of energy policy (National Energy and Climate Plan - NECP), energy efficiency (First and Second National Action Plan for Energy Efficiency), renewable energy sources (Action Plan for Renewable energy sources for the period 2010–2020) and climate policy (Operative programme of GHG emissions reduction up to 2020).
2. Establishment of energy managers’ training in the framework of the European project EUREM and professional support to industry and other institutions by carrying out energy audits, feasibility studies and

other consulting (Goodyear, TE-TOL, Luka Koper, Salonit Anhovo, Telekom Slovenije, Letrika–Mahle, BTC, KOTO, etc.).

- In the framework of the European project **Transparens** the EEC led, very successfully, the preparation of the **European code of Conduct for energy contracting**. The Code identifies the basic values and principles, which are of key importance for the successful preparation and carrying out of projects with third-party financing. The Code was very successfully accepted at the European level and currently already has 171 signatories, among them the European association of companies for energy services (eu.ESCO) and the European federation for intelligent services of energy efficiency (EFIEES), supported also by the European Commission. In Slovenia the code was already tested in practice in a project of integrated energy renovation of the municipal building of the municipality Brda.

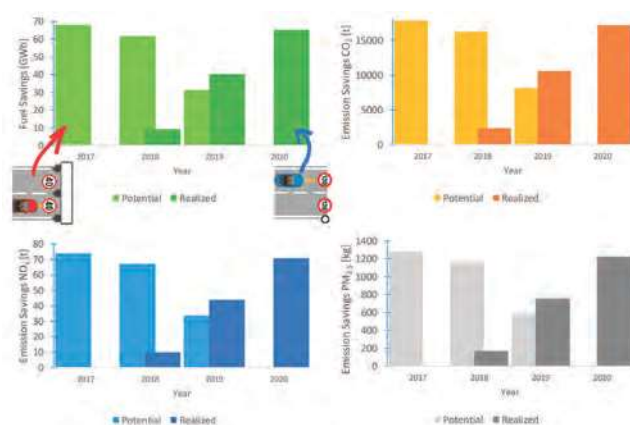


Figure 5: Analysis of fuel (energy) savings and emission reduction as a consequence of the removal of DARS toll stations

Awards and Appointments

- Gašper Stegnar: PhD Student award for outstanding and original contributions to research in the field of district heating and cooling at the 19th Eurheat & Power Congress, Nantes, France, the award was given by the DHC + Technology Platform

Organization of conferences, congresses and meetings

- Strategic environmental impact assessment process and evaluation of scenarios - workshop on Life Climate Path 2050 project, ARSO, Ljubljana, Slovenia, 14 February, 2019
- Potential of biomass for energy use and potentials up to 2050 - technical workshop on Life Climate Path 2050, JSI, Brinje, Slovenia, 5 March, 2019
- An overview of Strategic environmental impact assessment for hydropower plants and wind turbines - workshop on Life Climate Path 2050 project, ARSO, Ljubljana, Slovenia, 7 March, 2019
- Consortium meeting NEPN, JSI, Brinje, Slovenia, 15 March 2019
- Consortium meeting NEPN, JSI, Brinje, Slovenia, 24 March 2019
- LULUCF model and its assumptions - workshop on Life Climate Path 2050 project, GIS, Ljubljana, Slovenia, 26 March, 2019
- 21st Energy Days, Meeting of energy managers of Slovenia, Portorož, Slovenia, 19-17 April 2019
- Possibilities for energy renovation of cultural heritage buildings until 2030 and 2050 - workshop on Life Climate Path 2050 project, MK, Ljubljana, Slovenia, 19 April, 2019
- Preparation workshop for Climate Action Mirror 2019 on Climate Path 2050 project, ARSO, Ljubljana, Slovenia, 25 April, 2019
- Incentives/subsidies to reduce GHG emissions in the economy - workshop on Climate Path 2050 project, JSI, Brinje, Slovenia, 10 May, 2019
- Sustainable mobility and user behaviour- measures to promote public passenger transport - workshop on Life Climate Path 2050 project, MK, Ljubljana, Slovenia, 14 May, 2019
- GHG emissions in Agriculture - workshop on Life Climate Path 2050 project, KIS, Ljubljana, Slovenia, 6 Jun, 2019
- Future of natural gas and development of low carbon fuels - meeting of experts on Life Climate Path 2050 project, JSI, Brinje, Slovenia, 11 Jun, 2019
- Climate Action Mirror 2019 and Local Action Scoreboard 2019 on Climate Path 2050 project, MAO, Fužine castle, Ljubljana, Slovenia, 12 Jun, 2019
- Climate neutrality - from weather to how; consultation about long term climate strategy for Slovenia - meeting on Climate Path 2050 project, National Council of the Republic of Slovenia, Ljubljana, Slovenia, 20 Jun, 2019
- Regional conference on the preparation of NEPN, Energy Industry Chamber of Slovenia (EICS), Ljubljana, Slovenia, 4 July, 2019
- Alumni EUREM Slovenia 2019, Ljubljana, Slovenia, 19 September, 2019
- 4th Steering Committee Meeting on EU Keep Warm project, RCP, Brinje, Slovenia, 24-27 September, 2019
- Quality assurance of energy efficiency projects (Expert seminar within the EU project H2020 QualitEE, Brinje, Slovenia, 5 December, 2019
- Financing the transition to low carbon society, part 1 - workshop on Life Climate Path 2050 project, JSI, Brinje, Slovenia, 11 December, 2019

