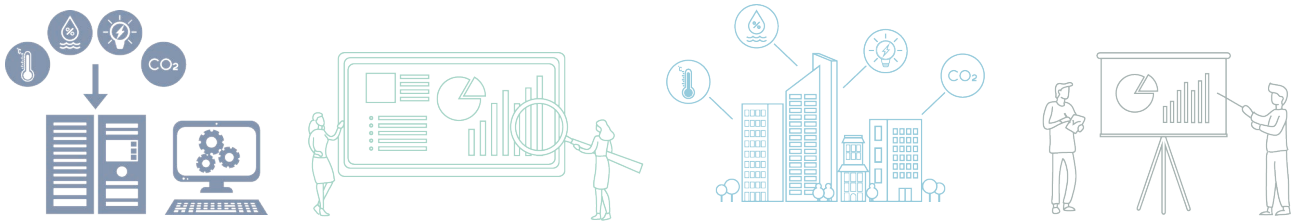
ENERGee Watch

Curriculum and learning material for Course:

Data Collection
(acquisition and treatment)



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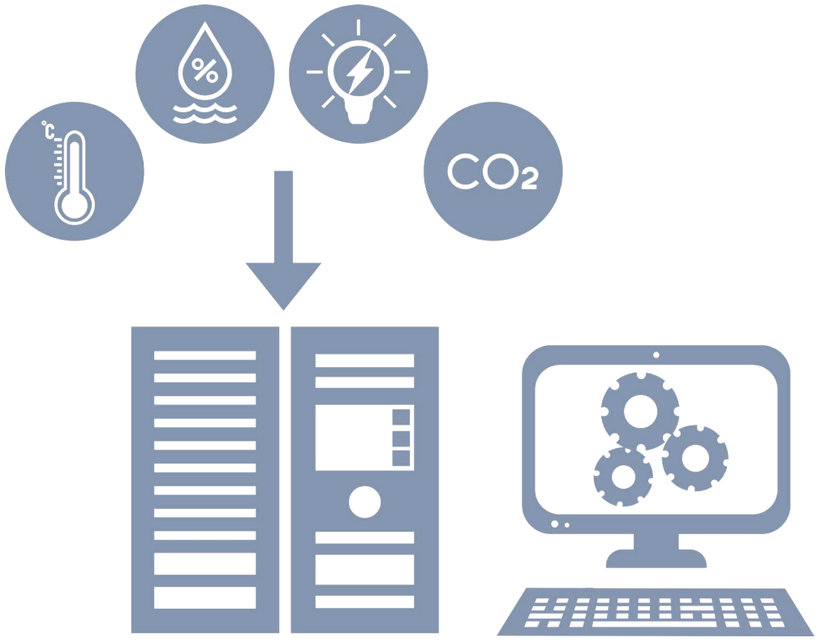

Introduction

The ENERGee Watch project stems from the existing informal European network of regional greenhouse gas emission observatories managed by FEDARENE whose mission is to collect, monitor, and report Greenhouse gas (GHG) Emissions and implement energy saving strategies and policies.

Many of the structures are governed by a local consortium gathering at least several public authorities and energy data suppliers. They are very often supported by public authorities and integrated within existing regional organisations such as energy agencies or public departments. The value that this type of structure can provide stems from their expertise in data gathering, data analysis, and energy planning.

These observatories contribute strongly towards building a representation of the territorial impact on climate change and a framework for identifying areas of responsibility and priority areas for action. To best serve society, the observation of GHG emissions is a prerequisite before taking any appropriate action. The tasks of an observatory are very diverse. An observation system primary task is to provide data – most often free of charge – and improve knowledge about the territory's current and future situation with regards to impacts caused by climate change (energy and information related to GHG emissions). In some cases, air quality, social, economic or environmental effects on climate change are included. As a result, an observatory will characterise the current situation and the challenges on climate change, identify trends and influencing factors, and define various scenarios to meet any long-term energy and climate targets.

