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Journal of Land Use, Mobility and Environment

There are a number of different future-city visions being developed around the world at the moment: one of them is Smart Cities: ICT and big data availability may contribute to better understand and plan the city, improving efficiency, equity and quality of life. But these visions of utopia need an urgent reality check: this is one of the future challenges that Smart Cities have to face.

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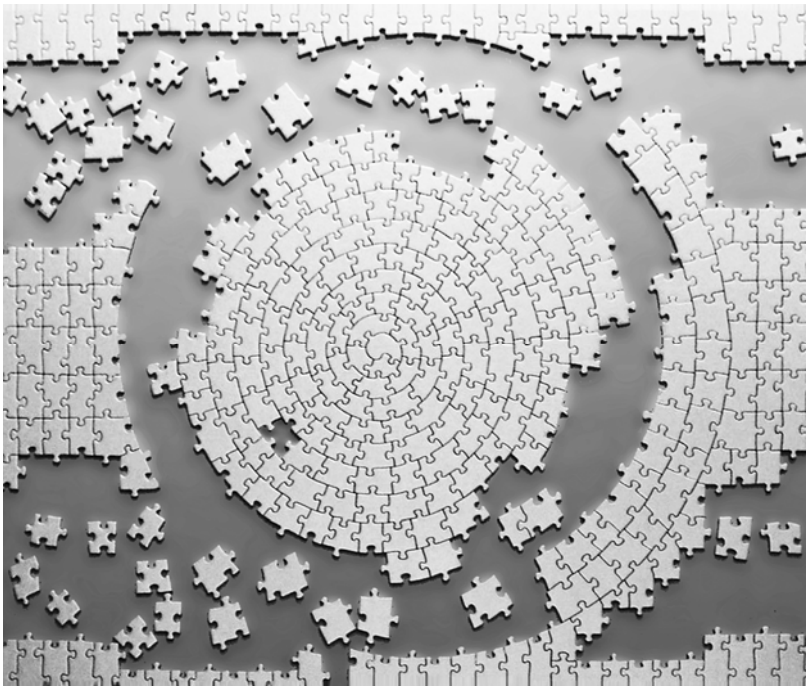

SMART CITY AND METROPOLITAN AREA

THE ENERGY COMPONENT IN THE CASE STUDIES OF GENOA AND NAPLES

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ABSTRACT

The Smart City model is now considered one of the opportunities to rethink cities and, in general, the development of urban communities. One of the most relevant themes in the application of the Smart City paradigm is the city/energy relationship and Italian cities are fielding several actions to effectively cope with the energy issues. Nevertheless, actions and projects are often uncritically promoted as 'smart', but actually lack innovative contents and methods. Therefore, the aim of this research, of which we present the first findings, is the drafting of a survey, tested through field analysis, of the experimentations of Italian metropolitan areas on the Smart City topic. The in-depth analysis of two case studies, Genoa and Naples, allowed us to compare the actual state of the two cities. We have that they have undertaken a common path in the implementation of strategies to try to transform themselves into Smart Cities, focusing especially on the energy aspects.

KEYWORDS:
Energy Efficiency; Smart City; Smartness Indicators; Genoa; Naples.

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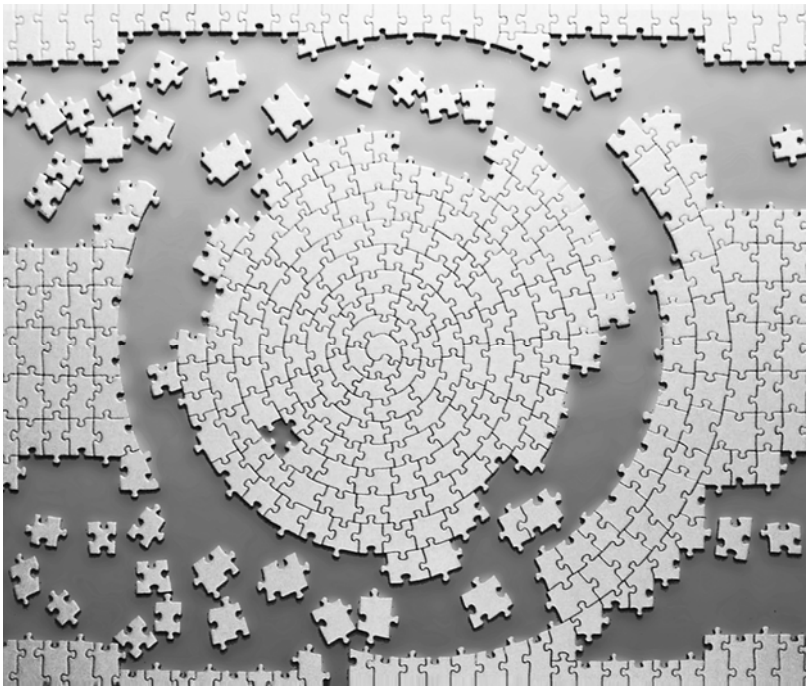

