International Energy Agency Technology Collaboration Programme on

Cities

IEA Cities Task 2

Data for Urban Energy Planning

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Content

1 Starting situation and challenges

Cities are the largest consumers of energy produced globally – between 60 and 80% – and account for a roughly equal share of global CO_2 emissions. While the challenge of decarbonization must be addressed immediately to mitigate the critical impacts of climate change and create sustainable economies, cities and communities are currently falling short of their expected and potential contributions.

1.1 Cities are faced with multiple challenges

Decision-making, planning and selection of solutions for decarbonization take place in a dynamic environment and must simultaneously consider a variety of technical and non-technical aspects and interlinked objectives (local economy, education, health, employment, circular economy, etc.). This integrated decision-making requires comprehensive skills, knowledge and resources, e.g. in dealing with implementation measures, related steps and the necessary data bases, which are lacking in cities and especially in smaller municipalities. The high complexity and uncertainty of innovative technologies, the combination of technologies and the practical effects of implementation measures make things even more difficult. This regularly leads to uncoordinated and fragmented decision-making not only within cities, but also among different interest groups.

1.2 IEA Cities – a new technology collaboration programme

Recognizing the importance of helping cities accelerate their decarbonization efforts, the International Energy Agency (IEA) has established a new Technology Cooperation Programme (TCP) for Cities. This is an international, cross-cutting initiative from the IEA's family of technology programs. It brings together all relevant information from the IEA's city-related technology cooperation programs such as District Heating and Cooling (DHC) and Energy in Buildings and Communities (EBC). The Cities TCP thus aims to accelerate the contribution to the energy transition and make decarbonization a top priority for cities.

1.3 Current challenges and research demand

As one of the first initiatives of this newly established TCP, the IEA Cities Task 2 "Data for Urban Energy Planning" is now starting. This task will support cities and municipalities in a field in which they have competencies, finances and decision-making capabilities: urban planning. Task 2 will therefore focus on urban energy planning and the related goals and tasks of this topic, on the requirements for data, tools, methods, etc. and on how cities and municipalities can use urban energy planning as an essential tool to enable the necessary change and ensure a high quality of life. The clear intention of this tactic is to provide information and advice for cities and municipalities to shape the urban energy transition by collecting and analysing best practice examples worldwide.

The main benefits arising from IEA Cities Task 2 for cities and municipalities include international exchange between initiatives, research projects and frontrunners in this context, the leverage effect of R&D resources, possible technology and skills transfer, training and capacity building. All member countries can thus build up and exchange knowledge, e.g. in the area of the municipal

heat transition with countries such as Denmark and Germany and related subject areas. This knowledge should be passed on to cities and municipalities through multipliers such as energy agencies. Such an exchange of knowledge and expertise would drive forward the energy transition in cities and municipalities at all levels and further support national initiatives such as the pioneering cities.

1.3.1 Novelty and added value

The main innovation of Task 2 is the focus on cities and municipalities as well as public bodies as target groups and the interaction with them as the addressees of the dissemination and project results. These results are not – as is usually the case in TCPs – technology-related but are oriented towards solutions for cities and municipalities. Ultimately, these solutions should cover all current and future tasks and decision-making areas in the context of the energy transition. Furthermore, these solutions should be based on use cases (primarily Subtask 1 "Use cases") that are already being used (permanently) or are currently being demonstrated and tested by cities and municipalities, among others. Subtasks 2–4 then focus on the fundamentals and requirements for the use cases in terms of methods, tools and data-specific aspects. They are therefore more at the expert level of cities and municipalities as well as the scientific participants in the consortium.

Thematically, Task 2 is broadly based. The current partners are contributing various application topics such as energy poverty, municipal heat planning, methods for automated reporting, energy communities and energy spatial planning. Other possible topics include mobility, positive energy districts and the use of AI in the context of energy planning.

Figure 1: Overview subtask structure

To cover this thematic breadth, the closely interlinked Subtasks 1 and 2 are structured similarly. Both are not topic-specific according to e.g. energy sectors, but are based on the following task areas of cities and municipalities (see Figure 2):

- Planning & designing
- Monitoring & observing
- Steering & deciding
- Communicating & reporting

For example, ST 1 deals with specific applications for planning the municipal heat transition, while ST 2 deals with the necessary GIS tools and web services.

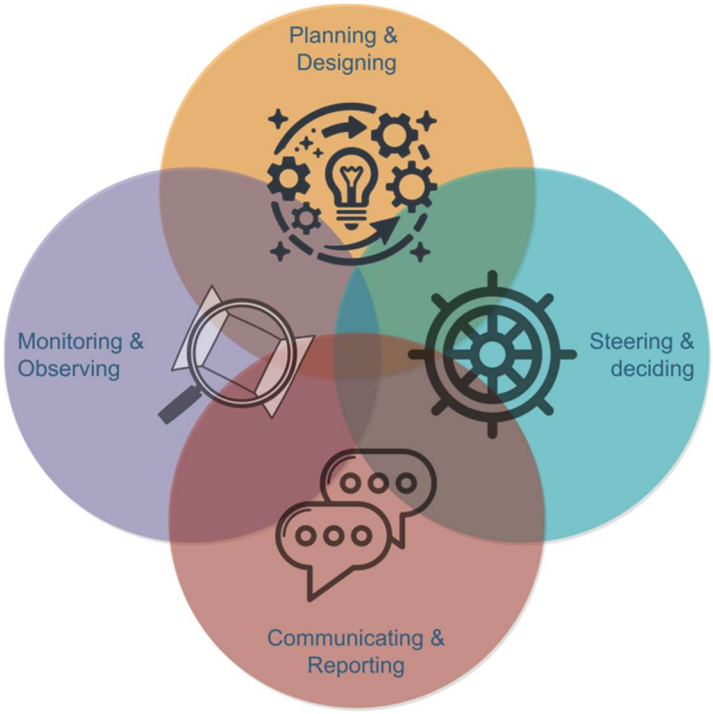

Figure 2: Categorization "Use cases" and "Methods & Tools"

ST 3 ("Data") deals with the necessary data bases for urban energy planning and their conditions of use: Due to the great heterogeneity of relevant data sources (e.g. in terms of access options, data type, data origin, data scope, data quality) at local, regional, national and international level, a categorization and evaluation of these data sources with regard to usability for various topics and tasks is required here. The underlying methods for data acquisition, collection, storage and improvement of data quality are also important aspects in this evaluation and recommendation for cities and municipalities on how to proceed. This also requires studies for data management plans for cities as well as a compilation of best practice examples regarding data availability, access and usability in a country and international comparison.

To round off this complex topic, ST 4 ("Non-technical framework conditions") deals with the often critical legal and economic aspects in this context in an international comparison. Here, among other things, consideration of data authorship and data security as well as standards and

interface specifications (e.g., compatibility for reporting obligations, ISO standardization) are essential as well as possible services, spin-off / start-up ideas and private / public - private business models in the context of data for urban energy planning.

1.3.2 Communication & interaction with cities / municipalities: the role of NGOs, energy agencies and other multipliers

An innovative feature of Task 2 is the implementation of communication and interaction with cities and municipalities. There are generally two problems here:

1) Researchers, developers, technicians, etc. speak a different language than cities and municipalities ("engineer-ish" vs. "city-ish")
2) Due to the large number of cities and municipalities, it is almost impossible to actively involve many cities and municipalities in an IEA cooperation.

To solve these two problems, the project is actively seeking cooperation with institutions that can act as translators and multipliers at (inter)national level: these are sector-specific and city-specific NGOs such as Global Covenant of Mayors[1] or ICLEI[2] (cooperation is being discussed with both institutions at TCP level) as well as with national and regional energy agencies. Specifically, TS 2 cooperates with GCOM; in the Austrian consortium, the SIR, with its access to the e5[3] network, the pioneering cities[4] and the "Spatial Energy Planning" platform currently under development, takes on this envisaged multiplier role. Similar collaborations are also being sought in other participating countries.

1.3.3 Added value compared to ongoing and already completed IEA projects

The Cities TCP, and thus Task 2, is an absolute novelty in the context of IEA projects. While technology providers, planners, energy supply companies, manufacturing companies, etc. were previously the focus of the TCPs, it is now cities, municipalities, public bodies, energy agencies and even ministries. This makes them the primary target group of an IEA project for the first time. They will benefit from the bundled expertise of all TCPs and pre-projects, which will be used in Task 2, among others, to support cities and municipalities in the energy transition. An exchange with other TCPs such as DHC and EBC is planned in the project and is also welcomed by the TCPs.

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[1] See Global Covenant of Mayors (2024): Global Covenant of Mayors for Climate & Energy. https://www.globalcovenantofmayors.org/.
[2] See ICLEI – Local Governments for Sustainability (2025): ICLEI – Local Governments for Sustainability. https://iclei.org/.
[3] See Österreichische Energieagentur – Austrian Energy Agency (2025): e5 Österreich – Programm für energieeffiziente Gemeinden. https://www.e5-gemeinden.at/.
[4] See Bundesministerium für Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie (2024): Pionierstädte, Klimaneutrale Stadt. https://klimaneutralestadt.at/de/initiativen/pionierstaedte/.

