Draft Version

The energy transition and the cities.
A risky demand for a social and technological change?

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1. Introduction: energy transition as fragmented process

Despite the International Agenda suggestions and alarming data, the carbon-dioxide emissions are still arising at a global scale. Whilst in Europe they have decreased thanks to both green practices' usages and heavy activities' relocation in extra-European countries, in other parts from globe these emissions are still increasing. If agro-food innovations, smart transports, green industrial structures are the recurrent sectors recalled to drive this change, at the same time, cities are considered as the principal places producing the heaviest ecological footprint at a global scale and, consequently, they are thought as crucial key elements to reduce it. Cities are privileged laboratory of change where experimenting *adaptive and mitigate international instruments*, whose concrete actions are embedded in the concept of *energy transition* (Rutter and Keistead, 2012). Energy transition is a very used word, expressing the passage towards a form of energy provision, distribution and consumption to be essentially based on renewable sources. Besides, this word often indicates an entire unique socio-technical process - although at a deeper concrete look, it shows diverse niche transformations at different territorial scales, experienced by diverse social, economical, political sectors. In this sense, it is an up-valued concept and an under-valued word. By observing smaller territories, divergent niche aspects emerge from the overall energy question and social theories are also challenged by the arising of new and various energy transition processes: in fact, both social practices and territorial experiments show how energy question is actually crossed by heterogeneous paths. Cities do not remain the special unique entities expected to shape this transition, in spite of being urban laboratories by the highest concentration of technological and social innovations. The idea about an unique energy transition, where societies and territories should converge, appears progressively obsolete: both small urban communities and international political agencies participate to *energy question* at the same intensity and at different levels. So, a renewed understanding about these divergent specific paths is required, marking the contradictions from every contextualised energy changes.

2. The niche dimensions of energy transition

Many authors reflect on the advent of a sustainable late modernity, struggling between universally green networked spaces and re-localised enclaves in small communities (Coutard and Rutherford, 2011). Energy transition may result in the spatial organisations, in the economic performances or in the social cohesion of communities, whose basic issues differ between places and over time, too. The building up of a complete energy transition is concrete when three passages - niche, regime and landscape - are progressively crossed in the socio-technical structure. Nevertheless, it is relevant to understand and organize these pieces of changes into a

systematic framework. If energy transition is composed by diverse pathways by different scales, different strands of research arise according to types of local transformations. Starting from Italian case studies' observation, I delineate an analytical schedule about the kinds of energy changes in places and the related theoretical frames depicting them.

Next pages mark two issues: the first concerns with some notes about the Italian delay on energy transition's goals imposed by International Community and the second one underlines the strands of research arising from its case studies analysis.

2.1. Italian trend to energy transition

Italy is the third biggest CO_2 emitter in Europe, although it has decreased its emissions by 6% in 1990 and it has the fourth lowest energy transition in the EU. In spite of some successful steps - such as its increased share from renewables in primary supply (from 6.6 in 2011 to 11.7% in 2011 according to OECD, 2013) - Italy is quite far to meet its commitments to the 20-20-20 Strategy for Energy. In its *2012 National Energy Strategy Plan*, it expresses to reach these commitments by combining efficiency measures, substitution of gas for oil and a shift to less energy intensive economic activities. Until now, the positive steps have involved the PAEE (*Italian Action Plan for Energy Efficiency* agreed in 2007) which has achieved energy savings in usages, especially in household sector; and, also the development of solar power which was a prominent feature in its 2014 national budget. A part from this, three main critical aspects still remain. One concerns with the strong dependence of Italy from the fossil fuels, particularly from gas: in fact, Italy is becoming an important gas hub for Europe, having obtained a favoured access to Caspian Sea gas supplies. A second aspect, it is the yearly amount of tax reliefs, nearly all for the petroleum whose main beneficiaries are trucking companies (346 million Euro), agriculture (908 million Euro), shipping (547 million Euro). A third aspect stresses the territorial divide between South and North Italy where southern areas pay lower rates of taxation and receive some specific reduction for oil producing areas, spreading some doubts about the role of lead-in tariffs in supporting renewables.

2.2. Diverse pathways for energy paradigma

From my case-studies, in this draft I synthesize eight strands of research whilst the selection and deeper analysis from concrete cases is going to be illustrated during the conference.

One strand of research stresses how urban energy is usually subsumed by international organisations and led throughout their laws. From an international viewpoint, both mitigate and adaptive norms take part of these juridical entanglement; by the word "mitigation", it is marked a more sustainable change of actual forms of production and consumption into specific contexts

whilst the word “adaptation” marks the social capability of transforming components from society after some specific events or effects. In both cases, the low carbon transition is led by the international governance of climate change where the setting of political instruments from institutional actors and bottom-up local actions are equally considered. This research strand underlines two main empirical and theoretical implications. The first concerns with the particular capability of urban governance to influence energy-related change: the multilevel perspectives are crucial and whereby environmental/energy governance is rescaled, downwards as well as upwards. For instance, all technical innovations, spatial re-organisations and social practices related to energy in cities are constantly shaped by local political negotiations defining urban energy provision and usage. The second implication marks how cities work as bounded spaces where national or supranational laws can directly act according to mitigate and adaptive instruments (Mason, 2013). In both implications, climate change policies can also include the reflection about wider ecological narratives (Swyngedouw 2007) and political ecology perspectives (Jonas *et al.*, 2011).