智能城市和都市圈

热那亚和那不勒斯能源个案研究

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摘要

智能城市目前被认为是重新思考城市和城市社区发展的机会之一。在智能城市模式的应用中最相关的主题之一就是城市/能源和意大利城市的关系为有效应对能源问题提出了若干举措。尽管如此，举措和项目还是常常不加批判地被作为“智能”来推广，但实际上却缺乏创新的内容和方法。从这个意义上说，第一项发现的目的就在于起草一份概述，通过智能城市这一主题，对意大利都市圈进行实地探测分析。热那亚和那不勒斯的两项深度个案分析让我们可以对这两座城市的实际状况进行比较，从而表明两座城市在建设智能城市的战略实施中采取了共同的道路，特别关注了能源方面。

关键词

能源效率，智能城市，智能指数，热那亚，那不勒斯

1 SMART AND METROPOLITAN CITIES: AN OPPORTUNITY TO RETHINK URBAN DEVELOPMENT

The topic of Smart Cities has gained, in the last few years, an increasing relevance in the scientific debate and in the national and international operative practises, becoming one of the opportunities to rethink cities and, in general, the development of urban communities.

The first considerations, studies and projects on the subject seem to agree that a "smart" sustainable development combines physical components – infrastructures and material networks – and social components – actors and city users to pursue sustainable purposes, efficiency and urban quality. Adopting this approach, the Smart City takes shape as a system providing services and infrastructures that derive from stakeholders and city users' needs, focusing on the aspects of sustainability and environmental protection. In this sense, what makes the Smart City different from other "city models" is the use of new information technologies at the service of an urban community inclined to revise its own lifestyle to pursue a model of sustainable development (Gargiulo, Pinto and Zucaro, 2012).

From 2009, the European Community has conferred substantial resources to Member States, to allow scientific in-depth analysis and practical applications of this approach through different financings such as National Operative Programme *Research & Competitiveness* 2007- 2013 "Smart Cities and Communities". Among others, this Programme has funded a research project called "Smart Energy Master for the energy management of territory (SEM)", which involves the Department of Civil, Building and Environmental Engineering of the University Federico II of Naples.

Focus of the SEM project is the identification of best practices and integrated solutions for energy saving and efficiency at urban and metropolitan scale. Within the SEM project a survey entitled "Governance Analysis Project for the Smart Energy City (GAP)" is under development.

Scope of this study is to verify whether - and how - the adoption of the Smart City paradigm can support the radical process of administrative transformation that Italian cities must face after the approval of the regulation 56/2014 «*Dispositions on Metropolitan areas…*». This analysis has taken into account the ongoing actions in the Metropolitan areas, which can be considered as the first applications of the "Smart City" model, because they also make extensive use of ICTs for the deployment of services and apps for citizens.

Among the various Italian Metropolitan areas, this research has focused on the best practises in the field of energy saving/efficiency as this topic has a particular relevance in the pursuit of a sustainable development for the protection of environmental resources which, as mentioned, is a crux of the Smart City model.

This paper presents the first results of the research activities conducted on two case studies: Genoa and Naples. Although Genoa is in the North of Italy and Naples in the South, they present some "physical analogies": both are coastal towns, and both have a historically stratified urban settlement and a complex morphology. Furthermore, although with different levels of development, they are both experimenting noteworthy actions in the energy sector, for the application of the Smart City model. The aim of this research is the evaluation of the two approaches adopted, considering the present energy management of their territories. Moreover, on the one hand it draws attention to the vocations and weaknesses and on the other to the development trajectories of the implemented strategies.