1.3.4 Cooperation and exploitation strategy

The participants in Task 2 will contribute their own content and results from (inter)national projects, which will be coordinated by the sub-task leaders based on the international task description. Task 2 will primarily rely on online meetings and workshops for processing and coordination. These will be supplemented by physical meetings for an extended discussion of the results and further planning.

The project results will be disseminated in a targeted manner as part of Subtask 5 and supported and implemented nationally as part of WP1. On the one hand, this will take place within the framework of general & scientific dissemination, where the organization and coordination of the dissemination of the task results will be undertaken at international level. This includes the organization of e.g. special sessions and workshops in cooperation with specialist conferences and committees as well as cooperation with the IEA Cities TCP secretariat and the IEA directly. The participants will present the results of the project at international conferences and in specialist journals.

A key element of Task 2 is dissemination for and interaction with cities and municipalities. The following measures are planned for this purpose:

- Creation of brochures / fact sheets on existing examples of the use of data in urban energy planning
- Creation of information and training material for cities and municipalities in cooperation with (inter-)national NGOs (e.g. Cities Detox Heat, Global Covenant of Mayors, International Society of City and Regional Planners) and (inter-national) multipliers such as energy agencies
- Creation of videos and information material of use cases including experience reports from city representatives
- Organization of e.g. topic-specific workshops and webinars for cities and municipalities

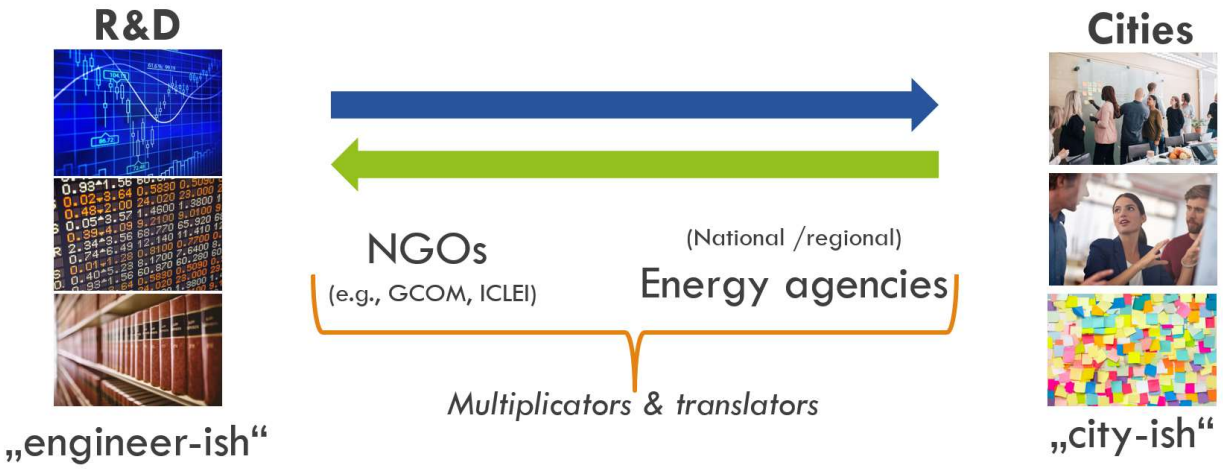


Figure 3: Role of NGO's and energy agencies as multiplicators and translators

2 Background, scope and objectives

2.1 Background

Cities and municipalities are the main drivers of our energy transition. Yet they are also in dire need of methods, tools and best-practice examples on how to shape this energy transition together with their citizens while avoiding common pitfalls. The IEA Cities Task 2 joins international expertise and knowhow in this field and aims to transfer this expertise and knowhow to cities and municipalities.

2.2 Scope

The IEA Cities Task 2 (“Data for urban energy planning”) focusses on

- data and
- methods and tools using these data
- for applications and services
- executed and / or operated by cities, municipalities and their representatives
- in the wider field of urban energy planning.

Urban energy planning may include all energy vectors (e.g., heat, cold, electricity, mobility) with all their technical and non-technical (e.g., economic, legislative) aspects. It may furthermore include energy-related aspects such as energy poverty, education of citizens on energy and communication on energy-related issues.

The IEA Cities Task 2 aims to provide an overview of this field while providing deep dives on selected topics with the focus on the R&D community respectively on the city and municipality perspective. Furthermore, we aim to provide the following types of deliverables:

"Landscape" Deliverables
These provide an overview of a broad topic and are aimed at supporting cities and stakeholders new to urban energy planning. These deliverables outline foundational concepts, such as types of data, families of methods, and general use cases where data can support energy planning. By creating a shared understanding of current practices, these deliverables enable cities to e.g. exchange good practices, accelerate the use of data-driven methods, and standardize perspectives across countries and regulatory frameworks. They are contributed by multiple partners from different countries to offer a global view that transcends local regulations.

- Purpose: Facilitate introduction and standardization of topics for city officials and planners.
- Update Frequency: Produced once and reviewed every few years to remain current with evolving practices.

"Focus On" Thematic Deliverables

These deliverables dive into specific issues or challenges related to urban energy planning and are more targeted at an expert level. For example, the deliverable could explore “building level data” or “barriers to data sharing.” They provide in depth exploration through reports, presentations, and workshops. Additionally, they may spark new collaborative projects by identifying key issues or opportunities within a particular subdomain.

- Purpose: Address detailed aspects of urban energy planning through specialized topics to foster collaboration and problem-solving.
- Format: Can be reports, presentations, or meetings; flexible in content delivery.

"Cross-Fertilization" or "Cross-Country" Deliverables

These highlight comparative studies across countries or regions, showing how different regulatory or geographical contexts affect energy planning outcomes. Such deliverables analyze topics like the potential for renewable energy or the impact of local regulations on data usage. By showcasing the diversity of solutions and the different barriers faced, these deliverables help identify best practices adaptable across varying contexts.

- Purpose: Enable knowledge transfer between countries, emphasizing the impact of diverse regulatory and technical environments on urban energy outcomes.
- Format: Cross-country reports, atlases, or policy briefs.

2.3 Objectives

The IEA Cities Task 2 pursues the following objectives:

- Provide a comprehensive overview of the need and potential of energy-related data for urban energy planning
- Promote the exchange of experience, knowledge, best practices and use cases for data-driven urban energy planning
- Facilitate the discourse on legal, regulatory and socio-economic aspects of urban energy planning
- Identify scientific, regulatory and data-related gaps as well as implementation and research needs
- Establish a knowledge hub in the context of the Task 2 topic, benefiting cities, municipalities and other stakeholders

2.4 Target groups

The primary target groups are cities and municipalities as well city-related public authorities and ministries. Regional, national and international organizations representing cities and municipalities are considered as primary target groups as they may function as multiplier and linkage to cities and municipalities.

Further target groups are:

- Citizens
- Energy and technology suppliers
- Planners, engineering companies

2.5 Deliverables

- Subtask 1
  - Summary documentation of all use cases
- Subtask 2
  - Report on classification of methods, tools and services
- Subtask 3
  - Documentation comprehensive data needs and data sources framework, the urban energy planning data mapping tool and best-practice methods, standards and technology for data acquisition, storage and improvement for urban energy systems
- Subtask 4
  - Documentation Compilation of best-practice examples, procedures and recommendations in the context of "Regulatory framework", “Economic aspects” and “Data management and governance for cities”
- Subtask 5
  - Communication package
  - Training package including training materials, guides, recording of webinars

3 Work plan

3.1 General

Task 2 is divided into 5 subtasks (see Figure 1):

- *Subtask 1: Use cases*
  - Subtask 1 deals with concrete use cases in various fields of urban energy planning. These topics can range from energy poverty, citizen participation, planning processes to municipal heating/cooling plans. The examples are characterized by the fact that they are already being used by cities, municipalities and public bodies. They provide the main reference point for cities and municipalities to the project.
- *Subtask 2: Methods, tools & services*
  - Subtask 2 deals with methods, tools and services that are necessary for the realization of the examples in Subtask 1 or with further use cases. These include web applications, digital twins and scenario comparison tools.
- *Subtask 3: Data*
  - Subtask 3 deals with, among other things, available (inter)national data sources, methods for data acquisition, collection, storage and improvement of data quality, data management plans for cities and framework conditions for handling data.
- *Subtask 4: Non-technical framework*
  - Subtask 4 deals with legal aspects (e.g., data authorship, data security) and interfaces (e.g., compatibility for reporting obligations, ISO standardization) as well as economic aspects (e.g., possible services, private / public - private business models, property rights and IPR).
- *Subtask 5: Dissemination*
  - Subtask 5 deals with general & scientific dissemination as well as dissemination for and interaction with cities and municipalities, which is particularly important for the Cities TCP and Task 2, e.g. through brochures / fact sheets as well as information and training material.

