IL PIEMONTE DELLE AUTONOMIE
Rivista quadrimestrale di scienze dell'Amministrazione
ISSN 2385-085X Registrazione Tribunale di Torino n.4 del 18 febbraio 2014

The Smart City and the Green Economy in Europe: a Critical Approach

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(Abstract)

It is shown in this article on the basis of the current European legislation that the future progress of smart cities will critically depend on the advancement of the green economy and consequently on the further development of energy efficiency and of renewable energy sources. However, the lack of a clear legal framework capable of transforming the current pledges into binding rules at national level may fail to establish a more direct and profitable link between the extensive European legislation on energy and environment, and the harmonious and efficient development of smart cities in Europe.

Keywords: smart city; green economy; energy efficiency; renewable energy sources; legal framework; directives; regulations; soft law.

1. Introduction.

The concepts of smart city and green economy as delineated in European regulations and directives may sometimes appear to be rather cursory or even little more than simple slogans born in the shadow of the economic crisis and destined to disappear, almost without a trace, by the time the crisis is over.

While it is extremely difficult to make predictions in this regard, there might certainly be some elements of truth in this analysis; however it is no less certain that today these conceptual categories, defined as values and objectives to be pursued and achieved, are heavily employed in the context of the general policies of the European Union.

Indeed there are many documents of the European Union that are along these lines. They are often in the form of soft law propositions having the simple aim of introducing medium-long term targets and are subsequently followed by more binding regulatory measures, with a view to providing stable provisions to the general principles previously enunciated.

One of them is the document *Smart Cities & Communities*[1], issued by the European Commission in 2011, containing the outline of an optimal, virtually perfect model of smart city, in which it is possible to reconcile and combine economy and ecology [2], and in which it is therefore possible to implement any necessary synergy between the protection of the environment and the development of new technologies, including policies of environmental sustainability and transformation processes of the urban land [3].

In accordance with the definition that clearly inspired the document of the European Commission quoted above: "*A smart city…uses digital technologies to enhance performance and wellbeing, to reduce costs and resource consumption and to engage more effectively and actively with the citizens. Key smart sectors include transport, energy, health care, water and waste. A smart city should be able to respond faster to urban and global challenges than one with a simple 'transactional' relationship with its citizens*".

In other words: "*Interest in smart cities is motivated by major challenges, including climate change, economic restructuring, retail and entertainment services moving online, ageing populations, and pressures on public finances*". The terms 'intelligent city' and 'digital city' are also used [4].These simple and concise excerpts taken from the most commonly used definitions show that the issue of smart cities is functionally related to that of environmental policies, and especially of environmental policies at the local level: cities, communities, regions.This leads to the observation that the structure and governance of smart cities (or of smart communities, if related to wider areas) are based on the institutions of the so-called green economy, which is a key issue.Indeed, the green economy has its fundamental element of qualification and identification in the fundamental project, based on the Article 11 of the Treaty on the Functioning of the European Union (TFEU), to put together economic growth and environmental values, integrating and reconciling them.Consequently, in the papers of the scientific community as well as in EU documents, the smart city is substantially identified with the sustainable city, its smartness, that is its "intelligence", coinciding with its sustainability. This is going to become the new paradigm for the most important cities in the world [5], especially in the western hemisphere.

In this article I shall outline the links between the considerable amount of acquis communautaire in the form of regulations, directives and soft law tools related to energy and environment with the vision of a smart city. The necessity of a formal framework to transform the current pledges into binding rules will be examined in the conclusions.

2. Analysis and Discussion.

If, as outlined in the introduction, sustainability is the key to smart cities, then the proper frame of reference must include some of the most relevant EU documents pointing to an intelligent and efficient use of energy as medium-long term objectives and targets. The smart and consequently sustainable city will be capable of limiting the impact of the environmental overload caused by undue expenditure of energy and by an energy mix with a low share of renewable energy content.Smart cities have even been predicted to become the future "industrial (or) manufacturing cities" [6], a globalized business model where the renewable energies can play, in a "smart context", an important economic role.