2 MEASURING THE SMARTNESS

In the last decade, a wide literature on the matter of Smart City has been produced to define contents, strategies and objectives. Simultaneously, numerous contributions have been dedicated to "measuring" the level of smartness of the different cities, to define their strategies.

In Europe, one of the most known and qualified studies is the one conducted in 2007 by the Vienna University of Technology, University of Lubiana and the Delft University of Technology on medium sized cities (Giffinger et al., 2007). This research states that the good performance of a city can be measured by

the combination of endowments and activities of self-decisive, independent and aware citizens in a framework constituted by 6 characteristics of smartness: "*Smart Environment", "Smart Mobility", "Smart Governance", "Smart Living", "Smart People" and "Smart Economy"*. The structure of Giffinger's model countains 31 factors, divided into 6 characteristics, creating the framework to identify 74 indicators in order to describe different aspects of urban life. E.g. referring to the characteristic "Smart Mobility", the component "Sustainable, innovative and safe transport systems" articulated into 3 indicators: "Green mobility share", "Traffic safety" and "'Use of economical cars".

In the United States, among various attempts to measure smartness of cities, the study "The Smart Cities Wheel" (Cohen, 2012), emerges, conducted in 2011 by the climate strategist Body Cohen from University of Colorado. Cohen deals with the theme of the classification of the level of smartness of the world's largest cities, using the same characteristics identified by Giffinger but connected to only three factors.

In Italy, an application aimed at establishing a national ranking has been conducted by FORUM PA, which has proposed the "I City rate" index (Forum PA, 2014). Also in this case, the model proposed by Giffinger is applied, though with some differences; it did not identify factors but only about 100 indicators, divided into Giffinger's six characteristics.

Another interesting research at the national level has been conducted by the National Council of Economy and Labour (CNEL) and the National Istitute of Statistics (ISTAT) in 2010 to define a method to evaluate the Sustainable and Equal Wellness (in Italian: Benessere Equo e Sostenibile - BES from which the name UrBES derives) (Cnel, Istat, 2013). The research identifies a set of indicators to measure BES, considering different aspects of urban living and not only GDP. The pursuit of new dimensions and new indicators is particularly interesting for a city that aspires to be "smart" not only in the sense of being more efficient from an economic, environmental and infrastructural point of view, but also in the sense of social inclusion and sustainability. Though not explicitly aimed at the definition of the Smart City, UrBES has many similiarities with Giffinger's study, proposing a quantitative evaluation, also for not easily measurable aspects of urban life, such as people's open-mindedness. These two studies reach comparable conclusions, though with some differences in the methodology and adopted procedures (DIST Polito, 2013).

Still referring to the Italian case, starting from 2013, the "Smart City Index" has been proposed (Between, 2014), a ranking of 116 Italian provincial capitals. The peculiarity is that, instead of measuring the level of smartness of a specific city, the attention is focused on the evaluation of the distance between the city identified as the best and the others.

From the comparison of all these studies, the great importance assumed by the cities' performances in the field of energy and environment emerges. They underline how the cities smartness is strictly connected to a vision that considers environmental protection of natural resources and energy efficiency as essential elements (Benevolo, Dameri, 2013). Besides the mentioned studies, there are many other surveys that measure the smartness, such as: Smart Cities in Italia: un'opportunità nello spirito del Rinascimento per una nuova qualità della vita (CERTeT Bocconi, ABB, The European House – Ambrosetti, 2012), EfficienCities (Cittalia, Siemens, 2012), La mobilità sostenibile in Italia (Euromobility, 2013), Ecosistema Urbano (Legambiente, 2014), Qualità della vita (Il Sole 24 ore), Smart cities and housing markets: evidence from Italy (Maltese, Mariotti and Boscacci, 2013) Dati ambientali nelle città (Cnel, Istat, 2012).

The limits of these works is that they take a somewhat extremely synthetic picture of a very complex phenomena. Therefore, besides consulting scientific literature on the identification of quantitative indicators describing the present state and the vocation of each urban area, this research has analysed policies and actions being developed in each territory to give a framework of their trends of development.

