Data4Energy

Knowledge report

COORDINATOR

LÄNSSTYRELSEN ÖSTERGÖTLAND

PARTNERS

LÄNSSTYRELSEN DALARNAS LÄN

Länsstyrelsen i Jönköpings län

RI.SE Research Institutes of Sweden

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Introduction

The project Data4energy started the second half of 2024 and ended in April 2025. The aim of the project was to:

1. Conduct an initial investigation of the data sources used in monitoring of energy and climate goals with the purpose of building a digital platform for improved monitoring in the future.
2. Exchanging experiences of the local and regional level of governance when it comes to energy data and statistics to monitor energy and climate goals and

The desired outcomes are to form a base for future collaborations and joint applications through:

1. better trained civil servants and
2. exchange of good practises
3. list of data sources used for monitoring of energy and climate goals

The following report summarizes knowledge gained during the project implementation. This report follows the phases of the project which is: Kick-off in Bologna, interviews with municipalities, finals seminar and reporting back to stakeholders. In the end of the report you find conclusions and future work.

Kick-off in Bologna

On October the 23rd to 24th the kick-off meeting was held I Bologna, Italy. All the project partners participated at the meeting (the county administrative board of Jonkoping participated online). Bellow you will find the lectures from the meeting and a brief summary of what they presented. Short points on findings from the day:

- We should report, similarities and differences in available data
- Focus on municipalities and energy usage in territorial area.
- What goals do we follow? Why collect data?
- The purpose of collecting data needs to be clear!
- Focus should be on collecting specific data, not just detailed
- Data is lenses that we use to view the world

Agenda:

Wednesday 23rd October	
TIME	**ITEM**
9h30-10h00	Registration and official welcome at the Bologna Innovation Square Piazza Liber Paradisus 11
10h00-10h10	Short presentation of BIS initiative Nicolas Sassoli, CTE COBO

10h10-10h20	Short presentation of the project Data4Energy Joakim Svensson CAB
10h20-10h50	Collection of data, quality. Concrete experiences Susanna Ferrari (Municipality of Reggio Emilia)/Piergiorgio Cipriani (Deda Next)
10h50-11h10	*Break*
11h10-11h40	Semantic model RISE Sweden
11h40-12h10	Energy Observatory. Tools and reportings Leonardo Palumbo - Simonetta Tugnoli - ARPAE
12h10-12h30	Focus on Energy communities Alessandro Pin - AESS (Agency for energy and sustainable development)
12h30-13h00	Discussion on what challenges and opportunities we have to collect data All participants
13:00h-14h00	**Lunch at LAZA BAR (near venue approx 2 min)**
14h00-14h20	Monitoring of energy consumption and sustainability in Lepida Giorgia Landi - Federico Calò- Lepida
14h20-14h40	Carbon dioxid budgets in Sweden Anders Heggestad, Klimatsekretariatet (videoconferencing) https://meet.google.com/eqd-jsyt-vys
14h40 - 15h00	*Break*
15h00-16h00	Discussion and meeting wrap-up
~16h00	*KOM Day 1 Closes*
16h000-19h30	*Free time*
~20h00	**Dinner at Trattoria da Me Nella Torre** **Corte De Galluzzi, 5A - 40122 Bologna**

AGENDA

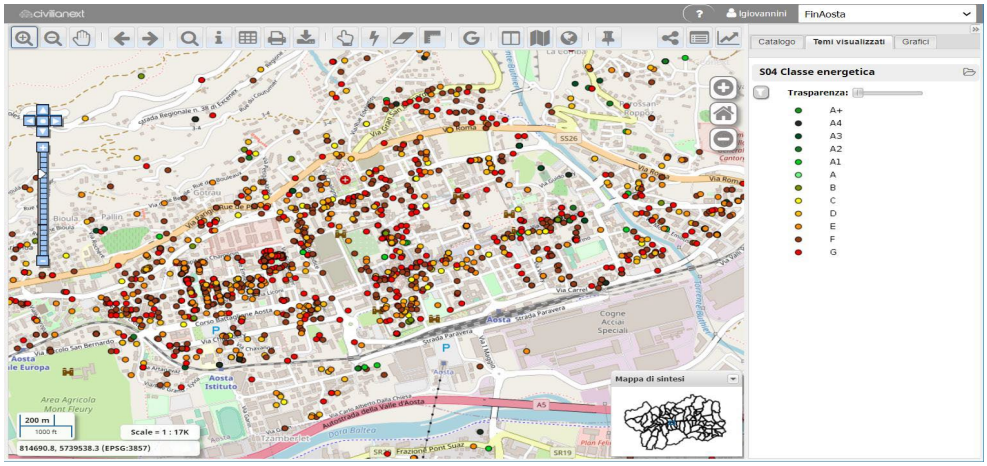
Thursday 24th October 2024

Thursday 24th October	
TIME	**ITEM**
9h15	Welcome back at BIS
9h15-11h00	• Reflection from the day before • Current status and challenges in each country/from partners perspective • Discussion: what data do we have available that we can use in a common framework? What gaps do we see?
11h00-11h30	*Break*

11h30-12h45	• Going through the application and input from Erasmus+ (economy etc.)
12h45-14h00	**Lunch at at LAZA BAR (near venue approx 2 min)**
14h00-15h30	Planning the project, focus areas, final output from the project, activities, economy etc. Next steps
~15h30	*KOM Closes*