3.2 Subtask 1: Use Cases

3.2.1 Scope

Subtask 1 focuses on actual use cases in the field of urban energy planning, either implemented and operational or in the startup phase. These use cases should directly support the activities of cities and municipalities, reduce workload and simplify complexity while addressing by preference the upcoming challenges in our energy and climate transition. The aim here is to analyze and evaluate e.g., the main elements, drivers, organizational setup, supporting and adverse boundary conditions and to derive the essentials for other cities and municipalities to replicate the use cases and applications.

3.2.2 Overall objectives Subtask 1

To collect, analyze and evaluate use cases in the field of urban energy planning in the categories of:

- Planning & designing
- Monitoring & observing
- Steering & deciding
- Communicating & reporting

3.2.3 Organisational structure Subtask 1

- Lead / Co-Lead Subtask 1: AEE INTEC
- Lead / Co-Lead Work Item 1.1: AEE INTEC
- Lead / Co-Lead Work Item 1.2: AEE INTEC
- Lead / Co-Lead Work Item 1.3: AEE INTEC
- Lead / Co-Lead Work Item 1.4: AEE INTEC
  Lead / Co-Lead Work Item 1.5: AEE INTEC

3.2.4 Work item 1.1: Use cases on “Planning and designing”

Objective:

- Collection and analysis of use cases in the field of urban energy planning

Activity:

- Collection of use cases with a focus on "Planning and designing”
- Creation of fact sheets for each use case with the main statements for further dissemination
- Analysis and evaluation of the use cases in terms of prerequisites, lessons learnt and replication potential

Deliverables:

- Fact sheets of all use cases
- Documentation analysis & evaluation use cases

3.2.5 Work item 1.2: Use cases on “Monitoring & observing"

Objective:

- Collection and analysis of related use cases on "Monitoring & observing"

Activity:

- Collection of use cases with a focus on "Monitoring & observing"
- Creation of fact sheets for each use case with the main statements for further dissemination
- Analysis and evaluation of the use cases in terms of prerequisites, lessons learnt and replication potential

Deliverables:

- Fact sheets of all use cases
- Documentation analysis & evaluation use cases

3.2.6 Work item 1.3: Use cases on "Steering & deciding"

Objective:

- Collection and analysis of use cases on "Steering & deciding"

Activity:

- Collection of use cases with a focus on "Steering & deciding"
- Creation of fact sheets for each use case with the main statements for further dissemination
- Analysis and evaluation of the use cases in terms of prerequisites, lessons learnt and replication potential

Deliverables:

- Fact sheets of all use cases
- Documentation analysis & evaluation use cases

3.2.7 Work item 1.4: Use cases on "Communicating & reporting"

Objective:

- Collection and analysis of use cases on "Communicating & reporting"

Activity:

- Collection of use cases with a focus on "Communicating & reporting"
- Creation of fact sheets for each use case with the main statements for further dissemination
- Analysis and evaluation of the use cases in terms of prerequisites, lessons learnt and replication potential

Deliverables:

- Fact sheets of all use cases
- Documentation analysis & evaluation use cases

3.2.8 Work item 1.5: Comparative analysis and evaluation of use cases

Objective:

- Comparative analysis and evaluation of all use cases

Activity:

- Comparison and further analysis and evaluation of use cases
- Summary, documentation & dissemination of results

Deliverables:

- Summary documentation of all use cases
- Dissemination materials

3.2.9 Milestones Subtask 1

No.	Description	ref. to WI	Month due
MS.1.1	Collection Use cases on “Planning & designing" completed	1.1	18
MS.1.2	Collection Use cases on "Steering & deciding” completed	1.2	18
MS.1.3	Collection Use cases on “Monitoring & observing" completed	1.3	18
MS.1.4	Collection Use cases on “"Communicating & reporting" completed	1.4	18

MS.1.5	Comparative analysis and evaluation of all use cases	1.5	42

3.2.10 Deliverables Subtask 1

No.	Description	ref. to WI	Month due
D.1.1	Fact sheets of use cases	1.1 – 1.4	12
D.1.2	Documentation analysis & evaluation use cases	1.1 – 1.4	36
D.1.3	Summary documentation of all use cases	1.5	48
D.1.4	Dissemination materials	1.5	48

3.3 Subtask 2: Methods, Tools and Services

3.3.1 Overall objectives Subtask 2

- Which methods and tools exist to make use of available qualitative and quantitative data, to satisfy the needs of policy makers and other users?
- Which services can be enabled with this data?

3.3.2 Organisational structure Subtask 2

- Lead / Co-Lead Subtask 2: EIFER / EHU
- Lead / Co-Lead Work Item 2.1: EIFER / EHU
- Lead / Co-Lead Work Item 2.2: EIFER / EHU
- Lead / Co-Lead Work Item 2.3: EIFER / EHU

This subtask aims to reflect activities in daily life of working within local authority / municipalities dealing with energy data.

3.3.3 Work item 2.1: The panorama of methods, tools and services

Objective: The goal is to draw the global panorama of methods and tools: which families of methods is used to address various use cases.

Activities:

- State-of-art methods: “what”, for instance: spatial analysis, statistical learning, modelling of demand, disaggregation of statistical data, prediction of energy demand),
- Linking to use cases: “why” this method/tool is used, e.g.
  - estimation of building energy demand can be used to plan heat networks, set up priorities for refurbishments,
  - estimate the potential for renewable deployment)

  These analyse required data (what they need as input, for instance: estimation of building energy demand requires data on the structure of the building, energy carriers used for heating, typology of usage […]).
- Provide synthesis of the state of art providing key challenges, references and usages example.

This synthesis includes methods on energy Hubs / energy Communities, energy planning at the building-level, Heat network planning, energy demand or on monitoring of energy and GHG at city level.

Deliverable:

- Collection of factsheets on each method and tool analysed during the project
- Comparative report of main (fields of) methods and tools

3.3.4 Work item 2.2: Diagnosis

Objective: this work item will focus on available methods to assess the current situation, which includes the assessment of energy demand, system and production.

Activities:

The starting point for the planning process is to define the current situation in order to develop severable pathway and scenario. To achieve this, different approaches can be used standalone or combined such as statistical spatial analysis, spatial analysis or energy system modelling,

In certain cases, the **estimation of missing data** in existing datasets is needed and methods to disaggregate statistics at local level or to assess local energy consumption are needed.

For example:

- Estimation of the housing stock's characteristics: AI statistical learning to learn the correlation between building characteristics and energy consumption and extrapolate to other buildings.
- Estimation of missing data in energy consumption/production: methods for interpolation, learning of thermal sensitivity.
- Methodologies to consolidate energy & GHG emissions: avoid double counting, apply, normalization of methods and EU and international level (IPC)
- Disaggregation methods, to obtain monthly/hourly demand values from aggregated yearly consumption, based on building characteristics, historical data, or climate conditions

Deliverable:

- Comparative report based on factsheets about each method and tool related to diagnosis

3.3.5 Work item 2.3: Forecasting

Objective: this work item will focus on available forecasting methods to assess future situation, which includes the assessment of energy demand, system and production. Forecasting includes simulation, forecast modeling, what if scenario; all methods which looks in the future.

Activities:

There are several methods and tools at local scale to support decision maker in energy planning, including solutions for local production of energy (heat, PV, thermal solar), local resources (waste heat, biomass, geothermal, […]), energy efficiency (thermal insulation), decarbonization (substitution of energy carriers), energy storage (heat tank, seasonal storage, second life batteries, etc). Such a local energy system can be optimized regarding several objectives: energy efficiency, cost, decarbonization, social equity, self-consumption […].

The main activity will review current tool and method data oriented to help forecasting on energy demand. For example:

- methods based on the statistical learning (AI) on past energy consumption, identification of correlations,

- methods based on the expert modeling of energy consumption and production

Deliverable:

- Comparative report based on factsheets about each method and tool related to forecasting

3.3.6 Work item 2.4: Participatory energy planning, communication and stakeholder interaction

Objective:

Develop overview and evaluation of methods and tools which help to collect data from participative approaches and allow for a) communication and b) interaction with stakeholder in order to collect their feedback.

Activities:

- Collection of methods and approaches for participatory energy planning, communication and stakeholder interaction
- Creation of fact sheets of methods and approaches for participatory energy planning, communication and stakeholder interaction
- Analysis and evaluation of methods and approaches for participatory energy planning, communication and stakeholder interaction

Deliverable:

- Comparative report on methods and approaches for participatory energy planning, communication and stakeholder interaction

3.3.7 Work item 2.5: Classification of methods, tools and services

Objective:

- To collect and classify methods, tools and services in order to support expert and decision maker to use appropriate method according to their question and their data availability.