2.1. Precursory concepts of the smart cities.

While originally focused on ICT, the smart city concept today goes beyond it and its main goals are a better use of resources and less emissions, which means more efficient urban transport networks, better waste disposal facilities, and energy-saving ways to light and heat buildings.The three initiatives contained in the *Intelligent Energy Europe Programme* (examined more in detail in the next section) with their focus on sustainable mobility in urban environments and increased use of renewable energies have clearly contributed to paving the way to the Launch Conference of the Smart Cities and Communities Initiative by the European Commission in 2011.The concept of smarter city has been related from its very beginning to sustainability, which becomes its most relevant factor of identification and is associated to a greater enjoyment of life.In this sense, it is impossible to miss the echo of important doctrines, especially of French origin, which introduce the right to happiness. Indeed one of the indispensable prerequisites of this right to happiness is the claim to a rational and, in fact, happy organization of the city, capable of adequately combining economy and ecology [7], determining a veritable *droit à la ville* [8], namely the right to a city that considers sustainability the founding character of its identity.It is therefore no surprise that Paris is a candidate to be, by 2050, a smart city of European level and to become model and leader of a project of city life that has in sustainability (and in the "beauty" that naturally derives from it) its fundamental strength and indispensable identification [9].

If the sustainability of the smart city brings us immediately to the EU strategy"20-20-20″, heralding a comprehensive legislation on energy efficiency and energy production from renewable sources, the legal basis of these important rules (i.e., the directives resulting from this common strategy "20-20-20") can be found in two important provisions of the TFEU: article 192, second paragraph, which allows derogations from the ordinary procedure of decision in case of "*provisions primarily of a fiscal nature*", of measures affecting the environment and of "*measures significantly affecting the choice of a Member State between different energy sources and the general structure of its energy supply* ", and article 194, under which EU policies in the energy sector must take into account "… *the need to preserve and improve the environment*…" [10,11].

2.2. A Review of the Relevant European Legislation.

The probably best known measure is the "challenge" launched by the European Union in March 2007 with the fielding of the strategy "20-20-20" (the so called climate and energy package), albeit in the less binding form of soft law. The Union's aim by 2020 is three-fold: reducing greenhouse gases by 20% (or 30%, assuming an international agreement in this sense); reducing energy consumption by 20% thanks to the gradual increasing of energy efficiency; increasing the share of renewable energy to at least 20%.The climate and energy package was building on the results of *Intelligent Energy Europe Programme*, originally adopted in 2003, which foresaw the establishment of a road map for the energy choices of the European Union and the Member States to the distant 2050. The Programme was divided into three main areas:

1. fostering energy efficiency and the rational use of energy resources (SAVE initiative);

2. promoting new and renewable energy sources and support energy diversification (ALTENER initiative);

3. promoting energy efficiency and the use of new and renewable energy sources in the field of the transport (STEER initiative).

Five directives, one decision and one regulation are the most significant legal acts of the European Union to be considered to this purpose. They will be listed in chronological sequence.

a) Directive on the so called renewable energy sources (2009/28/EC);

It is considered a fundamental directive because it provides a legislative framework for the EU targets for greenhouse gas emission savings, and the production and promotion of energy from renewable sources. Moreover, the aim of the directive is to encourage energy efficiency, energy consumption from renewable sources in line with the overall goal "20-20-20", as well as the improvement of energy supply and the economic stimulation of a dynamic sector in which the European Union is trying to set an example.

Member States must also establish national action plans, which in addition to setting the share of energy from renewable sources in transport, production of electricity and heating by 2020, must also take into account the impact of other energy efficiency measures on final energy consumption. The aim of these plans is also to establish special procedures for the reform of planning and pricing schemes and of the access to electricity networks from renewable sources.

Cooperation between the Member States is also foreseen by the directive. The Member States can in fact transfer energy from renewable sources using a statistical accounting system and set up joint projects concerning the production of electricity and heating from renewable sources. This kind of cooperation is also possible with third countries, provided some conditions are satisfied: the electricity must be consumed in the territory of the European Union; the electricity must be produced (after June 2009) by a newly constructed installation; the quantity of electricity produced and exported must not benefit from any other support.

In addition the Member States must ensure access to and operation of the grids. This is a very important focus point because the Member States should build the necessary infrastructures for energy from renewable sources in the transport sector. It is hardly necessary to stress the importance of this issue in the context of the policies aiming to promote the smart cities and smart communities.

