Energy Transition Partnership

Draft Orientation Paper

Introduction

The energy system is crucial to the future prosperity and liveability of European cities. It provides a smart integrated system that is able to meet a city's energy demand in the most carbon and cost efficient way. A city's energy demand includes every day choices and activities pursued by its citizens and business as well as the operation of its supporting infrastructure to allow the city to operate effectively. This system needs to be secure, resilient, affordable, clean and sustainable.

If cities want to have a bright future that overcomes the challenges that they face, then they need to think carefully about how they develop their future energy system. Energy transition is a long-term structural change in energy systems aimed at developing a secure, affordable and climate friendly energy system better able to manage and balance dynamic patterns of supply and demand from a national and even European level right down to a local level. This must enhance both national and European energy security while ensuring energy equality: affordable energy accessible by all citizens.

The word "transition" alludes to the change from a present state to a future one. This undertaking consists of integrating innovative smart technology and control systems in order to help optimise the effective use of energy and minimise primary energy demand, through for example better control of energy use in buildings and the integration of city infrastructure and energy planning.

Composition of the Partnership

- Coordinators
  - Gdansk (PL)
  - London (UK)
  - Roeselare (BE)
- Partners representing Urban Authorities

    - Gothenburg (SE)
    - Navarra Nasuvinsa (ES)
    - Udine (IT)
    - Tilburg (NL)
    - Vaasa (FI)
    - Vidzeme Region (LV)
    - Warsaw (PL)
    - CEMR
    - EUROCITIES
- Partners representing Member States
    - France
    - Germany
- Partners representing the European Commission
    - DG REGIO
- Partners representing Stakeholders
    - EIB
- Observers
    - URBACT
- Secretariat
    - ECORYS

Context and Starting Position

- The energy transition requires a long-term structural change in our approach to energy systems, creating a more integrated and smarter energy system that is better able to manage and balance dynamic patterns of supply and demand at an EU, national and local level.
- The energy system is fundamental to enabling a successful and cost-effective energy transition in the EU. The future prosperity and liveability of European cities depend on creating a smarter, more integrated energy system at an EU, national and local level; a system that is secure, resilient, affordable, clean and sustainable.
- A system-level approach that will:
    - minimise energy demand;
    - diversify our energy sources;
    - maximise cost effective combinations of storage options;
    - deploy smart platforms, technologies and controls and management to:
        - create a more integrated, smarter and more decentralised energy system;
        - optimise use of secondary energy sources;
        - provide affordability and choice to consumers;
        - enable customers to be energy prosumers - both consumers and producers.

Major **challenges** of Energy Transition are:

- Implement the required Disruptive Approach;
- Create a new smart, integrated energy system with greater levels of decentralization – delivering a secure, resilient, clean, low carbon and affordable energy system;
- Introduction of the Circular Energy System: Reduce use, Reuse available secondary energy sources and then meet remaining energy demand with Renewable energy;

- Creating an energy market that recognises and rewards all players in enabling the transition to a flexible demand-led energy system;
- Realising the financial benefits that such an energy market would deliver at a building, community, district and city level;
- Enabling new players with new business models to enter the market, such as civic energy which involves people and communities or energy Co-ops that re-invest profits back into the community;
- Create a coherent and integrated regulatory framework that supports this transition at the EU, MS and local levels;
- To ensure on-going competitiveness of EU businesses and that EU businesses are part of the solution, generating jobs and economic activity;
- Transition needs to be aware and supportive of people and businesses;
- Gaining social/community involvement;
- Renewables are important part of the solution but need a system that can accommodate their intermittent nature and effectively integrate them;
- Ensure sustainable urban development plans and approaches, with energy masterplanning playing a key role;
- Integration with other UA Partnerships and other activities is essential;
- Gaining acceptance for impact on the local environment and its aesthetics;
- Common language between energy companies and cities and consumers and their involvement;
- Ensuring it addresses not compounds energy poverty;
- Ensuring it delivers energy security and resilience.