3 RESEARCH METHOD

In order to define the current inclination towards “smartness” of Italian cities and, at a later stage, verify the consistency between allocations, strategies and actions currently underway, a methodology applicable in different metropolitan territories has been developed. This survey has been structured in two macro-phases; the first aimed at collecting information studying documents, databases, projects, programmes and actions and the second based on stakeholders interviews.

A huge amount of materials, documents and information available on the web about the cities’ actions, often uncritically promote them as "smart", but they actually lacks innovative contents and methods.

Through field analysis, we have tried to give a picture as close as possible to the reality of each metropolitan area, to understand whether the projects and actions are effective and coherent with the objectives.

A systematic set of information (administrative documents, proposals, projects, etc.) has been developed, which gives a complete overview of what is been done in the 12 metropolitan Italian cities (instituted by Delrio Law n.56/2014).

The research has been structured in different phases.

In the first phase, based on the extensive available literature, the set of indicators to characterize territorial and urban “smartness” was defined. Indicators were selected by taking into account their occurrence in the different studies, the availability of data at different scales (national, regional, provincial and municipal) and the reliability of the sources. In particular, regarding this last aspect, we used data provided by the Italian National Institute of Statistics (ISTAT) and by public and private research institutions.

This process led to the identification of 39 indicators calculated in a 10 year period, to also evaluate the development trends of the metropolitan systems. We have employed those indicators on different scales:

a. metropolitan capital;
b. metropolitan municipalities minus capital;
c. metropolitan area (a + b);
d. region;
e. nation.

We have distributed 36 indicators into 6 smartness characteristics both taken from literature; they have given a first overview on the smart characterization of the examined cities.

The second phase dealt with the screening of the actions, either currently underway or simply planned.

The selection of actions took into account: the actual state of completion; the consistency between early assumptions, targets and results achieved; the effectiveness in relation to impacts (economic, social, environmental, etc.) on the city; its reproducibility in other territorial contexts. The screening was carried out through an indirect analysis of documents, news available on the web and through the comparison with the urban planning documents, and the Sustainable Energy Action Plans (SEAP).

Actions have been classified by:

- their type (researches, interventions, projects, technologies, products and innovations, plans and programmes, promotion and awareness actions);
- their smart characteristic;
- their actuators (public bodies, companies, associations, institutions of research);

During the third phase, the fieldwork consisted in interviews to actors and stakeholders, based on in- depth analysis sheets on the different actions, previously collected.

The selection criteria of the significant actions to focus on, favoured those included in Smart Environment, and, in particular, those related to the energy sector, that is the focus of the SEM research project.

4 GENOA AND NAPLES: TWO SMART APPROACHES IN THE ENERGY FIELD

Focus of the SEM project, as stated, is to increase the energy efficiency of the territory and in the course of the activities, a special attention was given to the Italian metropolitan cities that are experimenting innovative actions in this field.

The analysis revealed t that Naples and Genoa (Figure 1) are characterized by a marked concentration of actions in the "Smart Environment" category, with a focus on energy issues. In particular, the energy aspect is the determining factor in the difference of the approach that the two cities are following for "urban smartness"; difference in both the number and the scope of the actions put in place. Moreover, as explicitly stated by interviewed respondents, since Genoa represents a "model" for Naples in the development of intervention strategies for the implementation of the Smart City, it seemed interesting to analyse in detail the two cities to determine whether and how effective a policy can be if it replicates the actions in several metropolitan areas.

Furthermore, as mentioned in the introduction, since one of the objectives of the research project was to precisely verify the incisiveness of some actions in the implementation process of a metropolitan Smart City, the possibility offered by Naples and Genoa to verify the effectiveness of actions in contexts that, although similar, have different vocations and services seemed particularly interesting.

Subsequently, the first findings of the research activity are then synthetically shown below and divided in two principal components:

- the Smart vocation of the two metropolitan areas;
- the ongoing experimentations which adopt the Smart City model, with special regards to those in the energy field.