From a technical point of view the directive takes into account energy from biofuels and bioliquids, in order to contribute to a reduction of at least 35% of greenhouse gas emissions. In particular, from the first of January 2017 their share in emissions savings should be increased to 50%. Biofuels and bioliquids should not use raw materials (produced either outside the European Union or within it) from land with high biodiversity value or with high carbon stock. Consequently, to benefit from financial support biofuels and bioliquids must be qualified as "sustainable", in accordance to the criteria of the directive. Again, an important issue for smart communities.

b) Directive (2009/29 /EC) on emission trading;

c) Directive (2009/30/EC) (Fuel Quality Directive), with a strong impact on sustainable mobility and consequently on the development of the concept of smart city;

d) Directive (2009/31/EC) on carbon capture and storage;

e) Decision (2009/406/EC) the so called Effort Sharing Decision concerning the reduction of greenhouse gas emissions on the basis of solidarity between Member States and of sustainable economic growth across the Union;

f) Regulation (2009/443 / EC) Regulation of CO_2 emissions from cars;

These measures were all issued in 2009, that is in the middle of the systemic financial and real economy crisis, in the hope that the green economy provide a key way out of it, as maintained also by B. Obama in the immediate aftermath of the global crisis;

g) Directive (2012/27/EU), amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC. This Directive integrates and completes the "package" of European standards issued in 2009.

Indeed this directive provides a broad framework concerning many fields: the energy efficiency *stricto sensu*, i.e. efficiency in energy use, for example in heating and cooling (article 14), in energy transformation, transmission and distribution (article 15, with an important "warning" for the national energy regulatory authorities), the compliance with the minimum energy performance requirements of buildings used by public bodies, the energy efficiency obligation schemes, the so called energy audits and energy management systems, metering and billing information, and so on.

Even the premises are very significant : "Whereas…(3) *The conclusions of the European council of 17 June 2010 confirmed the energy efficiency target as one of the headline targets of the Union's new strategy for jobs and smart, sustainable and inclusive growth (Europe 2020 Strategy)*; in addition: " … (11) *This directive …also contributes to meeting the goals set out in the Roadmap for moving to a competitive low carbon economy in 2050, in particular by reducing greenhouse gas emissions from the energy sector, and to achieving zero emission electricity production by 2050*" … " (17) *The rate of building renovation needs to be increased, as the existing building stock represents the single biggest potential sector for energy savings. Moreover buildings are crucial to achieving the Union objective of reducing greenhouse gas emissions by 80-90% by 2050 compared to 1990…*". This is, without any doubt, the core of the directive with the declared objective to increase the using of renewable energies (especially in the cities) by encouraging the use of financing facilities (such as special contributions [12]) to further the objectives of the directive.

Chapter IV of the Directive (articles 16- 20) on the "Horizontal provisions" includes issues that are of particular importance for the development of smart communities: article 17 concerns "information and training" whereas article 20 is dedicated to "Energy efficiency national fund, financing and technical support", which acknowledges a key point: *"…Member States shall facilitate the establishment of financing facilities, or use of existing*

ones, for energy efficiency improvement measures to maximise the benefits of multiple streams of financing" (article 20, first paragraph). In other words, and in line with the article 192, second paragraph, of the Treaty on the Functioning of the European Union, the new energies, renewable energies will be financially sustainable only in case of good economic supporting of the Member States and of the European Union as well.

A general analysis of the Directive shows a close relationship between the concept of smart city and the renewable energy issue, which is an important element of the "new economy", in other words of the green economy. Furthermore, the development of renewable energies, together with a policy of building renovation (as foreseen by the Directive), will increase the number of well-paid jobs and of skilled employment. This does match the anticipated character of smart cities (and of smart communities, clusters and regions): dynamic, well-educated and open to innovation.

Moreover, the smart city will be the ideal urban space where participation and democracy is increased by the sophisticated interplay of the social actors (individuals and collective bodies) like political parties, consumer and environment protection associations and other stakeholders. This is clearly envisaged by the Directive (art. 17): "*Member States shall ensure that information on available efficiency mechanisms and financial and legal frameworks is transparent and widely disseminated to all relevant market actors, such as consumers, builders, architects, engineers, environmental and energy auditors, an installers of building elements..*".