Collection of data, quality. Concrete experience

This lecture was presented by Piergiorgio Cipriani from Deda Next. They have had a project focusing on creating scenarios about energy retrofitting of buildings, defining the time horizon the territorial scale, the type of use and the age of buildings. This has been done through a plugin in GIS (Geographical Information System). Teh “what-if scenarios has been possible through parametric simulations of consumption and needs cross referencing EPB (energy performance data) with characteristics of buildings. Link with more information: Home - Deda Next, Presentation



Giorgio Cipriani delivered a presentation on behalf of Susanna Ferrari Bergomi, a Public Official in Environmental Sustainability for the Municipality of Reggio Emilia. The presentation focused on the GeoSmartCity project and its "Green Energy" pilot, which ran from 2015 to 2017. The GeoSmartCity project aimed to enhance the integration, standardization, and accessibility of energy-related data. The Municipality of Reggio Emilia focused on improving energy efficiency by using geo-referenced data. This initiative demonstrated the potential of integrated, geospatial data to support energy efficiency and sustainability, serving as a model for other municipalities.

The presentation used a "recipe" metaphor to describe the data management process:

1. **"Shopping" for Ingredients**: Highlighting challenges like fragmented and inconsistent data, limited interoperability, and privacy constraints.
2. **"Cooking" the Data**: Addressing issues of data cleaning, geocoding, and harmonization, often hindered by poor data quality and outdated technology.
3. **"Serving the Dish"**: Delivering practical tools and open data despite limitations, emphasizing learning from experience and refining methodologies over time.

For more information look at the presentation.

Semantic model

Valentina Ivanova from RISE gave an introduction of knowledge graphs, including data-related use cases which could benefit from the application of knowledge graphs as well as knowledge graphs main building blocks.
In the context of the Web, which is abundant with numerous, heterogeneous, and diverse sources, knowledge graphs facilitate their integration and exploration. A knowledge graph (is a graph structure) represents description of real-world or abstract entities and the relationships between them. Descriptions usually have a formal semantics and allow for inference of new knowledge.
An industry survey[1] between 150 companies in data-intensive sector (32% financial services; 18 information technologies; 13% health care, life sciences and pharmaceuticals) found that knowledge graphs are most suitable to address the following data related challenges: data integration, data discovery, data harmonization, entity resolution, lineage/provenance, financial/business reporting, identity management, connected inventory, privacy, access control and cyber security.
Knowledge graphs have two main components – the semantic model (called an ontology) which serves as a schema of the knowledge graph and the data themselves. "*Ontologies define the basic terms and relations comprising the vocabulary of a topic area, as well as the rules for combining terms and relations to define extensions to the vocabulary.*" Ontologies provide for shared understanding of the terms and relationships in a topic area. Formal ontologies are described with the help of formal logic languages which allow for logic-based reasoning, inference and classification.

[1] https://innovator.news/new-report-details-industrys-use-of-knowledge-graphs-6d093718eebf

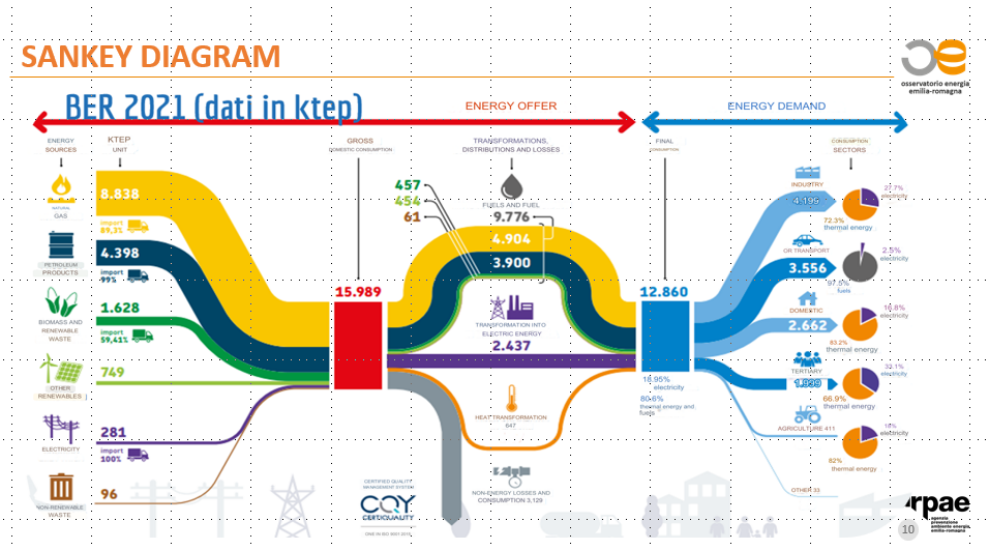
A project, called Transparency Energy Knowledge Graph by Ontotext[2], was presented as an example of the potential of the application of knowledge graphs to the energy domain. The project semantically integrates and verifies data from several sources (including master data). The data sources include European Network of Transmission System Operators for Electricity (ENTSO-E), Energy Identification Code (EIC), VAT Information Exchange System (VIES), Power Plant Datasets, Open Street Map as well as Wikidata (an open knowledge graph).
A dashboard was then built on top of the knowledge graphs. It provides visual analytics and exploration capabilities which include production and generation units by type, capacity and bidding zone (as well as their location and known outages) as well as wind and solar actual and forecasted output and data for energy balancing.
This dashboard supports the analysis of existing (major) producers and consumers, tracking actual and forecasted produced and consumed energy including its type (fossil, renewables, etc.) as well as un/planned outages.