Major Energy Transition **bottlenecks**:

- Regulatory framework is holding back the transition;
- Incoherent existing energy systems on state and city levels;
- Lack of technical and financial knowledge and capacity to deliver the radical transition required;
- Lack of data and access to available data that can inform and enable appropriate and focused projects and programs;
- Low prices of and subsidies for fossil fuel energy;
- Low price of carbon in ETS and lack of price of carbon in non-ETS sectors effectively creates no market driver for low and zero carbon sources;
- Lack of involvement of consumers and communities, as well as DG Energy;
- Complex ownership structure of many types of buildings, both residential and non-residential;
- Lack of capacity for cost-effective and efficient energy storage solutions, both at the building and system level.

Opportunities

- Life cycle costs of the challenge – construction, management and operation – will help make the business case for action;
- To stimulate and catalyse the transition through effective regulation;
- To create a fair and level-playing for all solutions so most cost and carbon competitive solutions come through;
- Knowledge sharing and exchanging of best practice;
- To provide technical and financial support to deliver projects for smaller municipalities;
- Competitiveness of an unsubsidised energy market, a crucial component of driving innovation and price control;
- Continuing innovation and technology improvement;
- Easier access to the improved market opportunities that are created through regulation and the increasing price of carbon. Commercialisation of solutions and support to SMEs;
- Involvement of citizens in energy planning, and consumption choices;
- New financing tools/models and development of existing ones to specifically support cities to deliver the energy transition in their cities;
- Connection of Energy Transition to other policy domains e.g. housing, and recognition of the benefits it can deliver;
- User oriented innovation and technologies to ensure changes and opportunities are accessible and realised;
- Greater access to available data to better plan, manage and execute the transition.

Aims and Objectives: to create a Smart, Integrated Energy System that is:

- **Secure and Resilient** – An energy system that has a diverse and extensive range of energy sources that it has control over and storage capacity that it is able to utilise so that it is best able to meet the energy demand of its customers under as broad a range of circumstances as possible. This requirement of the system ensures that the design and configuration of the energy system allows it to mitigate against a diverse range of risks to energy availability ensuring that energy is available to as many of its customers as consistently as is possible.
- **Affordable, Fair and Equitable** – An energy system that makes effective use of energy utilising it as efficiently as possible so that its energy can be supplied to all its consumers with the same level of service and in the most cost-efficient way. This ensures that energy is supplied at a fair price that people can afford and at which business can maintain their competitiveness.
- **Clean and Sustainable –** An energy system that uses energy effectively by minimising demand, minimising wasted energy and then maximising the use of secondary and renewable energy sources to meet its remaining energy demand before utilising high-efficiency co-generation to meet the residual demand. It also minimises harmful gaseous and particulate emissions to the atmosphere to play an important role in improving air quality in cities.

This will be done by adopting a systems-level approach that creates a smart, integrated system of systems from the following four system components all considered and integrated through an extensive energy masterplanning process:

1. **Energy Sources, Production and Storage**:
    - Includes:
        - Renewable and non-renewable primary energy sources;
        - Environmental and waste/recoverable secondary energy sources;
        - All the conversion technologies that can be used in the production, use and re-use of energy (it includes pro-sumers);
        - Diverse range of mediums for storing energy.
    - There is a need to map the energy sources available to cities: clean and/or existing – residual waste streams, biomass, waste water, power plants, renewable – solar, wind, tidal, wave, biogas, geothermal, as well as secondary energy – air/water/ ground source – waste heat sources;
    - Need a balance between large and smaller companies;
    - Short term and long-term/seasonal storage, as well as size and capacity of storage;
    - Interplay between heat, electricity and hydrogen;
    - Financial recognition of role of storage in system balancing;
    - **Impact on Partnerships**:
        - Air quality;
        - Circular economy;
        - Housing.
    - **Possible results**
        - Incentivise utilisation of secondary energy sources and storage to drive down demand for primary energy and GHG emissions;
        - Create mechanism that actively encourages secondary heat to be made readily available to heat networks by those that are producing or housing it
        - Drive development of renewable energy capacity;
        - Support development of extensive storage systems: thermal, electrical and hydrogen;
        - Provide grid balancing, flexibility and effective integration of RES;
        - Market signal mechanisms that reward the value that demand side response provides to the network.