Another role is to analyse and monitor the development of the territory's situation on climate change, by identifying the challenges and by keeping an account of GHG emissions and energy consumption in order to measure the progress. To this end, an observatory will determine both quantitative and qualitative objectives, identify resources and opportunities to take action. Moreover, an observatory provides expertise and advice in policy development and in the decision-making process. Indeed, it tracks progress against fixed objectives, adjusts efforts and focuses on climate action. Lastly, it evaluates the impact of climate action in terms of energy saved and GHG emissions avoided, then providing local stakeholders with a forum for sharing knowledge and experience gained.

The overall aim of ENERGee WATCH is to launch a peer-to-peer learning program to enable regional and local authorities to timely and accurately define, monitor and verify their sustainable actions. The learning process targets regional and/or provincial authorities and their agencies and observatories that are responsible for collecting and overseeing the monitoring of mitigation and adaptation indicators in order to empower them to make use of the best practices learnt.

Regional observatories are powerful tools to implement efficient strategies at local and regional levels. Through ENERGee Watch, the objective is to increase the capacity of data observation across Europe to best support local and regional decisions makers in their fight against climate change.

Data Collection (acquisition and treatment)

Overall description of the course

Introduction

Course Data collection is dedicated to understanding the importance of systematic, timely and periodic gathering of energy data. Data collection and management is crucial for identifying trends, defining and monitoring strategies and prioritizing energy efficiency improvements. As collection of reliable and complete energy data often shows to be a difficult task, this course will help participants to learn how to establish an effective energy management system for public sector, as well as how to identify sources and facilitate access to territorial aggregated, and non-identifying energy data.

More specifically, throughout this course participants will be able to better asses their needs for establishing EMIS that would serve their needs and capacities, learn tools for successful data mining and accessing robust energy data, learn methodologies to make quality energy estimations, learn how to establish a win-win collaborative agreements with data providers that would assure timely access to energy data and last but not least, learn to elaborate BEI, which is of critical importance for evaluating the impact of climate action.

Course objectives

In this course, mentees can achieve the following learning objectives:

- Objective 1: To understand the importance of systematic, timely and periodic gathering of energy data
- Objective 2: To understand the need for improving data sharing
- Objective 3: To be able to contribute to improving data sharing through agreements and collaborations
- Objective 4: To be able to use tools and methodologies for data retrieving, quality energy estimations and BEI calculation

Topics

Baseline Emission Inventory
- Basic principles: territorial principle and the polluter pays principle
- Approaches and recommendations for the elaboration of BEI
- Practical exercise

Energy management
- Assessing the need for energy management system
- How to elaborate building inventory

Energy supply and production
- Data mining and making quality energy estimations
- Improving data sharing: mapping key stakeholders and establishing collaboration models
- Analysing and evaluating gathered data

Transport
-Methods to estimate emissions in urban and other road transportation

Target

This course is aimed at professionals at regional and local level, that are responsible for energy data collection and would like to learn more on how to tackle challenges connected to gathering quality and comprehensive energy data. It is aimed at those who should or could play a key role in improving data sharing in order to accelerate achieving of EU climate goals.

Mentors

Boštjan Krajnc, CEO of Energy Agency of Savinjska, Šaleska and Koroška Region (KSSENA), has 16 years of work experience in the field of RES and RUE. Initially a project technologist responsible for the design and implementation of investment projects for power technologies implementation and environmental solutions, Boštjan Krajnc became a CEO of KSSENA in 2008. Boštjan Krajnc acquired the accreditation of the European Energy Manager from the Jožef Stefan Institute under the IEE project Eurem in 2009, as well as the official license from the Building and civil Engineering Institute ZRMK for issuing Energy Performance Certificate's. As member of the NALAS (Network of Associations of Local Authorities of South-East Europe) task force for Energy Efficiency he built an extensive experience in working with municipalities from South-East Europe. In his professional career Boštjan Krajnc has performed more than 50 trainings on energy management, energy efficiency and renewable energy sources, financial mechanisms (ESCO) and on transferring EU Energy efficiency directive into national legislations.