[2] https://transparency.ontotext.com

Energy Observatory. Tools and reporting

Simonetta Tugnoli, on behalf of Leonardo Palumbo from ARPAE Emilia-Romagna, presented the region's strategic use of energy data for sustainable development. The presentation emphasized the urgency of achieving ambitious energy and climate goals, such as a 55% GHG reduction by 2030 and carbon neutrality by 2050. Central to these efforts is the **Energy Observatory**, which monitors energy production, transformation, and consumption in the region. There is a growing increase in ambition in energy and climate goals and the time to achieve them is becoming less. Monitoring of energy data is an important part to follow the progress in energy and climate work. A part of this is the regional energy balance based on the BER-ER accounting framework (Eurostat 2019) that details all energy products/carriers entering, being transformed, and leaving the regional territory over a calendar year (in ktoe). It serves as a knowledge base for the Regional Energy Plan and GHG inventory and assesses progress towards renewable energy and efficiency targets and evaluates energy system stability and supply security. They will build a methodology to get this data in the project. The data will for example be presented Sankey diagrams as presented below in the picture. This data can be used to make projections and measurements on how to decrease energy use and greenhouse gas (GHG) emissions.

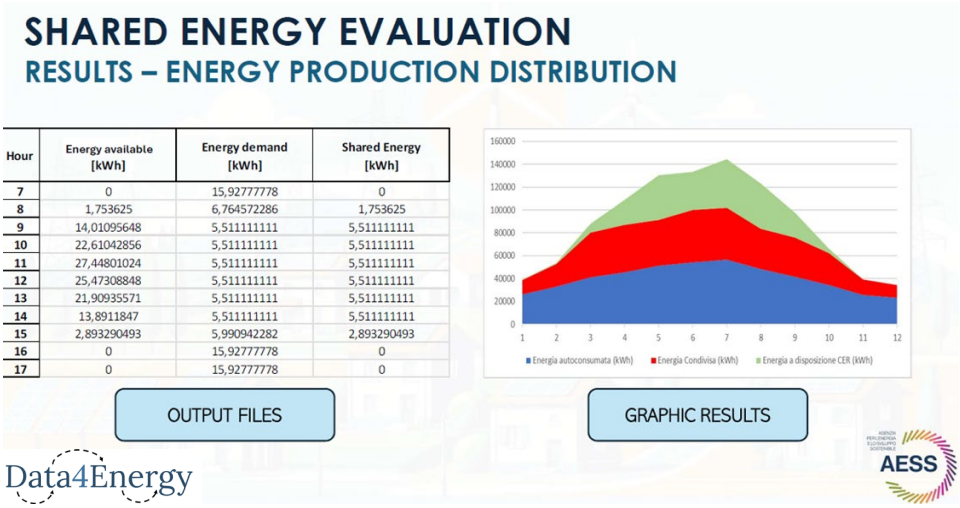
For more information, look at the presentation.presentation.



Focus on Energy communities

Allesandro Pin from AESS presented their work on energy communities through innovative data analysis and modeling techniques. They are working with analysis of the roofs of buildings to assess the potential of solar panels on them. The analysis begins with spatial and territorial mapping to evaluate rooftops' potential for hosting photovoltaic (PV) panels. Further as a complement 3D modeling of the potential buildings can be useful to make the assessment more reliable. The energy consumption of households is also collected and analyzed, providing a clearer understanding of production and consumption patterns across urban areas. These data sets can be used to assess the potential for energy communities in cites etc. since you can see where there can be production of electricity and where it can be used in other buildings, see picture below. Tus, the combination of these datasets enables the identification of opportunities for energy communities, where electricity generated in one building can be shared and utilized in others. Using tools like Python scripts for analysis, AESS models energy production, demand, and the balance between "prosumers" (producers and consumers) and consumers. The results highlight how shared energy can address local demand effectively.

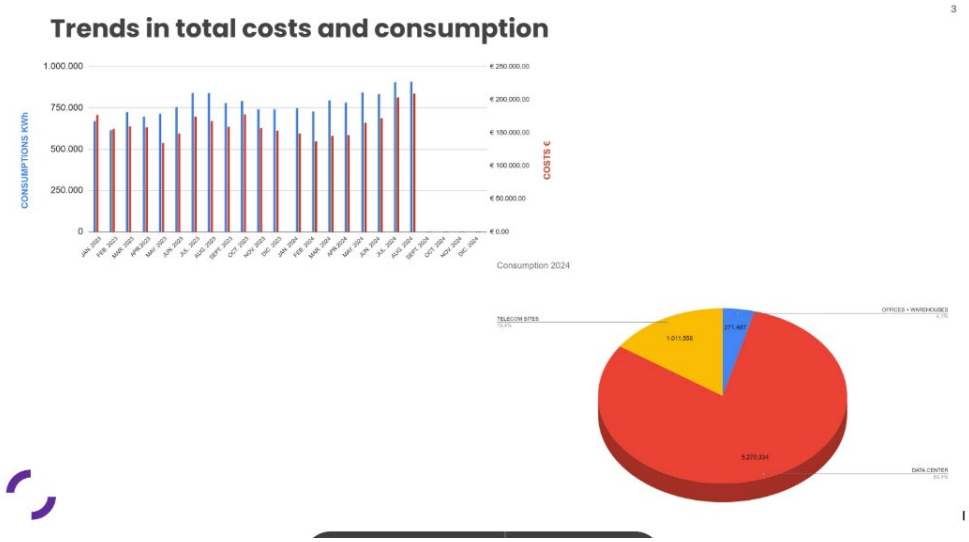
For more information, look at the presentation.