2.3. An Example of National Implementation: The Italian Case.

As an example of how the European legislation is implemented in the regulations of the Member States, the Italian system is considered. The following key pieces of legislation have been passed by the Italian Parliament in response to European legal acts:

1. Decree Law N. 28/2011, by which the before mentioned Directive 2009/28 / EC, has been implemented. It has set the general rules, whereas the detailed norms have been delegated to a number of Ministerial Decrees issued by the Minister of Economic Development;

i) Ministerial Decree of September 10, 2010, containing the national guidelines for the authorization of plants powered by renewable sources, according to article 12 of Legislative Decree n. 387/2003, which was the more general discipline of the matter until the enactment of the Legislative Decree. n. 28/2011;

ii) Ministerial Decree of March 15, 2012 about the definition and quantification of regional goals concerning renewable energy sources and the definition of how to handle cases of non-achievement of the objectives from the Regions and Autonomous Provinces (Burden Sharing), in compliance with Article 37 of the quoted Legislative Decree. n. 28/2011, (definition and quantification of the medium-long term results that the Regions and Autonomous Provinces commit to abide by in line with national targets set by 2020 in the light of the strategy "20-20-20 ");

2.the Presidential Decree of April 16, 2013 on the energy performance certificate, setting

rules for the verification of the professional qualification and independence of experts and organizations working in the same field of certification;

3. Law n. 90 of August 3, 2013, concerning the implementation of the Directive 2010/31/EU on energy performance in buildings into Italian law;4. Legislative Decree n. 102 of July 4, 2014, implementing the Directive 2012/27 / EU on energy efficiency. It provides a framework for concrete measures aimed at the promotion and implementation of the results of efficiency energy as already predetermined by the previously quoted D.M. of 15th March 2012 with a view to achieving the level of energy efficiency foreseen by European Union law.

Moreover it would be useful to include norms and regulations issued by each Italian Region. However they are mostly expenditure norms, i.e. provisions of financial support with the aim to encourage the use of renewable energies by economic operators and consumers [13].

In the other European countries transpositions into national laws went through similar legislative processes in accordance with the national procedures and practices specific to each issue.

In the United Kingdom, for instance, energy is a reserved matter for the Central Government, but the deployment of actual mechanisms for increasing the levels of renewables is a matter for Devolved Administrations. Thus, the Directive 2009/28/EC was implemented through a range of statutory instruments, such as the Renewables Obligation Orders (England and Wales/Scotland/Northern Ireland) issued by Devolved Authorities and the Feed-in Tariffs Order issued by the Minister of State of the National Government. Similarly, the Directive 2010/31/EU was implemented through the revision of the Housing Act 2004 and of the Energy Performance of Building Regulation 2007, contained in statutory instruments (England and Wales/Scotland/Northern Ireland). The strategy for the renovation of buildings referred to in the Directive 2012/27/EU has been established by the Secretary of State of the Central Government, after consultation with the other competent authorities (Northern Ireland departments, Scottish Ministers, and Welsh Ministers) in the Energy Efficiency (Building Renovation and Reporting) Regulations 2014 (S.I. 2014 No. 952).

2.4. Looming Difficulties.

No doubt there is an important, definite and stable relationship between the new energy sources and the smart city (and the smart community): indeed a key feature of smartness is the capability of reducing greenhouse gas emissions in the urban spaces (the so called public spaces).However, this point of view does not go completely unchallenged. In fact it is often claimed that there is not enough evidence underpinning this close identification. For one thing the renewable energies can prevail over traditional energy sources such as oil and gas only thanks to the generous economic contribution of the European Member States. This opinion is shared by the European Union, as is well reflected by the content of the directives examined above.

Thus, while providing subsidies to foster the use of renewable energy sources and reduce

greenhouse gas emissions is a correct strategy for the protection of the environment, it also introduces a dangerous distortion of the market. A doped market could easily collapse if the subsidies are suddenly lifted as might be the case in the present period of economic crisis. Even a progressive reduction of subsidies to the solar branch has given rise to a serious market disruption of this sector in Germany. The development of shale oil and shale gas extraction technologies, the recent volatility of oil prices, the geopolitical tensions involving major oil producers make predictions all the more unreliable. Thus, it can be wondered if the traditional energies have indeed a short future and how this lapse of time can be actually evaluated.