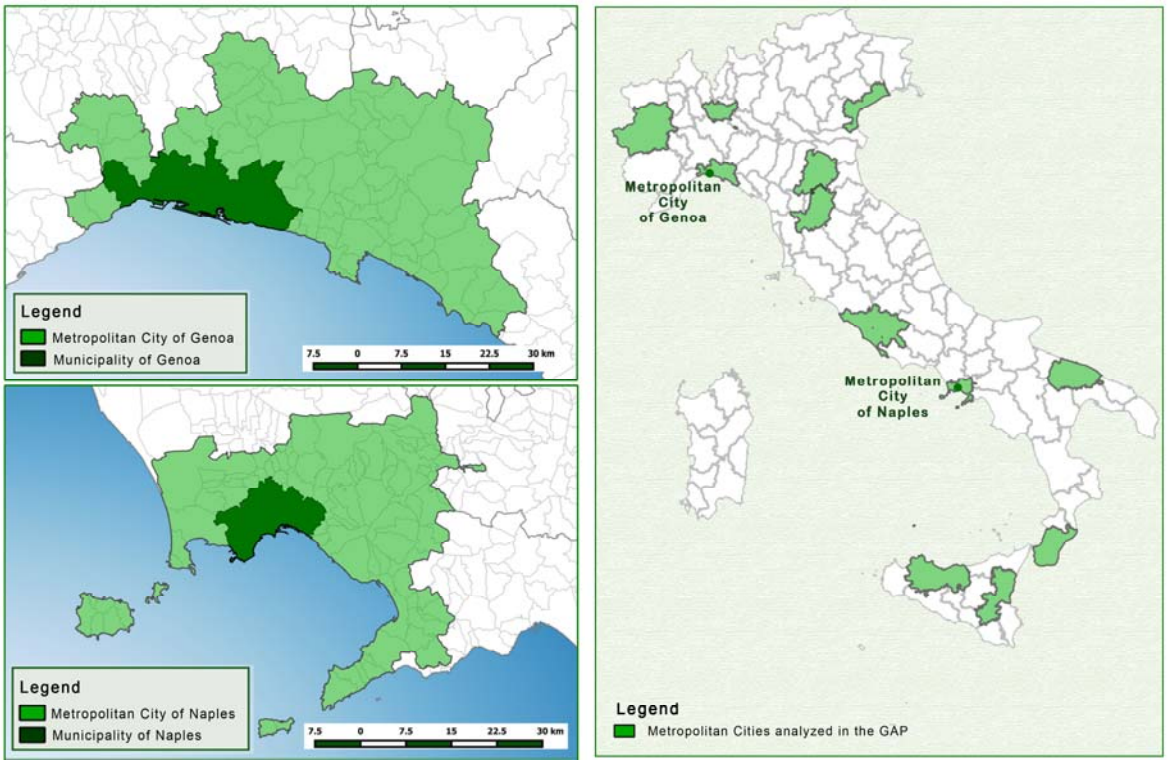


Fig. 1 Location of the two Italian metropolitan case studies

4.1 SMARTNESS INDICATORS AND ONGOING ACTIONS IN THE METROPOLITAN AREA OF GENOA

The metropolitan area of Genoa is composed of 67 municipalities, with a population of 855,834 and covers an area of 1833 km^2, with Genoa as its capital, which has a population of 586,180 and covers an area of 240 km^2.

The application of the methodology for the study of Genoa has allowed us to build a picture of its performance in relation to the smart characterization and brought out its strengths and weaknesses, but also its vocation and its level of propensity towards the Smart City. The 36 indicators referring to a ten year period and at different spatial scales provide the trend of the performance of each analysed aspect.

Figure 2 shows the values of Genoa in the different dimensions of smartness, differentiating the metropolitan territory from the Capital. The performance of the metropolitan area of Genoa than the Capital's emerges, with regard to all the characteristics except Smart Environment where a strong predominance of the capital city is evident.