Monitoring of energy consumption and sustainability in Lepida

Giorgia Landi and Federico Calò working in Lepida, respectively in the Security, environment& emergency division and in Datacenter&Cloud Department presented a comprehensive view of Lepida's activities, structured around its ongoing efforts in managing and optimizing energy consumption across its facilities.

Lepida's Energy & Environment division oversees a system for tracking energy consumption and costs. With nearly 200 Points of Delivery (PODs) across its infrastructure—ranging from data centers and telecom sites to offices and warehouses—Lepida conducts monthly and quarterly monitoring to identify trends and drive energy efficiency. This proactive approach ensures a continuous focus on minimizing energy usage while containing costs, demonstrating Lepida's commitment to sustainable operations. The picture below shows trends in total costs and consumption over time.



The presentation highlighted specific achievements and future plans in renewable energy integration that include:

- Activation of advanced multimeters at the Ferrara data center and plans to extend similar systems to Modena.
- Connecting Ravenna's photovoltaic system to the grid, further leveraging clean energy sources.
- A feasibility study for photovoltaic implementation at the Modena data center.
- Development of an AI-powered system for energy consumption optimization at the Parma data center.

These initiatives reflect Lepida's forward-thinking approach to embedding renewable energy technologies and innovative solutions into its operational framework.

Commitment to Sustainability

Sustainability is a cornerstone of Lepida's strategy. Beyond energy monitoring, the organization has adopted a holistic vision that incorporates environmental and social responsibility:

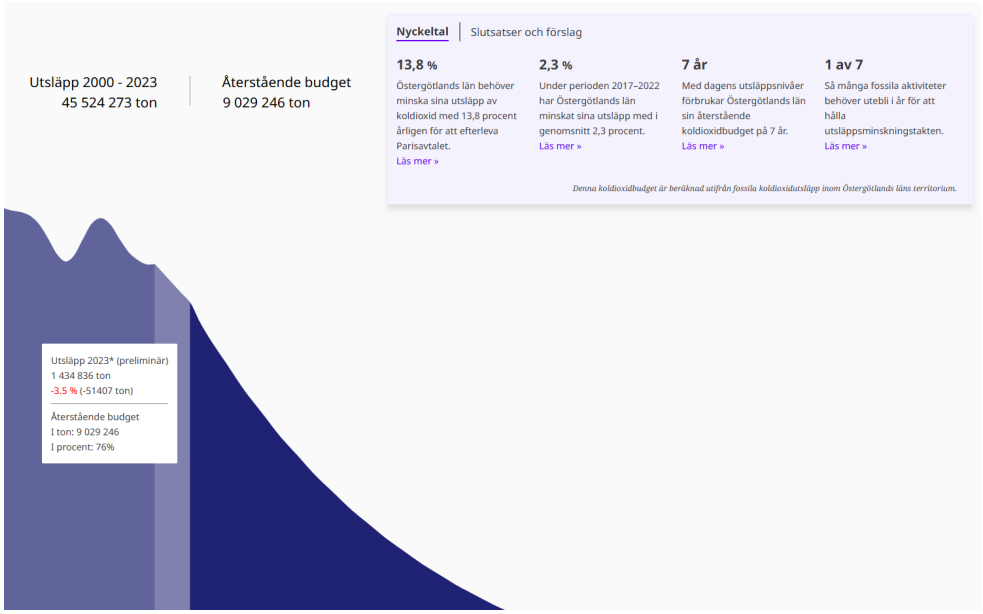
- Starting in 2025, Lepida will voluntarily prepare a sustainability report for 2024 in accordance with **GRI standards**, laying the groundwork for a mandatory report in 2026.
- Key focus areas include energy efficiency, electronic waste management, sustainable materials, digital accessibility, and raising awareness on sustainable practices.

Lepida also actively integrates sustainability into its daily operations. Actions such as distributing refurbished PCs to schools, promoting smart (home) working, subsidizing public transport for employees, and implementing low-energy systems highlight its commitment to creating a greener and more inclusive digital ecosystem.
In line with the **Digital Sustainability Index (DISI)**, Lepida's efforts place Emilia-Romagna on a promising trajectory for improvement. With a current index of 42 (compared to the national average of 45), Lepida's initiatives aim to close this gap, reflecting its determination to lead by example in the region.

For information, look at the presentation.

Carbon dioxide budgets in Sweden

Anders Heggestad at Klimatsekritariatet presented their tool for carbon dioxide budgets. The tool is based on national data and are mainly used by municipalities and regions/counties. One challenge is how to handle for example production industry that is of use for the whole country but are situated in a municipality and region. These municipalities will get a higher emission than others, but the others also benefit from the industry which can seem unfair. The solution for this is to identify such industry and divide the carbon dioxide emission to all municipalities in the country, for example the production of concrete. The budget is also a good tool to monitor the emissions in an area and provide a scenario which reductions need to be made in order to reach the Paris agreement goals. Below you can see the budget for the region of Östergötland, Sweden. It provides information on current emissions (2023), remaining budget, reduction in percent per year that is needed to reach the goal, how much has been reduced during 2017 to 2022, how many years that is left in the budget according to current emissions and how many fossil-based activities that needs to be stopped to reach the goals.