In other words there are many important questions waiting for sure and unequivocal answers before the transition to a sustainable development can be reliably predicted. Another matter of concern are the growing tensions within the very environmental movement.Indeed most environmental associations have supported from the beginning the choice of new, renewable energies with a view to increasing the protection of the environment. This can be considered a practical point of view, in accordance with the so called “shallow ecology” which is criticized for its utilitarian attitude by a select minority of environmental associations fighting against the use of new energies for environmental reasons, such as damages to the landscape, reduction of global space for agriculture, negative view impact, and so on. This is to some extent the natural consequence of a more general ideology, known as “deep ecology”. It emphasizes the inherent worth of nature regardless of its instrumental utility to humans [14].In addition to the uncertainties mentioned above it is also necessary to point out some reservations that have occasionally been raised against an uncritical extensive use of the concept of “smart city”.For one thing the existence of a positive prejudice toward the buildup of smart cities may lead to ignore alternative strategies of promising urban development for the improvement of the quality of life or, conversely, to underestimate the strong negative effects and consequences that the diffusion of new technologies and of networked infrastructures can occasionally give rise to [15].

2.5. A Serious Shortcoming: the Absence of a Binding Legal Framework.

The new renewable energies are certainly relevant from a legal perspective: there are European Strategies, as well as European legal acts, especially directives, whose current trends have been analysed in previous sections; and partly as a consequence of this acquis communautaire there are of course national norms and rules that regulate projects and objectives, and, first, of all, there are legal definitions of the single energy sources.

On the other side, is it possible to find, as of the present time, a legal definition of smart city? Indeed there exist both European and national strategies and documents concerning the smart cities (smart communities, smart regions), but there does not seem to be anything really relevant from the point of view of the law. On the other hand it is only the law that can legitimate the establishment of compulsory rules for individuals as well as for private and public collective bodies.

In other words the smart city (regarded as a logical category) is presently relevant and to some extent clear only from a sociological point of view.

According to most general reports [16,17], the defining features and factors of a smart city can be classified as follows:

1. smart economy, which means competitiveness, and consequently entrepreneurial skill, economic image & trademarks, productivity, flexibility of labour market, ability to innovate, etc.;

2. smart people, in other words social and human capital, with high levels of qualification, social and ethnic plurality, flexibility and creativity, participation in public life, etc.;

3. smart governance, which implies participation in decision making process, availability of public and social services, a transparent governance, good political strategies and perspectives [18];

4. smart mobility, with both local and national/international accessibility, for the promotion of sustainable, innovative and safe transports systems;

5. *smart environment*, in other words good policies for pollution prevention and environmental protection with a view to increasing the attractiveness of natural conditions and to promoting a sustainable resource management;

6. *smart living*, the so called quality of life, with cultural facilities, good health conditions, housing quality, education facilities, social cohesion, etc.Indeed these are all sociological concepts which provide general objectives and general guidelines for the development of good public policies in line with the most general aim to elevate the quality of life in urban spaces.In other words, it is certainly possible to conceive and design a development path for the future of our cities eventually leading to a scenario close to the smart model, even in accordance with the European road map "*Europa 2050*". However, it is extremely difficult (if not outright impossible) to find, at the same time, some legal trail by which to introduce compulsory tools for the implementation of a "smart" policy (or of several "smart" policies) with a view to increasing the overall attractiveness of public urban spaces in Europe.

3. Conclusions.

The evolution of the concept of "smart city" has gone hand in hand with the growing concern for the protection of the environment, the development of renewable energy sources and with the necessity of increasing the overall quality of urban landscapes including a dynamic social and cultural environment, capable of attracting a well-educated and skilled workforce.

While each single component of this scenario has been the object of an extensive European legislation, whose subsequent implementations in each Member State has given rise to a reasonable legal harmonization, no such action has been attempted for the definition of smart cities as a whole.

There may be some real hurdles in such an attempt: different physical landscapes, distinctive urban residential cultures, a divergent morphology of infrastructures, contrasting norms, traditions and habits at local level. However, the past history of European

integration has shown how tackling and overcoming difficult tasks has been the key to veritable breakthroughs in the process of Europeanization.

It's time for the scientific community to analyze the development of a suitable legal framework for the European smart cities of the future and for the policy makers at European and national level to take the necessary decisions.

Conflicts of Interest

The author declares no conflict of interest.

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