Activities:

- Analysis, evaluation and summary of the previous work items
- Decision Tree to support methods choice
- Typology based on canvas (example – non in the figure below)

Table 1: Example categorization canvas

Methods / approaches	Tools / Services	Diagnosis - Present	Forecasting - Future	Interactive - Participative
Spatial modelling	Arcgis	Atlas	Spatial analysis (urban sprawl)	- PPGIS - NIMBY
System modelling	Modelica	- Generation of synthetic data (subtask 3) - Digital twin	Simulation	Energy communities
Statistical approaches	Excel	- Generation of synthetic data (subtask 3) - Census	Forecasting trend	Survey
…	…			

Deliverables:

- Report on classification of methods, tools and services

3.3.8 Milestones Subtask 2

No.	Description	ref. to WI	Month due
MS.2.1	Documentation of the first factsheets collection period	2.1-2.4	12
MS.2.2	Documentation of the first factsheets collection period	2.1-2.4	24
MS.2.3	Report on Panorama	2.1-2.4	36
MS.2.4	Synthetic visuals for decision support	2.5	48

3.3.9 Deliverables Subtask 2

No.	Description	ref. to WI	Month due
D.2.1	Panorama of methods	2.1	M36
D.2.2	Methods for diagnosis	2.2	M42
D.2.3	Methods for forecasting	2.3	M42
D.2.4	Methods and approaches for participatory energy planning, communication and stakeholder interaction	2.4	M42
D.2.5	Report on classification of methods, tools and services	2.5	M48

3.4 Subtask 3: Technology, methods and tools for Data

3.4.1 Overall objectives Subtask 3

Support cities with knowledge to establish the necessary data infrastructure which can accelerate the energy transition in a sustainable, affordable and just manner.

3.4.2 Organisational structure Subtask 3

- Lead / Co-Lead Subtask 3: TNO
- Lead / Co-Lead Work Item 3.1.: TNO
- Lead / Co-Lead Work Item 3.2.: TNO

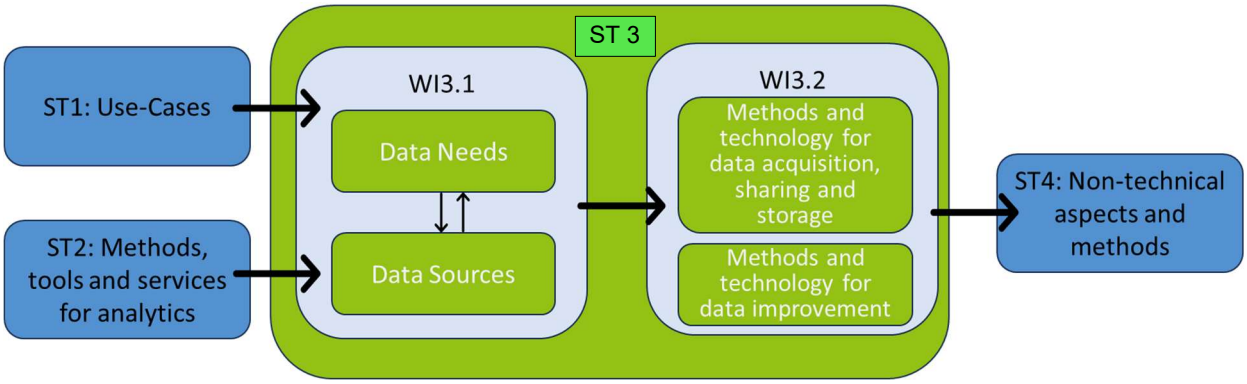


Figure 4: Origin of data and information for Subtask 3 and processing

3.4.3 Work item 3.1: Mapping and matching data needs and data sources

Objective:

Establish and share improved understanding about the data needs and supply for sustainable urban energy systems. For this objective we collaborate efficiently and effectively with ST1 (use-cases) and ST2 (methods, tools and services for analytics) to derive the data needs.

Activity:

- Identify a must-have and nice-to-have **data needs framework** for sustainable urban energy systems. This includes data type and data quality needs. The data needs are derived via collaboration with ST1 and ST2 and a set of to be determined cases or case cities. Examples of suitable cases are The Spatial Energy Planning initiative in Austria working with a standardized data model and the framework for municipal data needs in the heat transition in the Netherlands.
- Identify a must-have and nice-to-have **data sources framework** for sustainable urban energy systems. The data sources are derived via collaboration with WI1 and WI2 and a set of to be determined cases or case cities. For this activity we also report and synthesize the data sets generated in the IEA TCP network which are relevant for urban energy planning.

- Combine these frameworks in a comprehensive **demand-supply data framework,** in which the data needs are linked to the data sources.
- Translate this comprehensive framework into a useful and useable tool (working name: **the urban energy planning data mapping tool**) for cities to structurally collect and utilize urban energy system relevant data sources.

Deliverables:

- Documentation of the comprehensive data needs and data sources framework with the must-have and nice-to have data.
- Documentation of the urban energy planning data mapping tool shared via the UTMC platform.

3.4.4 Work item 3.2: Methods and technology for data acquisition, exchange, storage and improvement

Objective:

- support cities with improved knowledge and resources (methods and technology) for effective, efficient and responsible data acquisition, storage and improvement methods relevant for urban energy systems.

Activity:

- Conduct research on best practice methods, standards and technology for data acquisition, storage, exchange and improvement for urban energy systems and establish an easily-accessible inventory with these methods (e.g. through fact sheets). We collect, study and share: Best-practices on Extract, Transform, and Load (ETL) processes, to merge or link data from several sources. ETL cleans, organizes and prepares raw data for storage and utilization in analytics.
- Best practices on data standards for data integrity and interoperability. This is crucial to break down data silos and improve the ability of cities to exchange data between separate systems or organizations (Government2Government, Business2Government, Business 2Citizen, Government2Citizen).
    - Technical information on buildings or assets: CityGML for building, CityGML/ADE for energy data, 2IM standards.
    - Organizational principles for the sharing of data: FAIR principles for the sharing and documentation of open data, REST webservices, open-source tools (e.g. adok for geocoding), etc.
    - Frameworks of KPIs to collect and compare datasets between locations and over time, with meaningful yet feasible indicators derived from leading and large scale initiatives such as SECAP in EU and Covenant of Mayors.

- Best practices on technologies for responsible data sharing (G2G, B2G, B2C, G2C). This includes privacy enhancing technologies, such as Multi-Party Computation and Federated Learning. Moreover, we look into the application of Data Spaces for Urban Energy planning and draw lessons from the EU Energy Data Space.
- Methods for the acquisition of data in low data contexts (e.g., no cadastre, few surveys, no metering of energy consumption, no registries for refurbishment or deployment of installations…). Examples are:
    - Spatial analysis methods based on spatial data. An example is AI methods for image recognition for aerial picture, thermography or satellite images, to detect buildings/PV production/AC units/GHG emissions.
    - Disaggregation methods to turn statistical data into local estimations.

Deliverables:

- Documentation on best practice methods, standards and technology for data acquisition, storage and improvement for urban energy systems
- Accessible fact sheets on methods and technologies for cities, made available through the UTMC platform.

3.4.5 Milestones Subtask 3

No.	Description	ref. to WI	Month due
MS.3.1	Structure demand-supply data framework available	3.1	12
MS.3.2	Draft urban energy planning data mapping tool available	3.1	24
MS.3.3	First overview Best-practices on Extract, Transform, and Load (ETL) processes available	3.2	12
MS.3.4	Draft overview available on “Best practices on data standards for data integrity and interoperability”	3.2	24
MS.3.5	Draft overview available on “Best practices on technologies for responsible data sharing“	3.2	36
MS.3.6	Draft overview available on “Methods for the acquisition of data in low data contexts”	3.2	48

3.4.6 Deliverables Subtask 3

No.	Description	ref. to WI	Month due
D.3.1	Documentation of the comprehensive data needs and data sources framework with the must-have and nice-to have data.	3.1	12

D.3.2	Documentation of the urban energy planning data mapping tool shared via the UTMC platform.	3.1	24
D.3.3	Documentation on best practice methods, standards and technology for data acquisition, storage and improvement for urban energy systems	3.2	36
D.3.4	Accessible fact sheets on methods and technologies for cities, made available through the UTMC platform.	3.2	48

3.5 Subtask 4: Non-technical aspects and methods

3.5.1 Overall objectives Subtask 4

To assess the non-technical aspects in the field of data for urban energy planning and to give recommendations for methods and tools which contribute in the improvement and accelerated roll-out in cities.

3.5.2 Organisational structure Subtask 4

- Lead / Co-Lead Subtask 4: AEE INTEC, TNO (Co-Lead)
- Lead / Co-Lead Work Item 4.1: Urban Energy System Data Management and Governance
- Lead / Co-Lead Work Item 4.2: Organization Governance and Regulatory Framework
- Lead / Co-Lead Work Item 4.3: Economic aspects

3.5.3 Work item 4.1: Urban Energy System Data Management and Governance

Objective:

- Support cities in establishing effective and responsible data management and governance frameworks which enables them to utilize data accordingly for the planning and implementation of sustainable urban energy systems.

Activity:

- We study best practices for data management and governance frameworks applicable to urban energy systems. To start, we record and categorize standards and interface specifications (e.g. compatibility for reporting obligations, ISO standardisation) in the handling of data for urban energy planning.
- We compile best practice examples, procedures and recommendations in the Data Management and Governance framework (e.g., Compatibility for reporting obligations, ISO standardisation).
- We establish and test a model Urban Energy System Data Management and Governance template for cities.