Boštjan Krajnc

CEO of Energy Agency of Savinjska, Šaleska and Koroška Region (KSSENA)

Topic 1

Baseline emission inventory

Description of the topic (what)

A Baseline Emission Inventory (BEI) is a quantification of the amount of CO2 emitted due to energy consumption in a specified territory within a given period of time (the EU recommends base year being 1990, but can be chosen individually, too). It allows identifying the principal sources of CO2 emissions and their respective reduction potentials.

Elaborating a BEI is of critical importance, as the inventory will be the instrument allowing the local authority to measure the impact of its actions related to climate change. The BEI will show where the local authority was at the beginning, and the progress towards the objective. Emission inventories are very important elements to maintain the motivation of all parties willing to contribute to the local authority's CO2 reduction objective, allowing them to see the results of their efforts. There is no legal basis for a BEI elaboration, except the self-commitment of communities to protect the environment and save energy.

Balances can follow two basic principles, as they can either be based on territorial principle or on polluter pays principle. The territorial principle considers all consumptions within a spatial territory, hence, also energy consumption of tourists and transients are to be regarded. The polluter pays principle considers all consumptions of inhabitants of a spatial territory no matter where the consumption happens (e.g. mobility in other territories), hence, also e.g. the energy consumption of citizens during their vacations in other municipalities.

ENERGee Watch Partner Expertise

Energy agencies across Europe use different approaches in elaboration of BEI. In Slovenia, for example, national handbook for preparation of LEK (Local Energy Concept) and Covenant of Mayors guidebooks are used. In practice, local authorities in Slovenia usually focus on calculating BEI for areas where data is available and local authorities have the potential to implement changes. Data from private industry, aviation or agriculture are hard to obtain and thus not so relevant in a way, that local authorities usually have little power to make the change.

Relevant methods / tools (how to)

Results from energy flows are only comparable among different territories in case they follow the same methodology, meaning, as far as possible, the concepts, methodologies and definitions in internationally agreed standards shall be followed. Local authorities are thus encouraged to use emission factors that are in line with those of the Intergovernmental Panel on Climate Change (IPCC) or European Reference Life Cycle Database (ELCD), but it is given the flexibility to use any approach or tool that it considers appropriate for the purpose. In Europe, several descriptions and recommendations on the elaboration of BEI exist, that are mainly given by networks, such as Covenant of Mayors, European Energy Award, 2000-Watt Society and Climate Alliance.

Practices in other European regions

Climate Alliance for example has designed rules, tools and methods for BEI elaboration to facilitate municipal efforts for different regions, namely for countries like Germany, Italy, Luxemburg, Belgium, Austria. Also several calculation tools for BEI exist in EU, such as Climate protection planner (Germany), Ecospeed (Germany, Switzerland, Austria, Italy, Luxemburg) and Bilan Carbone (France).

Link(s) with other courses

Elaboration of BEI is a core activity for future energy planning and climate change adaptation. There are several different strategic documents (Local energy concepts, Sustainable energy and climate action plan, etc.) which are based on BEI elaboration. In this scope elaboration of BEI is closely connected to all learning courses.

Topic 2

Energy management

Description of the topic (what)

Under the Energy Efficiency Directive, EU Member States are required to use energy more efficiently at all stages of the energy chain, from its production to its final consumption. Member States shall encourage public bodies, including at regional and local level, to adopt an energy efficiency plan with clear goals and objectives as well as putting in place an energy management system as part of the implementation of their plan.

An EMIS (Energy management information system) is one of the key elements of a comprehensive energy management program. It provides accurate and timely information to key individuals and departments and enables data visualization, automatic report generation, simple process for manipulating, analysing, and storing data for future reference, as well as capability to provide more accurate projections of energy use in the future or under changed circumstances.