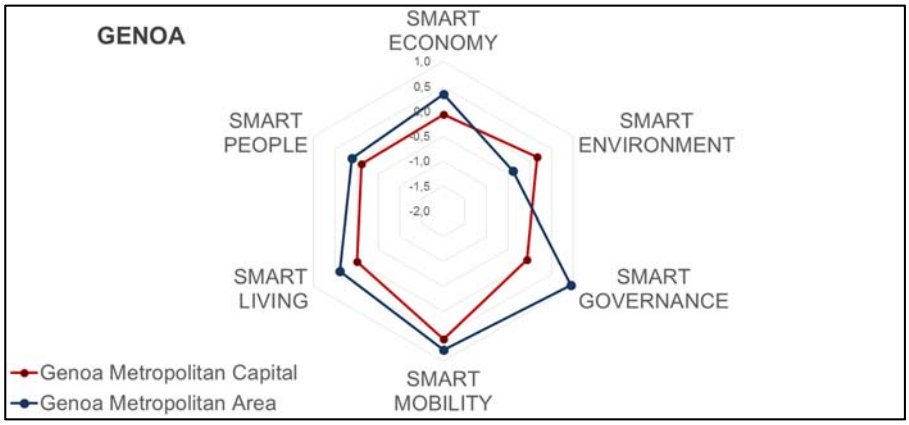


Fig. 2 Smart characteristics for Genoa and its metropolitan area

Concerning "Smart Environment", in particular, the identified indicators are:

- PM10 emissions;
- green urban spaces;
- energy consumption;
- Sustainable Environmental Action Plan;
- renewable sources from solar PV systems;
- recycling.

In particular, in relation to the focus of this paper, analysing the values of the indicators related to energy , the findings show that energy consumption for the metropolitan city of Genoa in 2011 are in line with the Italian average (1179 kWh/cap for Genoa against 1177 kWh/cap for Italy). In addition, it is interesting to note that, as shown in the graph on the urban smartness, the capital city has a lower energy consumption than the metropolitan territory, whose values are higher than national's. However, values referring to 2011 are higher in all territorial scale compared to 2001 (Figure 3 first part). As for energy production per capita by photovoltaic for 2014, the graph shows a greater inclination of metropolitan municipalities rather than the Capital to install photovoltaic systems. Probably, it is linked to the objective difficulty to install them in the city centre (Figure 3, second part).

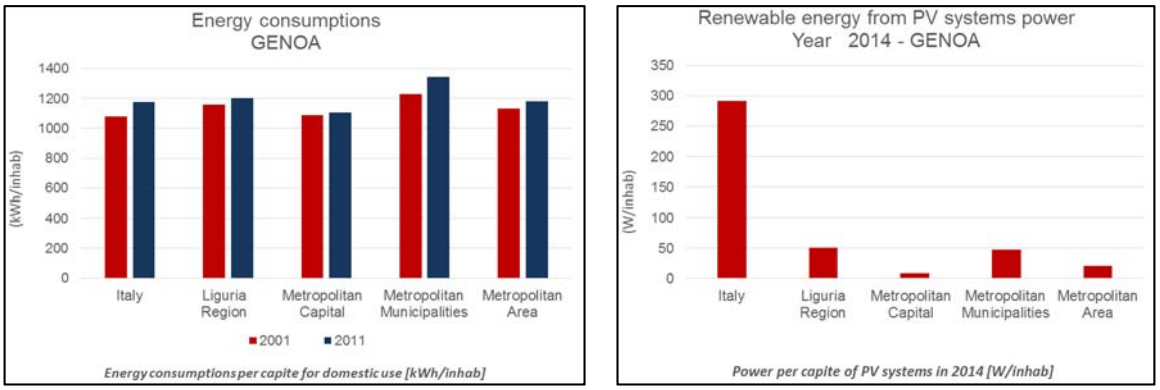


Fig. 3 Histograms related to energy consumption and renewable energy indicators for Genoa

The second phase which is, as mentioned, about the screening of actions to implement a Smart City, revealed that a significant number of actions concerned Smart Environment (Figure 4).