Data management describe how data will be generated and/or used in a certain project or activity, while data governance describes how an actor in the city (e.g. government) uses its people, procedures, and technology to manage internal and external data.

A data governance framework or template is a collection of rules and policies that regulate how data is gathered, kept, and used in an organization. Data Management and Governance frameworks encompass:

- Data strategy, these are an organization's high-level operating norms and needs for data, which may reflect the culture of the organization.

- Data processes: every data governance system requires the establishment of crucial data management procedures, e.g. data exchange, data quality monitoring and testing, and issue tracking.
- Data policies encompass a range of topics, e.g. regulatory compliance, data storage requirements, data quality, and internal and external data exchange.
- Data literacy
- Communication and collaboration
- Data security

Deliverables:

- Documentation of the data management & governance framework template in a useable format for cities.
- Data management & governance framework

3.5.4 Work item 4.2: Organization Governance and Regulatory Framework

Objective:

Investigate the existing organizational governance models and the legal aspects for data usage in urban energy planning and derive recommendations for applicants and necessary improvements.

Activity:

- We assess and share organizational governance models which contribute to the continuous improvement of data quality, availability and use. These include processes for the consolidation of datasets from institutional sources (e.g. Cadastre), processes to propose public or institutions to improve faulty data, and processes to leverage crowd sourcing for data improvement.
- We record and categorize relevant regulatory and legal aspects (e.g. data author-/ownership, data security) in the handling of data for urban energy planning and relate them to relevant current and future national and international legislation in the energy domain and the digitalization domain.
- We compile best practice examples, procedures and recommendations on the legal and regulatory aspects (e.g. how to cope with national and international legislation such as energy domain legislation and digitalization legislation.).

Deliverables:

- Documentation of the organizational governance models and of best practice examples, procedures and recommendations in the context of the relevant regulatory framework.

3.5.5 Work item 4.3: Economic Aspects

Objective:

- To assess the economic potential and limitations of services, business models etc. in the field of urban energy planning

Activity:

- Recording and categorisation of possible services, spin-off/start-up ideas and private/public/private business models in the context of data for urban energy planning –
- Consideration of property rights and IPR in the context of data for urban energy planning
- Compilation of best practice examples, procedures and recommendations in the context of "economic aspects"
- Derivation of recommendations for changes in the context of "economic aspects"

Deliverables:

- Documentation Compilation of best practice examples, procedures and recommendations in the context of "economic aspects"

3.5.6 Milestones Subtask 4

No.	Description	ref. to WI	Month due
MS.4.1	Collection and first assessment “Best practices for data management and governance frameworks” completed	4.1	18
MS.4.2	Collection and first assessment “organizational governance models” completed	4.2	18
MS.4.3	Recording and categorisation “economic aspects” completed	4.3	18

3.5.7 Deliverables Subtask 4

No.	Description	ref. to WI	Month due
D.4.1	Documentation of the data management & governance framework template in a useable format for cities.	4.1	48
D.4.2	Documentation Compilation of best practice examples, procedures and recommendations in the context of "Regulatory framework"	4.2	48
D.4.3	Documentation Compilation of best practice examples, procedures and recommendations in the context of "economic aspects"	4.3	48

3.6 Subtask 5: Dissemination

3.6.1 Overall objectives Subtask 5

Subtask 5 focuses on the strategic dissemination of key findings from Subtasks 1-4, with the overarching goal being to deliver information and advice about the urban energy transition to target groups, including cities, communities, planners, citizens, and industry. This dissemination will occur through both general and scientific channels, with an emphasis on international coordination and collaboration. Key activities include organising special sessions and workshops in partnership with specialist conferences, committees, and the IEA Cities TCP secretariat, as well as direct cooperation with the IEA. Project participants will share the outcomes at international conferences and publish them in relevant journals.

In addition to general and scientific dissemination, Subtask 5 prioritises engaging directly with cities and municipalities —an essential aspect for the Cities TCP and Task 2. This will involve creating brochures, fact sheets, educational materials, and capacity trainings tailored to these audiences. A crucial element of this subtask is facilitating communication between researchers, developers, technicians, and urban stakeholders, effectively translating technical language into actionable insights. The Subtask will leverage on the established partnership between the Cities TCP and GCOM: its online platform will be a key dissemination channel.

3.6.2 Organisational structure Subtask 5

- Lead / Co-Lead Subtask 5: RVO / AEE INTEC
- Lead / Co-Lead Work Item 5.1: RVO / AEE INTEC
- Lead / Co-Lead Work Item 5.2: RVO / AEE INTEC
- Lead / Co-Lead Work Item 5.5: RVO / AEE INTEC

3.6.3 Work item 5.1: Defining a dissemination strategy

Objective:

- To develop a structured and effective dissemination and communication strategy that maximises the impact and reach of the project's results. This strategy will ensure that key findings are communicated clearly and persuasively to both technical and non-technical audiences, enabling the practical application of research outcomes and fostering broader engagement with the project's work.

Activity:

- Work Item 5.1 involves setting up a comprehensive protocol for the dissemination of key project results. This includes conducting a thorough analysis of the target audiences to ensure that the dissemination strategies are effectively tailored. The activity will identify and evaluate the most appropriate communication channels & materials to reach these audiences, and outline specific messaging tactics for different stakeholder groups,

ensuring that technical findings are translated into actionable insights for non-technical stakeholders like city planners and municipalities.

Deliverables:

- Dissemination Strategy Document (D.5.1) detailing target audiences, comms channels, messaging approaches, and a timeline for dissemination activities

3.6.4 Work item 5.2: Dissemination materials & activities

Objective:

- To produce engaging and informative dissemination materials that appropriately convey key findings and results to the target audiences.

Activity:

Creation & deployment of a variety of dissemination materials and activities. This includes content creation and material preparation tailored to different stakeholder groups. Key activities include:

- Production of videos and information materials that highlight Use Cases and experience reports from city representatives (notably collected through GCOM membership)
- Development of brochures and fact sheets that showcase existing examples of data utilisation in urban energy planning
- Coordination of publication strategies
- Integration of materials in the TCP website
- Participation in international conferences (e.g. special sessions)

Deliverables:

Communication Package (D.5.2): short videos featuring Use Cases ; factsheets, brochures and policy briefs on selected topics.

3.6.5 Work item 5.3: Capacity building for cities & municipalities

Objective:

- To increase capacity of cities and municipalities by equipping them with the knowledge, tools and strategies needed for effective urban energy planning and empower local governments to implement sustainable energy practices that contribute to decarbonisation, urban resilience, and quality of life.

Activity:

Work Item 5.3 is dedicated to enhancing the capacity of cities and municipalities in urban energy planning. This involves organising targeted workshops and webinars that focus on the specific

goals and tasks related to urban energy planning. These events will cover critical topics such as data requirements, tools, and methodologies that cities and municipalities can utilise to drive effective urban energy planning. Additionally, and to ensure the adequacy of the final products vs. actual capacity building needs, information and training materials will be created in collaboration (inter-)national NGOs (e.g. Cities Detox Heat, Global Covenant of Mayors, International Society of City and Regional Planners) and (inter-national) multipliers, such as energy agencies. These materials will guide cities and municipalities in using urban energy planning as a strategic tool to facilitate necessary changes and maintain a high quality of life.

Deliverables:

Training package (D.5.3): training materials, guides, recording of webinars.

3.6.6 Work item 5.4: Synergies with the other Tasks in the TCP and other IEA TCPs

Objective:

- To create and enhance synergies between the various Tasks within the TCP & IEA TCPs in general, enabling greater collaboration and a unified approach to urban energy planning and related goals.
- Maximize effectiveness by promoting knowledge exchange, reducing duplication of efforts, and fostering innovative solutions etc.

Activity:

Focused on fostering synergies and collaborative efforts between the various Tasks within the Technology Cooperation Programme (TCP) for Cities and other related TPCs. This involves organising joint activities (workshops and webinars) that bring together participants from different Tasks / TCPs and help to build and strengthen a network among the different Tasks within the TCP / IEA, facilitating ongoing knowledge exchange and collaboration. By developing this network, the project seeks to ensure that the various Tasks complement each other, leading to more integrated and impactful outcomes across the entire TCP / IEA.