2. **Energy Distribution Networks**
    - Needed for supplying energy – heat and power – to consumers;
    - It is particularly important how they interconnect and support each other;
    - This is about how effectively energy is able to be utilised by capturing and distributing it from where it is sourced to where it is to be used this is relevant at an EU, national and city level and also considers how these systems can be inter-connected;
    - Integration of power, heat, gas, cooling and other networks is crucial for efficient operation;
    - Construction of new and adaption of existing distribution networks, especially in cities, where sub-surface utilities are already very congested; old cities are very difficult to lay new distribution infrastructure in but it is necessary so needs co-ordinating;
    - Need for co-ordinated programmes of delivery across utilities, including all types of infrastructure at building, site, estate, neighbourhood and district level;
    - Hierarchy for connection of existing and new energy sources, prioritising secondary and then renewable sources, zero connections;
    - Challenges of size and speed of urban development, minimising sprawl, and co-ordinating energy supply solutions.
    - **Impact on Partnerships**:
        - Land use;
        - Housing;
        - Circular Economy.

- **Possible results:**
  - Integration of power, heat and gas networks;
  - Two-way relationship between national and city level systems with each supporting and enabling flexibility of the other;
  - To create a market structure that encourages carbon efficient solutions for grid flexibility and the transition to a demand-led energy system.

3. **Smart Data Platforms, Controls and Energy Management**
   - Smart platforms and technologies enabling system flexibility by utilising data to optimise type and nature of energy consumption along with supply at a building and/or system level in order to balance the system;
   - The amount and timing of energy production and consumption is essential for system balancing and this provides the opportunity for a range of demand management and response activities to transition to a demand led energy system;
   - Long term energy planning for operation and evolution of the system;
   - Interplay between energy providers and energy consumers, using the network as the interconnector and within this how do we encourage consumers to be prosumers;
   - Planning for energy positive districts;
   - Energy management systems and decarbonised networks very important in addressing emissions from historical building stock where fabric improvements are not possible;
   - Energy tariffs, such as time-of-use, need to be created to influence and direct the market to reward demand-side management;
   - Smart meters, trading systems and aggregators enabling consumers to actively participate in demand-side management;
   - Data-base to provide intelligence for informing decarbonisation activity: energy data needs to be made available to cities from both an energy efficiency and supply perspective;
   - Roles and opportunities of virtual power plants;
   - Stand-by capacity cost and responsibility and process to prioritise clean low carbon solutions;
   - Position of privacy in the data platforms and how it can be secured on the platforms.
   - **Impact on Partnership:**
     - Digital Transition;
     - Public Procurement.
   - **Possible results:**
     - Utilisation of data, smart technologies and controls and energy management systems to optimise performance at a system and building level Development of positive market mechanisms to encourage producers and consumers to partake in active demand response activities.

4. **Energy Consumption**
   - When, how and how much energy consumers and their buildings and appliances use plays an important role in the optimisation of the energy system and they clearly need to be an integral part of it;
   - Consumers include residential, commercial, industrial and transport and can include pro-sumers as well as district heat networks and other various storage options as a way of consuming surplus energy and making available at a later date;
   - It is essential to minimise actual energy demand in a cost effective way so that as much of remaining energy demand as possible can be met by secondary and renewable energy sources;

- Improve building regulations' specifications and quality requirements for place and building design requirements to help address overheating issues;
- Educate consumers to use their buildings in the optimum way (as they were designed to be used);
- Energy platforms to support people to undertake energy efficiency work on buildings – e.g. technical support financial support tax relief or credits for doing EE;
- Role of cities in education of citizens and explaining and raising awareness of the benefits of energy efficiency and low carbon energy supply and recognising the role of higher level administration for supporting this process;
- Gamification to support awareness raising, for energy efficiency and low carbon energy generation, this could include water and waste;
- Educate consumers about the opportunity to be prosumers and financial benefits of this;
- Address transport systems along with industrial and commercial consumption
- Integrated urban spatial planning, including energy masterplanning, ensuring it anticipates location and quantum of increasing energy demand associated with population growth.
- **Impact on Partnerships**:
  - Housing;
  - Digital Transition;
  - Urban Poverty.
- **Possible results:**
  - Market mechanisms to accelerate roll-out of extensive energy efficiency activity as a fundamental role in reducing demand for primary energy and GHGs;
  - Citizens understand the need for and nature of the energy transition;
  - Citizens understand and actively engage in energy efficiency and low carbon energy generation activities.