The inventory of the building stock presents the main area of the EMIS database. The information for the database can be retrieved mainly from energy audits and established monitoring systems of energy consumptions in public buildings as well as other methodologies for data collection.

Relevant methods / tools (how to)

The primary methods used would be to understand the benefits of applying EMIS systems, such as saving time and personnel capacity and especially provision of accurate and timely information. There are several specific applications of EMIS that can substantially vary in complexity and capability, therefore it is important to know the end user, their capacities and needs.

At the start of a long-term renovation strategy for all public buildings – independent of the size of the public body – it is essential to have concrete data about the buildings. A comprehensive building inventory is at the centre of EMIS and serves as a baseline for the next steps, like selection of priority buildings and benchmarking to assess the necessity and possibilities. Several data groups will be defined, that should define the structure of building inventory, as well as methodologies for data collection that will assure successful set up of building inventory and continuous data collection.

Practices in other European regions

Under the Energy Efficiency Directive, EU Member States are required to use energy more efficiently at all stages of the energy chain, from its production to its final consumption. Member States shall encourage public bodies, including at regional and local level, to adopt an energy efficiency plan with clear goals and objectives as well as putting in place an energy management system as part of the implementation of their plan.

ENERGee Watch Partner Expertise

The establishment of an energy management system may be an administrative act as a demonstration of political will and fulfilment of a legal obligation, but with the aim of establishing a solid foundation which would ensure that such a system functions effectively and efficiently, municipal instances must meet a series of preconditions. In Slovenia some of the main prerequisites in this context are:

- Declaration of determination
- Creating organizational structure
- Approval of the rules of procedure of the EMS
- Appointment of Energy manager
- Appointment of SME team
- Approval of the municipal energy framework

To collect energy data for public buildings KSSENA uses the E2 Manager tool that enables analysing energy consumption, resulting in automatically created reports, elaboration of CO2 footprint, creation of energy profiles, and possibility of benchmarking different buildings.

Link(s) with other courses

This topic is connected to course (Monitoring, reporting, verification) as periodically gathered data enables efficient monitoring of the progress and reduction in energy use following energy efficient improvements, and to course (Data display, dissemination and validation by local authorities) as EMIS opens possibilities for different data visualisation options.

ENERGee Watch

Topic 3

Energy supply and production

Description of the topic (what)

Since the liberalisation of gas and electricity market, the number of actors has increased, and the data related to energy consumption is becoming commercially sensitive and therefore more difficult to obtain from energy suppliers. The access and exchange of territorial aggregated, and non-identifying data needed for effective sustainable energy planning presents a major challenge as there is no obligation within EU legislative for TSOs and DSOs to share local energy data with third parties. As a result, data exchange is implemented on a voluntary basis, resulting in availability and accuracy of energy data varying from country to country and from one territorial unit to the other.

Many data on energy production and consumption per sectors, fuels, etc. are available from energy statistic reports and databases periodically published by energy providers and agencies. All missing data and information need to be gained either by estimations or by complex surveys among energy providers, fuel traders, large and industrial enterprises, and other large-scale consumers. The most effective data sharing involves establishing win-win collaborative partnerships between public authorities and data providers (e.g., energy utility companies).

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In Slovenia 5 key areas for data mining can be outlined in general, that each require specific approach:

Electricity: grid operators have data on overall electricity consumption in the area, as well as on consumption related to specific groups (residential etc.).

Natural Gas and district heating: grid providers have all necessary data.

Solid biofuels, heating oil, liquid gas: usually acquired by questionnaires and statistical databases.

Renewable energy sources: national or regional hubs of data related to renewable energy production exist, or in case it does not, data can be obtained by questionnaires and other statistical databases.

Waste: this data can be accessed through public utility companies (relevant data is energy efficiency of waste water treatment, use of external waste heat from waste water, energy from waste, biowaste etc).