Deliverables:

Framework for ongoing collaboration within the TCP / IEA, including a calendar of joint workshops, webinars, and network-building activities, along with a directory of key contacts and resources across the different Tasks

3.6.7 Milestones Subtask 5

No.	Description	ref. to WI	Month due
MS.5.1	Concept dissemination strategy available	5.1	4
MS.5.2	First version Communication package available	5.2	6

MS.5.3	First version Training package available	5.3	18
MS.5.4	First Framework for ongoing collaboration within the TCP / IEA available	5.4	9

3.6.8 Deliverables Subtask 5

No.	Description	ref. to WI	Month due
D.5.1	Dissemination Strategy Document	5.1	6
D.5.2	Communication Package	5.2	48
D.5.3	Training package including training materials, guides, recording of webinars.	5.3	36
D5.4	Framework for ongoing collaboration within the TCP / IEA	5.4	18

4 National contributions

Country	Organisation	Description of contribution	ref. to ST and WI
AUT	AEE INTEC	Municipal heat planning: Methods, workflows and practical experiences and examples	ST1, ST2, ST3, ST4
AUT	AEE INTEC	Remote sensing applications as data source for urban energy planning	ST1, ST2, ST3
AUT	AEE INTEC	Climate action plans for cities and municipalities	ST1, ST2, ST3
AUT	AEE INTEC	Monitoring concepts for CO_2 emissions, sustainability, etc.	ST1, ST2, ST3
AUT	AIT	Procedures and approaches from the projects: ▪ ASCEND: Development of integrated monitoring and evaluation methodology with the comprehensive set of KPIs to monitor and evaluate the performance of two demo-PEDs (PCEDs) in the lighthouse cities Lyon and Munich. This methodology covers the steps of data collection, data processing and cleansing, KPIs calculation and impact assessment. ▪ PLENTY-Life: Decarbonization of small and medium size cities demonstrated for seven pilot case-studies in four european countries (Austria, Italy, Portugal, Romania) ▪ DIGICITIES *data architecture for AUC1 the Zero Energy Building (ZEB) of the Neue Mittelschule (NMS) Enkplatz in Vienna, Austria (DEP)* ▪ Vitality City: full process that starts with data collection and culminates in an energy assessment using the developed tool. ▪ Goes: Use-case for the decarbonization of the Vienna City based on specio-temporal city energy modelling with focus on shallow geothermal energy	Tbd.
AUT	SIR	GEL S-E-P to PREP: Discussion of the Austrian approach for the implementation of spatial energy planning in the federal provinces of Austria from Data acquisition, through information generation to planning processes and regulatory framework	ST1, WI1.1
AUT	SIR	Energy Atlas: lessons learnt and making the model available for interested TCP partners. We would like to share	ST2, WI2.2

		our experience with data organisation for spatial energy planning as data use and data organisation in a centralised GIS platform.	ST3, WI3.1
AUT	SIR	Inventory analysis: lessons learnt on how an automated report for urban energy planning could support the urban planning process for a sustainable energy transition. This inventory analysis has already proven its worth in municipal heating/cooling planning process.	ST1, WI1.4 ST2, W2.2
AUT	SIR	EnergyCompass – Heating Transition Check: lessons learnt from the development of an online tool focussing on citizens as end users of the tool. Key findings include effective data integration, user-centred design and a robust, adaptable methodology for reliable energy analysis and decision-making.	ST2, WI2.3
AUT	SIR	Energy accounting (EBU) lessons learnt from the development of an online platform focussing on citizens as end users. Key findings include effective energy data integration, user-centred design and a robust adaptable methodology.	ST2, WI2.3
BEL	KU Leuven	**Demonstrating the value of data for the optimal design of district heating networks:** • Our research group has developed an optimization framework for the design of DHNs (called PATHOPT). • The more details are available, e.g. on production and consumption (spatially and temporally), the more the cost and energy efficiency of the design can be improved without compromising demand satisfaction. • We can provide concrete values (e.g. X% cost improvement if this data is available). *Important: We are dependent on the provision of data (use cases) from other contributors to the city task.*	ST2, tbd.
GER	DLR-VE	GIS-Based Workflows for Urban Energy Optimization (FlexiGIS) Optimization of City Energy Supply: Heat and electricity optimization with respect to system cost, system autarky, and CO_2 emissions	Tbd.
GER	DLR-VE	Potentials for Geothermal Integration in Urban Areas Integration of Heat Pumps: Exploring the role of geothermal heat pumps in urban energy systems	Tbd.
GER	DLR-VE	Technological Options in Urban Energy Systems: Assessment criteria: e.g. cost, autarky, emissions // Technological comparison: geothermal individual heat pumps, air source individual heat pumps, district heating systems based on large scale heat pumps utilizing geothermal, river-water or air as heat source, PV vs. solar thermal, centralized energy storage vs. decentral energy storage	Tbd.

GER	DLR-VE	Flexibility in Urban Energy Systems: Provision by Municipal utilities: e.g. utilizing sewage water treatment for flexibility, incorporation of electric buses	Tbd.
GER	DLR-VE	Electrification of Heating and Mobility Impact on distribution grids: effects of increased electrification on energy infrastructure	Tbd.
GER	DLR-VE	Georeferenced Energy Data Energy data mapping: utilization of geospatial data for urban energy planning	Tbd.
GER	DLR-VE	Renewable Energy in Urban Areas: Integration strategies: incorporation urban renewable energy sources into existing systems	Tbd.
GER	DLR-SF	**Estimating building energy demands (primarily heat) from open data** Harmonization of datasets from various sources Filling data gaps using machine learning	ST2, WI2.2, WI2.3 ST3, WI3.1
GER	DLR-SF	**Identification of urban energy cells** Clustering buildings, Matching demand and supply	ST2, WI2.2, WI2.5
GER	DLR-SF	**Data availability for urban building energy modelling (UBEM)** Characterization of existing and expected open datasets in Germany (potentially other countries, too) Assessment of relevance for UBEM, identification of gaps	ST3, WI3.1
GER	SIZ energieplus	Use Cases of diversity → focus on methods, cooperation between communities and project developers, and outcomes for concepts: • District heating with large heat pump and wind farm • Use of waste heat from a data center • Waste heat industrial plant with seasonal large-scale heat storage • Rural district with biogas CHP plant • Mixed quarters in combination with an electrolyser and renovation and solar potential “Kommunale Wärmeplanung” Braunschweig	ST1, WI1.1, WI1.4

GER	SIZ energieplus	Methods of Data collection, Data generation if there is a lack of Data, and data processing (Python-Tool DHNx (fact-sheet)) Modelling/ Tools for planning and designing and simulation on district level and building level (Gis, Python, TRNSYS) Methods to forecast the energy demand, consumption and production Focus on heat network planning methods	ST2, WI2.1, WI2.2, WI2.3, WI2.4, WI2.5
GER	SIZ energieplus	Mapping and matching data needs and data sources → Which data is important for our work? What can we provide on which data framework? Methods for data management → acquisition, storage and improvement	ST3, WI3.1, WI3.2
GER	SIZ energieplus	Data sources and data policy in Germany	ST4, WI4.2
GER/FRA	EIFER	Infos coming	ST1, tbd ST2, tbd ST3, tbd ST4, tbd
ESP	University of the Basque Country	Sustainable Energy and Climate Action Plans for municipalities under 5000 inh.	ST1, ST2, ST3, ST4
ESP	University of the Basque Country	Energy Poverty Mapping: a GIS based methodology to map energy poverty	ST2, ST3
ESP	University of the Basque Country	Renewable energy potential assessment tools	ST1, ST2
ESP	University of the Basque Country	Enerkide: a toolbox to optimize the deployment roadmaps of Energy Communities	ST1, ST2, ST3
NLD	Quintel Intelligence	Energy Transition Model (ETM): lessons learnt and making the model available for interested TCP partners. The Energy Transition Model was developed to improve everyone's understanding of the energy system in order to make more substantiated plans.	ST2, WI2.1 ST3, WI3.1
NLD	TNO	Data Management Plan Templates for urban energy planning. This activity includes the collection of best practice templates among participating countries, studying these templates on the international applicability, and the	ST3, WI3.1 ST4, WI4.1

		establishment and publication of templates to be shared with TCP partners and interested cities.	
NLD	TNO	Collect and share best practice examples regarding organizational governance models and the legal aspects for data usage in urban energy planning among Dutch municipalities.	ST4, WI4.2
NLD	TNO	Hestia, a new model for the Netherlands to calculate the impact of energy transition policy on the built environment. We intent to share lessons learnt about the development of the modelling suite and the utilization in the Dutch practice.	ST2, WI2.1, WI2.3 ST3, WI3.1
NLD	TNO	Collect and study methods and technology for data acquisition, exchange, storage and improvement among TCP partners. From TNO we can provide information regarding techniques in the field of Privacy Enhancing Technologies (PETs) and the related Data Spaces concept.	ST3, WI3.2
NLD	RVO and TNO	Municipal Heating Plans as a use case. We share lessons learnt on data and analytics, in collaboration with cities such as Utrecht and Amsterdam. This encompasses for instance fact sheets on the data needs of decentral governments in the planning and execution of a sustainable heating & cooling transition. The latter is referred to as the demand-supply data framework in sub-task 3.	ST1, WI1.1 ST2, WI2.1, WI2.5 ST3, WI3.1
NLD	RVO and TNO	Heat Pump Data for Urban Energy Planning. We intent to share lessons learnt from the collection and processing of the data, and study the options to this data/insights from the data in the TCP.	ST2, WI2.1, WI2.2, WI2.3 ST 3, WI 3.1
NLD	RVO and TNO	Technology and cost data for district heating and cooling systems (fact sheets or catalogues). We look to enrich and validate this data with TCP partners.	ST3, WI3.1
NLD	AMS & TU Delft	Simply Positive: Lessons learnt and tools coming from the research project in the Netherlands, Italy, Romania and Austria, to further upgrade our modelling framework for the massive implementation of PV(T) systems. (funded by RVO) Share lessons about Flexposts: toolkit for PED implementation focussed on flexibility, together with Danish partner (funded by RVO)	ST2, WI2.1 ST3, WI3.1
NDL	Hanze University of Applied Science	Share lessons about Flexposts: toolkit for PED implementation focussed on flexibility, together with Danish partner (funded by RVO)	ST1, WI1.1
SWE	RISE	[RISE will contribute by supporting the collection and analysis of use cases in municipal heat planning and renewable energy integration. With expertise in energy system modelling and urban energy strategy development,	ST1, WI1.1