Interviews and surveys with municipalities

Data4Energy aims to foster the exchange of knowledge and experiences in governance to monitor energy and climate targets at the local and regional levels. To achieve this, two surveys have been set up to better understand the practices and challenges municipalities face in energy and transportation data management.

Step 1: Survey with medium and medium-large Municipalities

The first survey involved municipalities with advanced experience in energy and climate data management. Six interviews were conducted: three in the Emilia-Romagna region of northern Italy and three in Sweden, representing Dalarna, Östergötland, and Jönköping counties.

These municipalities were selected based on their maturity in managing energy and climate data. The interviews focused on:

- Data sources and acquisition methods.
- Data quality, file formats, and models.
- Data usage for monitoring, evaluation, and policy development.

The findings provided valuable insights into the practices of experienced municipalities, which serve as a foundation for guiding less mature municipalities in improving their energy data governance.

These points below are the results from the interviews:

Municipal operations:

- Energy production and consumption from municipality owned companies
    - Municipality owned buildings:
        - Monthly bills and BMSs
        - Sweden: energy consumption separated for the building functioning (e.g. ventilation) and buildings user/occupant
        - Italy: Delivery Point (POD) for electricity and the Distribution Point (PRD) for gas
    - Fuel types and consumption of municipality vehicles (as well as ferries, airports) and energy production (district heating) as well as follow up on electrification of transport
    - Renewable energy produced and consumed, energy produced by PV and installed capacity of RES on municipal assets.

Municipal geographical area:

- Total/per sector energy production and consumption; total/per sector renewable and fossil-free energy production and consumption
- Further data needed for analysis of production and consumption per sector and renewable/fossil-free sources

- In Sweden: challenging to obtain due to being spread across several data sources as well as data classification issues
- Sources for statistics in Sweden: SCB, Energimyndigheten and Kolada
- In Italy: municipalities can request data regarding consumption of electricity, natural gas and water divided per sector from the local distributors
- Sources for statistics in Italy: Regulatory Authority for Energy, Networks and the Environment - ARERA
- Regional agency for prevention, environment and energy of Emilia-Romagna - ARPAE

Data usage:

- The municipalities in both countries follow up the energy flows on their territory and use the data to decide on what policy interventions and strategies to carry on in the future (for instance fossil fuels reduction).
    - Also retrofitting and redeveloping buildings
    - Focus is mainly on municipal operations
- Follow on SECAP (Action Plan for Sustainable Energy and Climate) objectives for reducing CO2 emissions by 2030 – in Italy
    - In collaboration/contract with Energy Agency for Sustainable Development (AESS)
- Follow up on the local goals connected to greenhouse gas emissions, renewable/fossils fuel usage, and building energy consumption/efficiency – in Sweden

Available tools:

- MS Excel
- Visualization tools
    - Sustainability Advantage – specialized sustainability-focused tool
        - readily integrates geographical area data and provides Sankey diagrams
    - MomentumRC - tracking energy use in tenant buildings
    - Infogram – multi-purpose visualization tool
    - built-in tools available in customer portals

Challenges:

- Mostly manual data import into a visualization/analytics tool
- Semantic challenges: different data models, terminology
- Inflexible tools demanding developers support for defining views and datasets integration
- Data spread across various sources
- Lack of data
    - infrequent collection
    - data are classified (Sweden) - hinders analysis (per sector) of municipal geographical area
- Difficulty in defining a meaningful indicators and targets
- Different methodology for reporting requirements
- Lack of trained public officers

Step 2; Survey with small municipalities

Building on the first phase, a survey targeting smaller municipalities was developed. This was done to address the unique challenges of less resourced

and less experienced municipalities. The questionnaire, designed to collect simple and actionable insights, includes up to 10 straightforward questions. It focuses on:

- current energy and transportation data practices.
- types of energy sources used.
- data tracking, production, and management.
- needs and challenges in energy data governance.

The survey was developed using **EU Survey**, a platform provided by the European Commission for online surveys. A draft English version is available, with an Italian and Swedish version being prepared. Once finalized, the survey will be distributed to small municipalities in the Italian region of Emilia Romagna and in the Swedish regions of Dalarna, Östergötland and Jönköping.

These points below are the results from the survey.

Across both countries, municipalities report **fragmented data landscapes**. Data is often available but not easily accessible or well-organized. Most monitoring activities focus on **basic operational needs**—such as billing, consumption tracking, and regulatory reporting—rather than strategic planning or proactive climate action.

Both in Sweden and Italy, the responsibility for managing energy and transport data is usually assigned to internal municipal staff, but in many cases **technical tools are basic** (mainly Excel), and there is a **lack of capacity**—in terms of time, skills, and personnel—to analyse or act on the data effectively.

Sweden:

- Resources to monitor energy data is limited, less to act and work strategically with it
- Most data are partly available and can be unorganized
- Highest need: A simple tool for collection and analysis of data would be preferable
- Data mostly used for internal monitoring, e.g. transports and electricity

Italy:

- The anonymous format, intended to encourage candid and informal responses, may have reduced the opportunity for direct follow-up and individualized reminders
- Resource constraints and limited internal capacity in small municipalities may further explain the modest engagement, especially if they lack staff dedicated to energy and climate policies
- The topic of energy and transportation data monitoring might still be perceived as non-priority or low impact within many small municipalities

The small sample size reflects the broader challenge of engaging municipalities on complex topics like energy data governance, which are often seen as technical, resource-intensive, and not immediately urgent.