INTERNATIONAL PROJECTS

1. Life IP Care4Climate - Boosting greenhouse gas emissions reduction by 2020 with a view to 2030
Stane Merše, M. Sc.
European Commission
2. „LIFE ClimatePath 2050“ Slovenian Path towards the Mid-Century Climate Target
Andreja Urbančič, M. Sc.
European Commission
3. H2020 - ENERFUND; An ENERgy Retroit FUNding rating tool
Jure Čizman, M. Sc.
European Commission
4. H2020 - guarantEE; Energy Efficiency with Performance Guarantees in Private and Public Sector
Damir Staničič, M. Sc.
European Commission
5. H2020 - QualitEE; Quality Certification Frameworks for Energy Efficiency Services to scale up Responsible Investment in the Building Sector
Damir Staničič, M. Sc.
European Commission
6. H2020 - KeepWarm; Improving the performance of district heating systems in Central and East Europe
Stane Merše, M. Sc.
European Commission
7. H2020 - ODYSEE-MURE; Monitoring EU Energy Efficiency First Principle and Policy Implementation
Dr. Fouad Al-Mansour
European Commission
8. H2020 - REPLACE; Making Heating and Cooling for European Consumers Efficient, Economically Resilient, Clean and Climate-Friendly
Gašper Stegnar, B. Sc.
European Commission

RESEARCH PROGRAMME

1. Modelling and environmental impact assessment of processes and energy technologies
Dr. Fouad Al-Mansour

R&D GRANTS AND CONTRACTS

1. Social acceptability of territorial effects in RES scenarios
Andreja Urbančič, M. Sc.
2. Evaluation of greenhouse gasses mitigation measures in industry
Dr. Matevž Pušnik
3. Development and design of energy consumption monitoring by connecting various databases
Dr. Fouad Al-Mansour
4. Evaluation of greenhouse gasses mitigation measures in industry
Dr. Matevž Pušnik
Ministry of the Environment and Spatial Planning
5. Development and design of energy consumption monitoring by connecting various databases
Dr. Fouad Al-Mansour
Ministry of Infrastructure
6. European Energy Manager - EUREM XII
Dr. Boris Sučić

NEW CONTRACTS

1. National Air Pollution Control Programme (OP-NEC)
Matjaž Česen, B. Sc.
Ministry of the Environment and Spatial Planning
2. Benchmarking of district heating systems
Damir Staničič, M. Sc.
Energetska Zbornica Slovenije
3. LIFE17 IPC7SI/000007 - LIFE IP CARE4CLIMATE
Stane Merše, M. Sc.
Ministry of the Environment and Spatial Planning
4. Opportunities and scenarios for the production of synthetic natural gas from RES - price ratios, sectors coupling and synthetic gas in transmission gas network
Stane Merše, M. Sc.
Plinovodi d. o. o.
5. Long-term renovation strategy to support the energy renovation to 2050
Gašper Stegnar, B. Sc.
Ministry of Infrastructure
6. Strategy for future utilization of renewable energy sources and improvement of energy and resource efficiency in the overall sustainable transformation of DARS d.d. by 2030
Dr. Boris Sučić
Dars, d.d.

VISITORS FROM ABROAD

1. Iñigo Bonilla, University of Basque Country, Leioa, Spain, 30 November, 2018 to 1 March, 2019
2. Daniel Brouht, Navid Khordehgan, Brunel University, London, Great Britain, 9-11 December, 2019

STAFF

Researchers

1. Dr. Fouad Al-Mansour
2. Asst. Prof. Marko Matkovič
3. **Stane Merše, M. Sc., Head**
4. Damir Staničič, M. Sc.
5. Andreja Urbančič, M. Sc.

Postdoctoral associate

6. Dr. Matevž Pušnik

Technical officers

7. Matjaž Česen, B. Sc.
8. Jure Čizman, M. Sc.
9. Marija Kavčič, B. Sc.

10. Dr. Marko Kovač
11. Polona Lah, B. Sc.
12. Marko Pečkaj, B. Sc.
13. Barbara Petelin Visočnik, M. Sc.
14. Gašper Stegnar, B. Sc.
15. Dr. Boris Sučić
16. Luka Tavčar, B. Sc.
17. **Technical and administrative staff**
18. Marko Đorič, B. Sc.
19. Tadeja Janša, B. Sc.
20. Igor Ribič
21. Katarina Trstenjak, B. Sc.