		RISE will document best practices, identify key success factors, and evaluate replication potential. This effort will focus on planning methodologies that address the integration of district heating networks, waste heat recovery, and long-term climate action goals.]	
SWE	RISE	RISE will contribute to the evaluation of use cases for monitoring and observing energy systems, emphasizing the role of digital tools and data visualization. Drawing from its experience in urban energy projects, RISE will document methods for GIS-based spatial analysis, real-time energy monitoring, and scenario evaluation to support informed decision-making at the municipal level. These efforts will highlight tools and workflows that enhance accessibility and interoperability for diverse stakeholders.	ST1, WI1.2
SWE	RISE	RISE will contribute to the documentation and analysis of diagnostic methods for assessing the current state of urban energy systems. This includes identifying and evaluating diagnostic approaches currently used in urban energy planning to analyse energy flows, infrastructure efficiency, and resource utilization. RISE will also: • Help preparing case studies that demonstrate how these methods have been applied in practical contexts, such as district energy systems or municipal heat networks. • Contribute with insights on integrating diagnostic outputs with GIS platforms to provide municipalities with spatially actionable data and highlight opportunities for efficiency improvements.	ST2, WI2.2
SWE	RISE	RISE will contribute to the evaluation and application of forecasting methods for predicting future urban energy scenarios. Leveraging expertise in energy system modelling, long-term scenario planning, and active contributions to projects like e-Flex in Sweden, RISE will document and assess forecasting methods used for projecting energy demand, renewable energy potential, and emissions trajectories at urban and municipal levels. RISE will also: • Provide examples of forecasting approaches integrated with decision-support tools, highlighting their application in strategic energy planning for cities and municipalities. • Contribute to the description of use cases illustrating how forecasting can inform investment priorities, policy-making, and operational strategies to achieve carbon neutrality and resilience goals.	ST2, WI2.3
SWE	RISE	RISE will contribute to the documentation and dissemination of participatory methods that enhance stakeholder engagement in urban energy planning. This includes identifying tools and techniques that cities can use to involve citizens, local businesses, and other stakeholders in co-developing energy strategies. RISE will also: • Support documenting case studies that illustrate how participatory approaches have influenced energy policy design and implementation, particularly in achieving buy-in and alignment with local priorities.	ST2, WI2.4

		• Contribute to the design of communication frameworks that integrate stakeholder input into municipal decision-making processes, ensuring transparency and inclusivity.	
SWE	RISE	RISE will contribute to documenting and disseminating best practices for data acquisition, exchange, storage, and improvement, drawing on its expertise and contributions to, among others, IEA EBC Annex 81 Subtask A (Open Data and Data Platform) and IEC SyC Smart Cities through the Swedish National Committee SEK. Specific contributions will include: • Sharing insights from the relevant publications from this Annex and IEC, such as the 'Guide on Data Platforms for Data-Driven Smart Buildings,' with a focus on enabling cities to implement open data frameworks and interoperable platforms. • Documenting best practices for data acquisition and quality improvement, including methods for linking diverse datasets to support urban energy planning and policy-making. • Providing recommendations on leveraging open data standards and platforms to improve accessibility and data sharing among stakeholders.	ST3, WI3.2
SWE	RISE	RISE will contribute to analysing and documenting best practices for regulatory frameworks, leveraging insights from its involvement in, among others, IEA EBC Annex 81 and EU data governance-related initiatives. Contributions will include: • Sharing findings from the 'Data Sharing Guideline for Buildings and HVAC Systems,' particularly regarding data authorship, privacy, and secure sharing protocols. • Providing recommendations on aligning urban energy planning practices with existing EU frameworks, such as GDPR and ISO standards, to ensure compliance and interoperability. • Contributing to best practices for regulatory improvements in municipal data handling, with a focus on balancing accessibility with data security and privacy.	ST4, WI4.1
SWE	RISE	RISE will contribute to the development of data governance frameworks, drawing from its work on EU data spaces and upcoming participation in the INSIEME project, which focuses on creating the EU Common Data Space for Energy. Contributions will include: • Sharing methodologies for applying FAIR principles in municipal data governance, based on RISE's involvement in EU-level initiatives. • Providing insights into data management strategies that ensure quality, interoperability, and compliance with	ST4, WI4.2

		privacy standards. • Developing templates for cities to adopt governance frameworks that enable secure, equitable, and efficient data sharing across stakeholders.	
SWE	RISE	RISE will contribute to assessing economic frameworks for data usage, focusing on business models and economic potential for municipal energy data initiatives. Specific contributions include: • Drawing on findings from EU data spaces and energy projects to evaluate the economic viability of open data platforms and public-private partnerships. • Providing case studies and recommendations on intellectual property rights (IPR) and their impact on data-sharing practices. • Exploring innovative business models that leverage energy data to create value for cities and stakeholders while ensuring fair access and compliance. • Incorporating insights from Life Cycle Assessment (LCA) to evaluate the environmental and economic implications of data-sharing infrastructure and energy initiatives, supporting sustainable decision-making.	ST4, WI4.3

5 Time schedule

IEA Cities Task 2																							
Starting date: 01.01.2025																							
End date: 31.12.2028																							
	2025												2026										
Activities	Jän.25	Feb.25	Mär.25	Apr.25	Mai.25	Jun.25	Jul.25	Aug.25	Sep.25	Okt.25	Nov.25	Dez.25	Jän.26	Feb.26	Mär.26	Apr.26	Mai.26	Jun.26	Jul.26	Aug.26	Sep.26	Okt.26	Nov.26	Dez.26
Subtask 1 Use cases																							
WI.1.1 Use cases on “Planning and designing”												D.1.1						M.1.1						
WI.1.2 Use cases on “Monitoring & observing"												D.1.1						M.1.2						
WI.1.3 Use cases on "Steering & deciding"												D.1.1						M.1.3						
WI.1.4 Use cases on "Communicating & reporting"												D.1.1						M.1.4						
WI.1.5 Comparative analysis and evaluation of use cases																								
Substask 2 Methods, tools and services																								
WI.2.1 The panorama of methods, tools and services												M.2.1												M.2.2
WI.2.2 Diagnosis												M.2.1												M.2.2
WI.2.3 Forecasting												M.2.1												M.2.2
WI.2.4 Participatory energy planning, communication and stakeholder interaction												M.2.1												M.2.2
WI.2.5 Classification of methods, tools and services to decision support																								
Subtask 3 Data																								
WI.3.1 Mapping and matching data needs and data sources												M.3.1 D.3.1												M.3.2 D.3.2
WI.3.2 Methods and technology for data acquisition, exchange, storage and improveme												M.3.3												M.3.4
Subtask 4 Non-technical aspects and methods																								
WI.4.1 Urban Energy System Data Management and Governance																		M.4.1						
WI.4.2 Organization Governance and Regulatory Framework																		M.4.2						
WI.4.3 Economic Aspects																		M.4.3						
Subtask 5 Dissemination																								
WI.5.1 Defining a dissemination strategy				M.5.1		D.5.1																		
WI.5.2 Dissemination materials & activities						M.5.2																		
WI.5.3 Capacity building for cities & municipalities																		M.5.3						
WI.5.4 Synergies with the other Tasks in the TCP and other IEA CTPs									M.5.4									D.5.4						
Working phase																								
Reporting phase																								