A second strand of research is based on energy efficiency in infrastructural and structural aspects (first of all, transports and buildings), led by technological innovations and green sources usages. The shaping and the efficiency of a different organisational urban space by smart building and mobility are, for instance, their recurrent *leitmotif*. The smart city model can be considered as their main urban experiment attempting - not always successfully - to merge two different approaches, according to territorial specificity. For example, this model is more influenced by sustainable theories when it is working about compatible social practices for reducing ecological footprint or when marking how to simultaneously reach social, economic and environmental equity. Differently, it is closer to Green Economy approaches when it stresses the importance of using new efficient and clean technologies, and solicits good socio-technical practices (green jobs, green technologies, green building and so on).
This overall strand of research also includes all the infrastructural technologies concerning with the electricity, heating, cooling through which the energy flows unify distant territories, thus underlying how their infrastructures are an important set to implement energy transition pathways.

A third line is more focused on technological innovations where it is crucial the mutual link between a renewable energy provision and the weight of urban activities for a better general energy metabolism. It is stressed the importance of cities as places of energy-related innovations and the relevance of technological innovations as instruments for low carbon policies. From a

more general perspective, for instance, the city is conceived as a technological system: case studies from port cities, using the off-shore wind energies, are emblematic. Port cities can be an interesting demonstration how places can be considered as a technological system or a unique collective actor. In this sense, technological innovations can replace the economic and social transformations like if two separate spheres co-habit in the same place: from one side, the production of off-shore wind energy which change all the provisional aspects whilst on the other one, the city reducing its dependence from fuel fossils. Under this viewpoint, this approach seems to be closer to Green Economy' one.

A fourth line analyses the overcoming divide between the social and the technical aspects, by focusing either on the technological innovations or on the study of the socio-political actions in using their local resources. For instance, the implementations and the experiments about *smart grids* in small communities take part of this transition paradigma. Local practitioners experiment competences in energy production, distribution and management as they seek to implement local energy policies, which often replace missing strategic actions at the national level. These energy transformations shape - at a small scale - a new way of relocating the energy governance thanks to a combination of interdependent political, economic and technical decentralisation actions. In this way, it is less relevant where to be placing the innovations but it is considered more important the energy materiality which is reinforced through localised relational processes. Here, the studies are more concerned with a combination of shared technologies and social habits where diverse practices reconfigure their relational spaces. It is not to read the simple spreading of a new technology but it is central the technology as driving force for better local lifestyles, by shifting social expectations, working environment, consumption forms in families. A crucial role are the actions coming from bottom-up practices. For instance, the energy districts are an interesting example how social actors change their territory by using *smart grids.*

Very complementary to the fourth one, a fifth line of research tries to understand how energy transitions are socially and technically constructed, giving the same relevance to technological infrastructures/structures and to social actions/values. This line is very connected to the fourth one: in fact, the smart grids experiments prove how the boundaries between producer and consumers have become weak, or to better explain, they stress how the demand-side management techniques and the local household energy production are reciprocal interlinked. In this fifth research strand, indeed, the technical and social aspects appear more mixed and it is difficult to distinguish them (Walker and Cass, 2007) as this combination of social and technical

aspects insist more on metabolic approaches: it is the mechanism by which energy system and social practices mutually reinforce or undermine each other. This viewpoint is connected to other divergent aspects: for example, how social acceptances of technology can move the energy changes, or which forms of urban energy could be generated by new socio-technological cultures, or else which practical and cultural actions can enact low carbon transition. For instance, the environmental metabolism about technological and cultural issues as well as the experiments about transition's towns can be included in this section of research .

Within a sixth line of research are the divergent territorial responses to energy question, especially between the North and the South Italy. These responses analyze circulations of energy and their territorial conflicts as well as the controversial taxes and conventions for energy supply and consumption and, furthermore, they also focus on the tensions and limits of energy positioning. In this strand of research, the territorial governance is often read as an asymmetric instrument of distribution in energy resources or other environmental goods. The theme of environmental justice better expresses this research line.

There are two minor Italian lines of research which could deserve further attention. One concerns with optimizing the energy usages in peripheral areas, in rural zones or suburbia where a set of material and social relations work against territorial dispersion. More concentrate land uses' and public transports technologies' mark the debate on the importance of more dense territories to avoid energy waste. To end, another weak pathway is involved with the analyse between the energy transition and the Italian urban regime. Firms and policymakers seem to have a strong alliance in urban regime, as a resistant bloc, shaping a managerial, organisational, narrative alliance which is difficult to remove (Levy, 2002): this perspective underlines how political power and urban regime tend to go hand-in-hand with the flows of oil and other fuel resources.

Conclusive remarks

Energy is often taken as a granted issue. Concepts as resilience process and socio-economic sobriety in empirical researches, or categories as better energy efficiency and decreasing carbon emissions, are surely important in actual energy question. Nevertheless the problematic pressure on energy resources related to economic and population growth still represent the matrix where these worries arise and they should start to be solved. As far as Italy, actually, it is boosting its use of natural gas and there are measures to increase competition in this sector by reducing the

burdens of its energy costs. Measures which seem to be contradictory from the long-term perspective of an energy transition.

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