BIBLIOGRAPHY

ORIGINAL ARTICLE

1. Gašper Stegnar, Tomo Cerovšek, "Information needs for progressive BIM methodology supporting the holistic energy renovation of office buildings", *Energy*, 2019, **173**, 317-331.
2. Marko Kovač, Gašper Stegnar, Fouad Al-Mansour, Stane Merše, Andrej Pečjak, "Assessing solar potential and battery instalment for self-sufficient buildings with simplified model", *Energy*, 2019, **173**, 1182-1195.
3. Gašper Stegnar, Damir Staničič, Matjaž Česen, Jure Čižman, Simona Pestotnik, Joerg Prestor, Andreja Urbančič, Stane Merše, "A framework for assessing the technical and economic potential of shallow geothermal energy in individual and district heating systems: A case study of Slovenia", *Energy*, 2019, **180**, 405-420.
4. Blaž Luin, Stojan Petelin, Fouad Al-Mansour, "Microsimulation of electric vehicle energy consumption", *Energy*, **174**, 24-32.
5. Janez Merlak, Aleš Groznik, Fouad Al-Mansour, "Determination of environmental footprint of inland container terminals", *Istraživanja i projektovanja za privredu*, 2019, **17**, 2, 144-156.

PUBLISHED CONFERENCE CONTRIBUTION

1. Blaž Luin, Fouad Al-Mansour, Darja Šemrov, "Estimate of traffic energy consumption from vehicle fleet distribution forecast", In: *International Conference on Advances in Energy Systems and Environmental Engineering (ASEE19)*, (E3S web of conferences, **116**), 2019, 00046.
2. Boris Sučić, Marko Pečkaj, Željko Tomšič, Jani Uranič, "Systematic approach for improving energy efficiency in industrial facilities, from energy audit to practical implementation - case study production of autoclaved aerated concrete", In: *International Conference on Advances in Energy Systems and Environmental Engineering (ASEE19)*, (E3S web of conferences, **116**), 2019, 00083.
3. Marko Kovač, Damir Staničič, Stane Merše, Andreja Urbančič, "Is heat storage with a possibility of district heating beneficial to Solar Plus micro grids", In: *Papers and abstracts, eceee 2019 Summer Study on energy efficiency, 3-8 June, Presqu'île de Giens, (eceee Summer Study proceedings)*, 2019, 817-823.
4. Boštjan Zajec, Marko Matkovič, Leon Cizelj, "Analysis of statistical uncertainties in a direct numerical simulation of flow in a backward facing step heat transfer measurements in a single-phase flow of refrigerant R245fa in annular geometry", In: *Proceedings, 28th International Conference Nuclear Energy for New Europe - NENE 2019, Portorož, Slovenia, September 9-12*, Nuclear Society of Slovenia, 2019, 207.
5. Anil Kumar Basavaraj, Blaž Mikuž, Marko Matkovič, "Flow and heat transfer CFD analysis in the section of THELMA for wall surface temperature determination", In: *Proceedings, 28th International Conference Nuclear Energy for New Europe - NENE 2019, Portorož, Slovenia, September 9-12*, Nuclear Society of Slovenia, 2019, 209.
6. Nejc Kosanič, Boštjan Zajec, Marko Matkovič, Jure Oder, Iztok Tiselj, "PIV measurements of turbulent flow over backward-facing step", In: *Proceedings, 28th International Conference Nuclear Energy for New Europe - NENE 2019, Portorož, Slovenia, September 9-12*, Nuclear Society of Slovenia, 2019, 210.
7. Boris Sučić, Stane Merše, Željko Tomšič, "Modeliranje i optimiranje potrošnje energije u zgradarstvu - analiza slučaja unutar kompleksa zgrada koje pripadaju znanstvenoistraživačkoj instituciji", In: *Referati = Papers, 14. savjetovanje HRO CIGRÉ, 10.-13. studenoga 2019, Šibenik, 14th HRO CIGRÉ Session, November 10-13, 2019, Šibenik, Hrvatski ogranak CIGRÉ*, 2019, 9
8. Boris Sučić, Stane Merše, Damir Crnčec, Matevž Pušnik, Matjaž Česen, Gašper Stegnar, "Challenges of national energy and climate planning - case study Slovenia", In: *Renewable and sustainable energy developments beyond 2030: 12th International Conference on Sustainable Energy & Environmental Protection, SEEP Conference 2019, 18-21 November 2019, Sharjah, United Arab Emirates*, Proceedings, Sharjah University, 2019, 104-108.
9. Marko Kovač, Boris Sučić, Stane Merše, "The essential parameters of optimal solar tariff for mitigation of a duck curve", In: *Renewable and sustainable energy developments beyond 2030: 12th International Conference on Sustainable Energy & Environmental Protection, SEEP Conference 2019, 18-21 November 2019, Sharjah, United Arab Emirates*, Proceedings, Sharjah University, 2019, 410.