IEA Cities Task 2

Starting date: 01.01.2025
End date: 31.12.2028

Activities	2027												2028											
	Jän.27	Feb.27	Mär.27	Apr.27	Mai.27	Jun.27	Jul.27	Aug.27	Sep.27	Okt.27	Nov.27	Dez.27	Jän.28	Feb.28	Mär.28	Apr.28	Mai.28	Jun.28	Jul.28	Aug.28	Sep.28	Okt.28	Nov.28	Dez.28
Subtask 1 Use cases																								
WI.1.1 Use cases on “Planning and designing”												D.1.2												
WI.1.2 Use cases on “Monitoring & observing"												D.1.2												
WI.1.3 Use cases on "Steering & deciding"												D.1.2												
WI.1.4 Use cases on "Communicating & reporting"												D.1.2												
WI.1.5 Comparative analysis and evaluation of use cases																		M.1.5						D.1.3 D.1.4
Substask 2 Methods, tools and services																								
WI.2.1 The panorama of methods, tools and services												M.2.3 D.2.1												
WI.2.2 Diagnosis												M.2.3						D.2.2						
WI.2.3 Forecasting												M.2.3						D.2.3						
WI.2.4 Participatory energy planning, communication and stakeholder interaction												M.2.3						D.2.4						
WI.2.5 Classification of methods, tools and services to decision support																								M.2.4 D.2.5
Subtask 3 Data																								
WI.3.1 Mapping and matching data needs and data sources																								
WI.3.2 Methods and technology for data acquisition, exchange, storage and improveme												M.3.5 D.3.3												M.3.6 D.3.4
Subtask 4 Non-technical aspects and methods																								
WI.4.1 Urban Energy System Data Management and Governance																								D.4.1
WI.4.2 Organization Governance and Regulatory Framework																								D.4.2
WI.4.3 Economic Aspects																								D.4.3
Subtask 5 Dissemination																								
WI.5.1 Defining a dissemination strategy																								
WI.5.2 Dissemination materials & activities																								D.5.2
WI.5.3 Capacity building for cities & municipalities												D.5.3												
WI.5.4 Synergies with the other Tasks in the TCP and other IEA CTPs																								
Working phase																								
Reporting phase																								

6 Task management

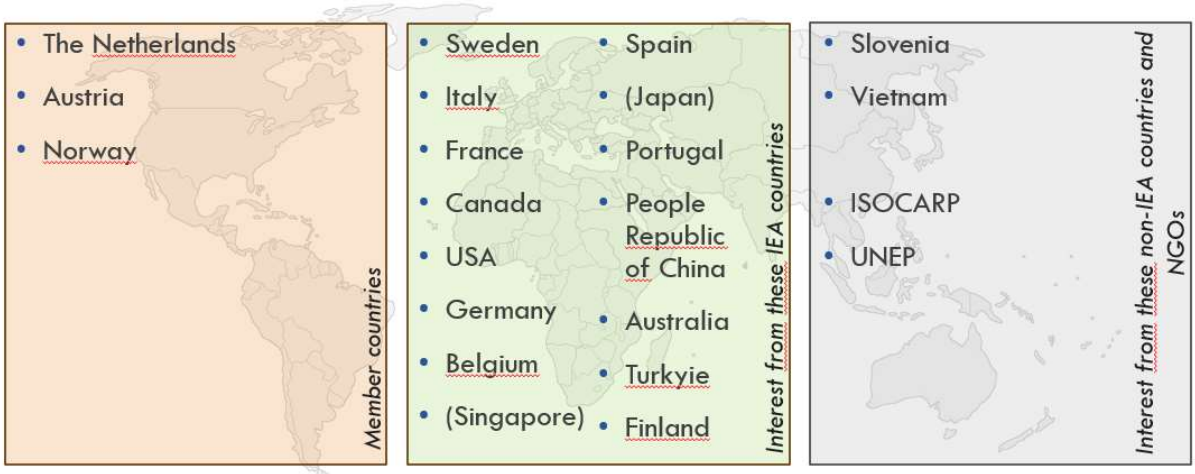
6.1 Task Manager and subtask leaders

Ingo Leusbrock (AEE INTEC, Austria) will take the responsibility as task manager.

The following institutions / persons were appointed as coordinators for the subtasks:

- ST 1 – Use Cases
  - AEE INTEC, Ingo Leusbrock, Austria
- ST 2 – Methods, Tools & Services
  - EIFER, Marie Sevenet & Samuel Thiriot, France/Germany
  - University of the Basque Country, Aitor Urresti, Spain
- ST 3 – Data
  - TNO, Devin Diran, The Netherlands
- ST 4 – Non-technical framework
  - TNO, Devin Diran, The Netherlands
  - AEE INTEC, Ingo Leusbrock, Austria
- ST 5 – Dissemination
  - RVO, Marion Bakker, Jeroen van Hemmen, The Netherlands
  - AEE INTEC, Ingo Leusbrock, Austria

6.2 Participating and interested countries



6.3 Contact details

Details task managers / subtask leads

Name	Organisation	Mail address
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Devin Diran	TNO Vector	Devin.diran@tno.nl
Marion Bakker	RVO	Marion.bakker@rvo.nl

7 Information and Intellectual Property

7.1 Executive Committee's Powers

The publication, distribution, handling, protection, and ownership of information and intellectual property arising from this Task shall be determined by the Executive Committee, acting by unanimity, in conformity with the Agreement.

7.2 Right to Publish

Subject only to copyright restrictions, the Participants shall have the right to publish all information provided to or arising from this Task, except proprietary information.

7.3 Proprietary Information

The Participants and the Task Manager shall take all necessary measures in accordance with this paragraph, the laws of their respective countries, and international law to protect proprietary information provided to or arising from this Task. For the purposes of this Task, proprietary information shall mean information of a confidential nature such as trade secrets and "know-how" (for example computer programs, design procedures and techniques, chemical composition of materials, or manufacturing methods, processes, or treatments) that is appropriately marked, provided such information:

1) Is not generally known or publicly available from other sources;
2) Has not previously been made available by the owner to others without obligation concerning its confidentiality;
3) Is not already in the possession of the recipient Participant without obligation concerning its confidentiality.

It shall be the responsibility of each Participant supplying proprietary information and of the Task Manager for appraising proprietary information, to identify the information as such and to ensure that it is appropriately marked.

7.4 Arising Information

All information developed in connection with and during activities carried out under this Task (arising information) shall be provided to each Participant by the Task Manager, subject only to the need to retain information concerning patentable inventions in confidence until appropriate action can be taken to protect such inventions.

7.5 Production of Relevant Information by Governments

The Task Manager should encourage the governments of all Agency Participating Countries to make available or to identify to the Task Manager all published or otherwise freely available information known to them that is relevant to the Task.

7.6 Production of Available Information by Participants

Each Participant agrees to provide to a Subtask Leader or to the Task Manager all previously existing information, and information developed independently of the Task that is needed by a Subtask Leader or by the Task Manager to carry out its functions under this Task, and that is freely at the disposal of the Participant and the transmission of which is not subject to any contractual and/or legal limitations:

- If no substantial cost is incurred by the Participant in making such information available, at no charge to the Task therefore;
- If substantial costs must be incurred by the Participant to make such information available, at such charges to the Task as shall be agreed between the Task Manager and the Participant with the approval of the Executive Committee.

7.7 Use of Confidential Information

If a Participant has access to confidential information that would be useful to a Subtask Leader or to the Task Manager in conducting studies, assessments, analyses, or evaluations, such information may be communicated to a Subtask Leader or to the Task Manager, but shall not become part of the reports, handbooks, or other documentation, nor be communicated to the other Participants, except as may be agreed, between the Subtask Leader or the Task Manager and the Participant who supplies such information.

7.8 Reports on Work Performed under the Task

The Task Manager shall, in accordance with Paragraph 9.7 above, provide reports of all work performed under the Task and the results thereof, including studies, assessments, analyses, evaluations, and other documentation, but excluding proprietary information; prepare the Task Brochure and updates to EBC Website.

7.9 Copyright

The Task Manager may take appropriate measures to protect copyrightable material generated under this Task. Copyrights obtained shall be the property of the Task Manager for the benefit of the Participants provided, however, that the Participants may reproduce and distribute such material. However, if it shall be published for profit, permission should be obtained from the Executive Committee.

7.10 Authors

Each Participant will, without prejudice to any rights of authors under its national laws, take necessary steps to provide the co-operation from its authors required to carry out the provisions of this paragraph. Each Participant will assume the responsibility to pay awards or compensation required to be paid to its employees according to the laws of its country.

8 References

Bundesministerium für Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie (BMK) (2024): Pionierstädte, Klimaneutrale Stadt. Available online at https://klimaneutralestadt.at/de/initiativen/pionierstaedte/, accessed on 13/02/2025.

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Österreichische Energieagentur – Austrian Energy Agency (2025): e5 Österreich – Programm für energieeffiziente Gemeinden. Available online at https://www.e5-gemeinden.at/, accessed on 13/02/2025.

9 Overview participants

Organisation	Name	Country	Role in task
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Aalborg University	Diana Moreno	DK	
Aalborg University	Meng Yuan	DK	
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AEE INTEC	Franz Mauthner	AUT	
AIT	Ghazal Etminan	AUT	
AIT	Shokufeh Zamini	AUT	
AIT	Gerhard Zotter	AUT	
BMK	Anna Wang	AUT	
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Climate KIC	Luise Fischer	EU, AUT	
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DENA	Ang YE	GER	
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DLR	Francesco Witte	GER	
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EIFER	Marie Sevenet	GER / FRA	Subtask lead
EIFER	Samuel Thiriot	GER / FRA	Subtask lead
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PoliMi	Alice Denaire	ITA	
PoliMi	Marianna Pozzi	ITA	
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SIR	Alexander Rehbogen	AUT	
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VTT	Francesco Reda	FIN	
Yes and More	Lieven Callewaert	CAN	
Yes and More	Dennis Kerkhoeven	NL	
ZHAW	Matthias Haase	CH	