The Levers for affecting change and enabling the Energy Transition (ET) through this Partnership:

- **Regulation** – We will explain the context of this and its role in the ET;
- **Financing** – We will explain the context of this and its role in the ET;
- **Knowledge Transfer** – We will explain the context of this and its role in the ET.

The Relevance of the Three Levers to the four System Components identified

1. **Energy Sources, Production and Storage** – Context and contribution to the Energy Transition
   a. **Regulation** – Context and role in catalysing ET in cities
   b. **Financing** – Context and role in catalysing ET in cities
   c. **Knowledge Transfer** – Context and role in catalysing ET in cities

2. **Energy Distribution Networks** - Context and contribution to the Energy Transition
   a. Regulation – Context and role in catalysing ET in cities
   b. **Financing –** Context and role in catalysing ET in cities
   c. Knowledge Transfer – Context and role in catalysing ET in cities

3. **Smart Data Platforms, Controls and Energy Management** - Context and contribution to the Energy Transition
   a. **Regulation –** Context and role in catalysing ET in cities
   b. **Financing –** Context and role in catalysing ET in cities
   c. **Knowledge Transfer** – Context and role in catalysing ET in cities

4. **Energy Consumption -** Context and contribution to the Energy Transition

a. **Regulation –** Context and role in catalysing ET in cities
b. **Financing –** Context and role in catalysing ET in cities
c. **Knowledge Transfer** – Context and role in catalysing ET in cities

How do each of these identified areas interact with the four system components? How can they help deliver each of them and how can they add value to them?

Areas	**Sources, Production and Storage**	**Distribution Networks**	**Smart Data Platforms, Controls and Management**	**Consumption**
Technologies and smart transition				
Integrated neighbourhood energy sufficiency				
Policy development				
Integrated planning and development				
Environmental and clean transition				
Economy and affordable transition				
Social and cultural transition				

Energy Transition essentials

- Efficient and feasible **local regulations** in addition to the EU Directives and national regulations;
- **Renewables** are essential part of the solution but need to be well integrated through the use of district heat networks and various storage options;
- Sustainable **urban development requires** integrated plans and approaches, including Energy MasterPlanning;
- Link to different topics and other UA **Partnerships** is essential;
- **Civic energy** involving people and community, social responsibility and gaining community involvement;
- Responsible transition is supportive of **people** and **businesses** and enables businesses to benefit from the **market opportunities** that it creates;
- **Common language** between energy companies, EU, MS, cities and consumers;
- **Life cycle costs** of the challenge need to be understood – construction, management and operation of the system (Capex and Opex).

Energy Transition Spatial Dimensions and actors

- Europe / businesses / EU;
- State / Member State governments;
- Regions / Regional governments;
- City / Municipalities;
- Neighbourhood / Local initiatives;
- Building / Building administrations;
- Dwelling / Citizens.

Energy as binder and enabler of other partnerships, especially:

- Housing;
- Digital Transition;
- Air Quality;
- Climate Adaptation;
- Urban Mobility;
- Urban Poverty;
- Circular Economy;
- Sustainable Land Use.

Focal points:

- **Mapping** energy transition needs, bottlenecks and solutions including those identified by other UA **Partnerships** ;
- **Mapping** of existing Energy Transition legal, financial and technological **solutions** EU wide, both on European, national, city, neighbourhood and micro scale as a starting point for further investigations;
- Concentration of **urban** related energy issues, especially housing, mobility, infrastructure, security, market and planning;
- Identification of available energy transition **funds, technologies and practices**, identify existing and potential bottlenecks and potential solutions;
- Suggesting **solutions** to enhance the Europe wide Energy Transition, especially from a regulatory and financing perspective.