While the two contexts differ, the key takeaway is shared: municipalities need support to manage and leverage energy and transport data effectively. This

includes:

- Simple, shared tools for data collection and analysis.
- Training for staff.
- Better integration of local and national data sources.

Building data governance capacity at the local level is a common need—and a precondition—for meaningful energy and climate action.

Final meeting in Falun, Sweden

The final meeting for the project was held in Falun, Sweden the 12-13th of March. Except from the project group the municipality of Norrköping and colleagues at the County administrative board of Dalarna also participated at the meeting. In addition to the two representatives from Lepida, an **energy engineer from AESS (Energy and Sustainable Development Agency)** also attended the seminar. Lepida involved AESS as a **domain-specific expert** to provide additional technical support on energy-related topics, particularly in the regional context. The first day focused on lectures to build knowledge and share experience on the subject and the second day consisted of a study visit to a local energy company and workshops in the afternoon. Short points on findings from the day:

- The most important challenge is to get robust data that is standardized to get good statistics
- There is a lack of data specially from industry
- There should be an automated data collection and integration for flexible analysis/visualization
- Analysis and visualisation are important but easier to work with in comparison to collecting data
- There is a need to change regulations and legislation when it comes to statistics, especially in Sweden
- It is not always clear why you collect data, sometimes the purpose and use of it is reviled after you have collected it. I.e. the purpose of collecting data do not necessarily have to be clear to foster innovations. This contradicts the conclusion from the first meeting in Bologna

In the meeting the results from the interviews and survey were presented. These have been presented above in the previous chapter “Interviews and surveys with municipalities”. Below you can find the different presentations from the first days meetings.

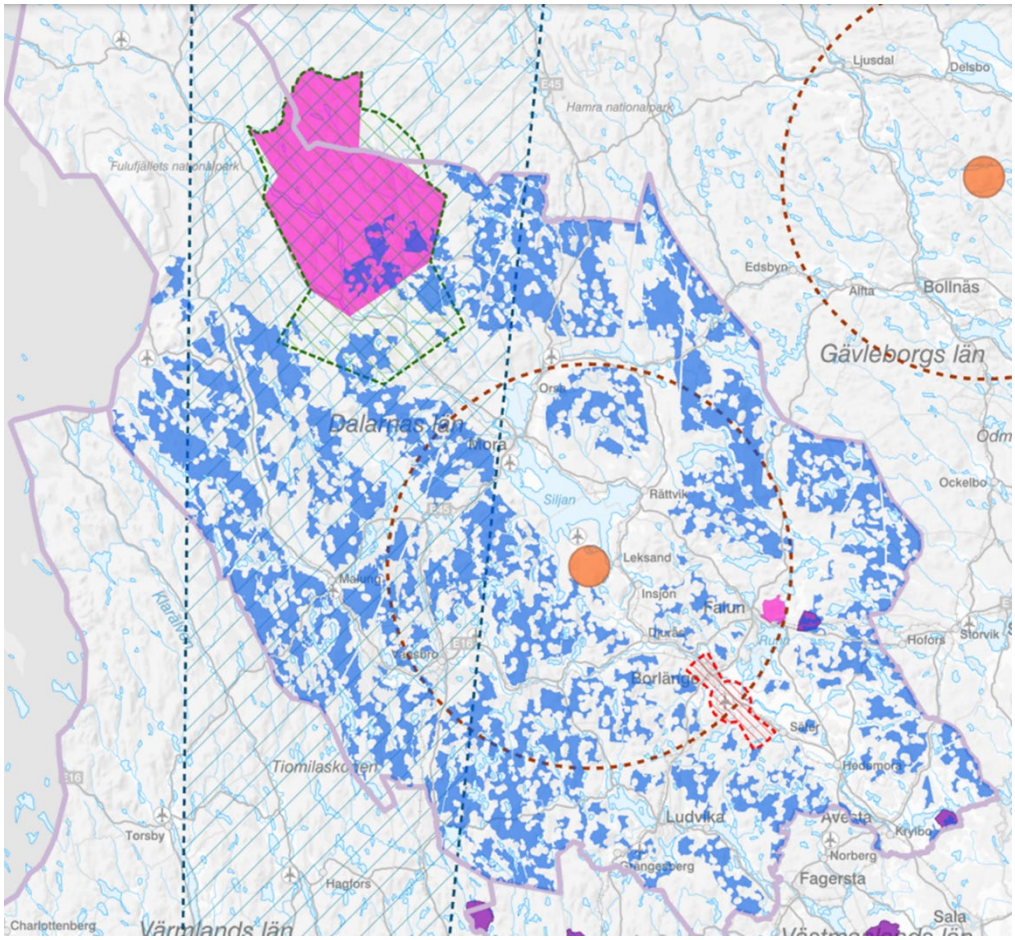
Solar and wind map in east Sweden

Filip Olsson, GiS specialist at the County administrative board of Östergötland presented the work from a project called “Elsmarta ÖMS” financed by ERUF. The map will show where there are governmental interests that can conflict with establishing solar or wind power production in five different counties. This will be a planning support for municipalities and entrepreneurs to establish sustainable power production in these counties.

Wind map in Dalarna

Jacob Ebner, Energy and climate strategist at the County administrative board of Dalarna presented the work from a project were they had built a map for wind production in their county. The outcome of the project is a planning document with areas that are considered to have potential for wind power development based on national and regional interests.