Relevant methods / tools (how to)

Several typical problems in data sharing will be discussed, such as lack of commitment, competences, skills and as well as data privacy. Focus will be on data mining, as in many cases, data can be collected from several databases and statistics reports. As data availability, data quality and data homogeneity differ greatly in the different countries and territorial units, estimation methodologies in case of missing or low-quality data (e.g., estimations based on number employees in certain industry branches) will be discussed as well as how gained data needs to be managed, analysed, and evaluated in order to calculate the final energy consumption.

How to improve data sharing will be discussed, including mapping of key stakeholders that may provide or facilitate access to energy data, as well as establishing collaborative agreements, that would bring benefits to both parties and most importantly, periodic updating of data.

Practices in other European regions

Netherlands and Denmark have since long developed tools which provide energy and climate data per activity sector, broken down at least at municipal level. Cyprus Energy Agency has also developed a tool, which provides the local authorities with all the energy consumption data required to establish their CO2 inventory.

DATA4ACTION and ENERGee Watch projects are active on establishing Regional Energy and GHG Emissions Observatories as a third party one-stop shop services gathering, analysing and providing energy data from many sources to the local authorities.

Link(s) with other courses

Energy production and consumption data are especially connected to Course Data display, dissemination, and validation by local authorities as well as with Course Monitoring, Reporting, Verification: follow up on implementation of actions.

Topic 4

Transport

Description of the topic (what)

As the amount of greenhouse gases of anthropogenic origin in the atmosphere increases intensively due to increasing emissions, especially due to the energy use of fuels. The largest share of GHG can be contributed to transport, with road transport as the source of the vast majority of emissions. The number of road motor vehicles, as well as the power and volume of their engines are constantly increasing, while infrastructure development, especially in urban areas, is unable to keep up with such growth and road congestion is becoming more frequent. In recent years, the growth of road freight transport, especially transit freight, has also been very acute.

Road transportation in the territory of the local authority can be divided into two parts:

- Urban road transportation, which includes road transportation on the local street network that is usually in the competence of the local authority. The inclusion of this sector in the BEI is strongly recommended.
- Other road transportation, which includes road transportation in the territory of the local authority on the roads that are not in the competence of the local, authority. An example of such road transportation is transportation on a highway that goes through the territory of the local authority.

To calculate road emissions, a lot of data needs to be obtained, which is oftentimes not complete.

For that purpose specific methods exist, that can be used to estimate emissions of both urban and other road transportation.

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Data on emissions from fuel combustion are mostly calculated using statistics on fuel use, fuel values and emission factors. To calculate emissions from road traffic a range of other data is used, most importantly fleet data (registered motor vehicles) and the mileage data. The recommended methodology in Slovenia is the one provided by Intergovernmental Panel on Climate Change (IPCC), which makes GHG emissions data internationally comparable.

Relevant methods / tools (how to)

The activity data for the road transportation sector is the amount of fuel consumed in the territory. Usually, the amount of fuel used is not equal to the amount of fuel sold, therefore, the estimation has to be made based either on mileage driven in the territory of the local authority, on vehicle fleet in the territory (cars, buses, two-wheelers, heavy and light-duty vehicles) or on average fuel consumption of each vehicle type.

The EMEP/EEA Guidebook (2009) and the 2006 IPCC Guidelines provide detailed guidance on the estimation of activity data for the road transportation sector. Even though the focus of these guidelines is on the national level, the information can be useful also to understand the principles for calculation of emissions at local level.

Practices in other European regions

In Germany, TREMOD is used, which is the expert model used by the Federal Environment Agency, the Federal Ministries, the German Association of the Automotive Industry (VDA) and Deutsche Bahn AG to calculate air pollution and greenhouse gas emissions from motorised traffic in Germany. In Italy e.g., the national environmental protection agency ISPRA monitors the emissions, also from the transport sector. The model GAINS-Italia is used to estimate emissions from transport mainly at regional level.

Link(s) with other courses

The transportation data are important and directly connected to all courses.

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