These areas, along with any other areas designated by the municipality, can then be tested by municipalities as suitable in municipal wind power planning." As example this map can be as auto generated. See example below.



Energy communities – Data collection and elaboration in Italy

Alessandro Pin, energy engineer at AESS (Energy Agency for Sustainable Development) presented the renewable energy communities according to Italian legislative framework. The topic has been already exposed by himself in the previous meeting in Bologna. This time the main focus was about the difficulties in data collection, methodologies for processing data of different quality and output visualization.

Energy communities and business models

Fredrik Ahlgrem, CEO of Sourceful Energy, presented the idea of energy communities and how these can tackle the problem of balancing the grid. At the heart of the solution is a data sharing model, and a business model where all contributors get a kickback from their contribution.

When small houses install solar panels and batteries it turns the traditional electricity system upside down. Consumers become producers and consumers "prosumers" which put new requirements on the power grid as well as challenging the traditional business models. It also provides new possibilities where these micro-scale producers/consumers can take a part in the grid balancing system. Sourceful Energy tries to elevate these opportunities by creating a collaborative energy community that can help balancing the grid and contribute to a cleaner more resilient energy system.

Workshops day 2

During the meeting in Falun a workshop was conducted to discuss what challenges we see in the area and how we would address these in a future project. Three main types of challenges were identified initially: collection of data, visualization and support for municipalities. These are detailed in separate headlines below.

Collection of data

This challenge is the most extensive one and consists of several underlying challenges. Below you find these challenges and how they should be prioritized in a future project. Possible solutions are also written for each one of these challenges.

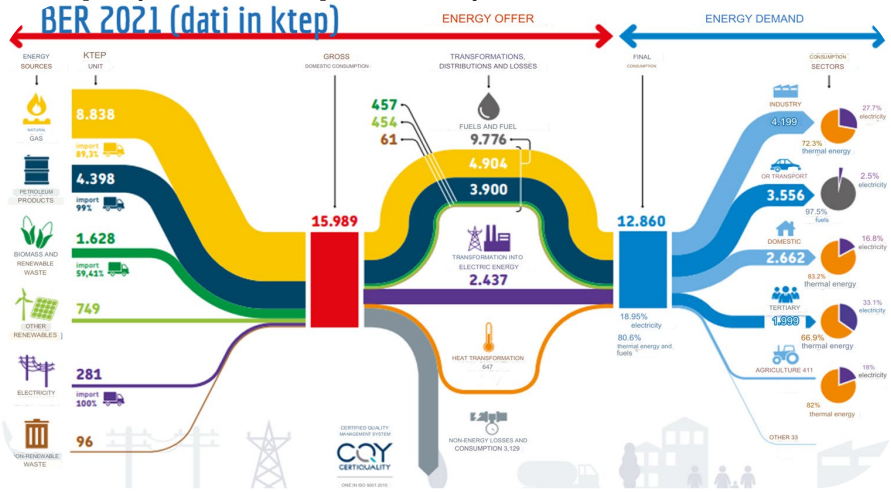
1. The first one is the lack of relevant indicators on a local level to monitor energy usage, production etc. an example can be how to monitor energy efficiency compared to growth. There are no good measures such as BNP on a municipal level which makes the energy usage and how it is more efficiently used in a geographical area hard to monitor since it is related to economy. A first step to try to solve this in a future project would be to interview municipalities to find suitable indicators that can be used and see what big data that is available.
2. Indirect effects on energy – related data. There are areas which have effects on energy usage but not directly. Transports for example have can have a direct and indirect effect on the energy system. A solution to address this is to have this in consideration when finding new data sources and working with it. CSRD and the indicators used in the reporting for that can be of use.
3. A robust, unified method for collection of data is lacking. A focus for a future project would be to find a model to collect data on a local level that also can be aggregated to the regional a national level.
4. There is a lack of data, especially industry data so this is an issue that needs to be worked on in a future project. This issue is complicated and needs work in different areas and levels of governance.

Visualization

The second area with challenges is how to visualize the collected data. This is not as extensive challenge as the collection of data but important for the use and analysis of it. Below the challenges is detailed together with possible

solutions for future work.

1. A challenge can be to visualize the intermunicipal challenges when it comes to energy and electricity. For example how different municipalities are connected to each other through a common electricity grid and the effects their actions have on other municipalities. Therefore a visualization on a regional level is needed in order for the municipalities to cooperate more and see how they relate to each other through to each other when it comes to energy supply and usage.
2. An energy flow chart for the local level is missing and is needed in order to show energy supply and usage. This is an important tool and visualization to have to get an overview of the energy flows in the municipality. See an example from Italy below.



Example of energy flow chart from ARPAE Energy Observatory, Italy.

Knowledge and support for municipalities

The third area that was identified in the project is the need for knowledge among public officers and policy makers in municipalities. A future project should have knowledge building parts such as regional seminars, webinars and other activities that supports these. Further support is also templates and tools that can be used directly in this work, something that is connected to the two areas presented above.

Identified target groups

The following target groups were identified to focus on in a future project and work.

- Representatives from municipalities (public officers and policy makers). Main target group for a future project.
- Private and public grid owners/companies. Important actors to involve in a future project.
- National authorities. Interest group that can be target for information and results from the project.
- Secondary target group: Companies and actors connected to energy

Reporting back to stakeholders

Emilia Romagna

Based on the discussions held during the final D4E meeting and the recurring emphasis placed on digital sustainability, it remains meaningful to propose to the Digital Agenda Department of the Emilia-Romagna Region (ADER) the launch of a new **thematic community of practice (COMTem)** focused on **Digital Sustainability & Energy-Environment**, to be officially launched in 2026.
The new COMTem would ideally involve:

- all local public authorities;
- municipal unions;
- provinces and the metropolitan city;
- and possibly other relevant partners.

The purpose of this thematic community would be to explore:

- how to identify the data needed for effective monitoring, along with sources, quality, and interoperability;
- how energy and environmental data (e.g., waste, water) can support local public administrations in planning and managing industrial or urbanized areas;
- whether it would be useful to produce guidelines to support local authorities in these domains;
- and whether it is relevant to also provide guidance on drafting public procurement calls, including technical parameters and criteria that ensure data quality and sustainability standards.

On the 28th of April, a local online follow-up meeting was held with around 10 participants, including representatives from ARPAE Emilia Romagna (Regional Agency for Environmental Protection and Energy), ANCI Emilia-Romagna (Regional branch of the National Association of Italian Municipalities), AESS (Agency for Energy and Sustainable Development), and Dedagroup. The objective of the meeting was to present the results of the interviews with medium-sized municipalities, the findings from the small survey conducted with municipalities under 5,000 inhabitants, and to open a discussion on future perspectives.
ARPAE shared updates on the regional energy observatory and the existing inventory of emissions and electricity consumption. They also mentioned a possible project on downscaling CO_2 emissions at the local level, aiming to compare such estimations with PAESC data. There was also a discussion around the fragmentation of data across different systems, especially between CRITER (regional energy certificate registry) and the national platform, and the presence of inaccuracies in cadastral and address data. Dedagroup (a participant company) highlighted the need to overcome these inconsistencies and emphasized the importance of making energy data available to municipalities via standardized API services, rather than outdated Excel-based formats.
The representative from ANCI offered insights into the challenges of involving small municipalities in voluntary data initiatives. According to ANCI, small municipalities tend to engage only when legally required or when there is a clear economic or practical benefit. Therefore, future projects should ensure a tangible return for local authorities, such as cost savings or easier administrative processes.

During the meeting a matrix with an overview of four strategic areas for future collaboration was shared:

- Development of **digital tools** for local data collection and visualization;
- **Training programs** for public officials on energy and data governance;
- **Pilot projects** for Local Energy Communities based on real data;
- Design of **local carbon budgets** and frameworks for emissions monitoring.

Sweden

On the 24th of April a digital seminar will be held in the three partner counties but also spread to other regions in Sweden (mainly the middle of Sweden). This will ensure that the local stakeholders, mainly public officers and politicians in municipalities have a better understanding of the challenge when working with energy data and how to address them. The seminar will also consist of good examples and research that can be useful to the participants. The seminar will end with an open forum for discussions and exchange of experiences. The digital seminar will be held in cooperation with another national project called "Elsmarta ÖMS", financed by the European Regional Development Fund, since the two projects align in the challenge to collect, analyse and visualize data. This will ensure further resources and support to host the meeting. See the webinar here: https://play.mediaflow.com/ovp/17/91DFDC1CAC

Conclusions and future work

Erasmus+ Forward-Looking Project

Looking ahead, a promising opportunity for future collaboration lies in the upcoming **Erasmus+ Forward-Looking Project** (Call: **ERASMUS-EDU-2025-PI-FORWARD-DIGITAL**), which focuses on innovative approaches to data collection and exchange in education, including vocational education and training (VET).

Although the call is particularly relevant and timely, the Data4Energy partners have agreed to take some time to reflect, as the deadline, May 27, 2025, is relatively tight. Nevertheless, there is a strong shared interest in continuing the work, and in particular in expanding the consortium to include partners from additional EU countries. The proposed idea aims to develop a digital education and training framework to support local governments and VET institutions in the field of energy data governance. The core objective would be to equip municipal staff and VET learners with the skills to manage, interpret, and utilize energy data for informed decision-making and sustainability planning.

Key components of the project could include:

- digital training modules for local public officials through VET structures;
- a governance framework for municipalities and schools to improve data-driven planning;
- better collection and use of energy data from schools and public buildings;
- pilot programs in selected municipalities to test methods and tools;
- the development of open-source dashboards and monitoring tools to assess local energy policies;
- transnational exchange of good practices on energy data management.

This project idea builds directly on the learnings from Data4Energy, responding to the need for greater digital capacity at local level and aiming to make energy data more usable, accessible, and impactful in day-to-day public decision-making.

Erasmus+ Partnerships for cooperation

Another call that can be interesting for the project to focus on is the Erasmus+ call for cooperations. The primary goal of Cooperation Partnerships is to allow organisations to increase the quality and relevance of their activities, to develop and reinforce their networks of partners, to increase their capacity to operate jointly at transnational level, boosting internationalisation of their activities and through exchanging or developing new practices and methods as well as sharing and confronting ideas. They aim to support the development, transfer and/or implementation of innovative practices as well as the implementation of joint initiatives promoting cooperation, peer learning and exchanges of experience at European level. Calls will open early 2026 and up to 400 000 euros can be applied for. Read more: Cooperation partnerships - Erasmus+[3].

[3] Swedish: Erasmus+ samarbetspartnerskap - Universitets- och högskolerådet (UHR)