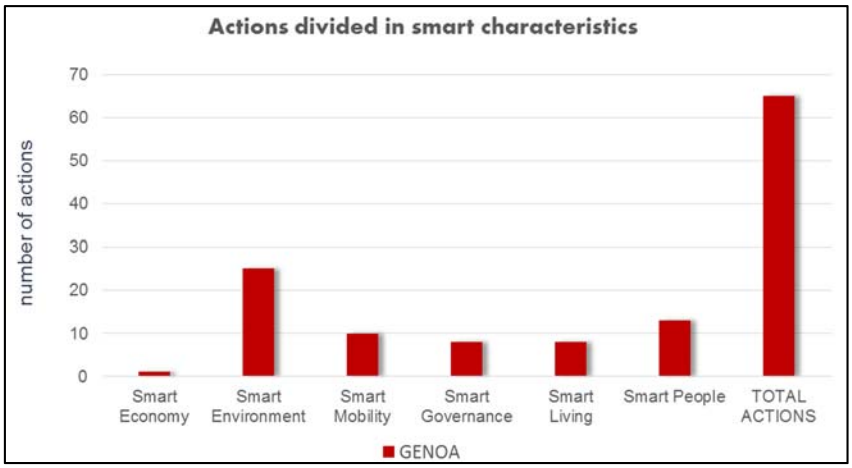


Fig. 4 Actions divided by characteristics in the Metropolitan City of Genoa

In particular, the first graph in Figure 5 shows that Genoa is mainly investing in interventions, infrastructures and projects (57.14%). This testifies its propensity to implement the Smart City. In the second graph of Figure 5 on the articulation of the actions for actuators, there is a clear preponderance of the local authorities and institutions. This finding is consistent with the type of prevalent actions (infrastructures and interventions) that can only be implemented by public local entities rather than by associations, companies or research institutes.

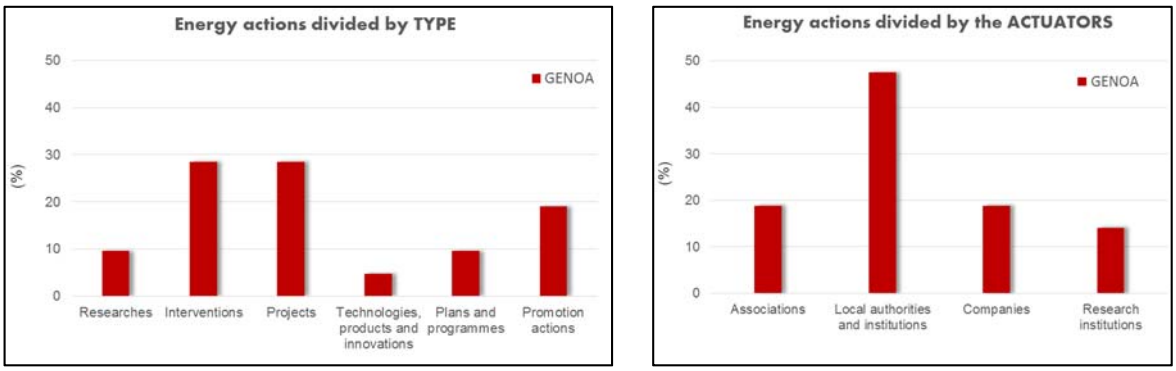


Fig. 5 Energy actions divided by type and actuators for Genoa

As the graph below shows (Figure 6), among all the actions associated to the Smart City, those related to energy issues have a significant share, 32% of the total.

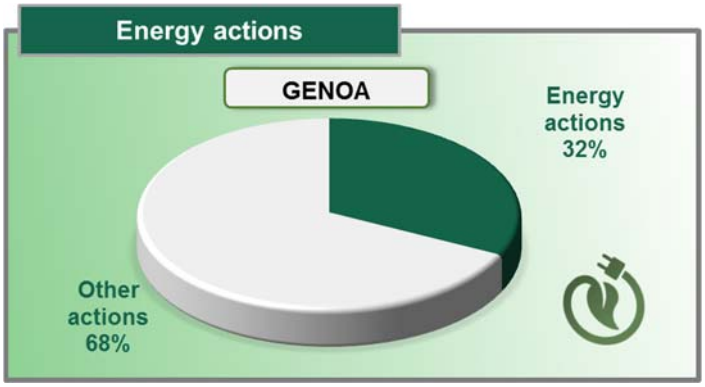


Fig. 6 Share of energy actions on the total actions for Genoa

From this initial analysis, we can deduced that in order to reduce energy consumption, that is very high and above the national average, Genoa is heavily investing in experiences, projects and actions to address energy efficiency and savings.

4.2 SMARTNESS INDICATORS AND ONGOING ACTIONS IN THE METROPOLITAN AREA OF NAPLES

The metropolitan area of Naples is composed of 92 municipalities, it has a population of 3,054,956 and covers an area of 1,171 km^2. Its capital, Naples, has a population of 962,003 and covers an area of 119.02 km^2. Figure 7 shows the values of Naples in the different dimensions of smartness.

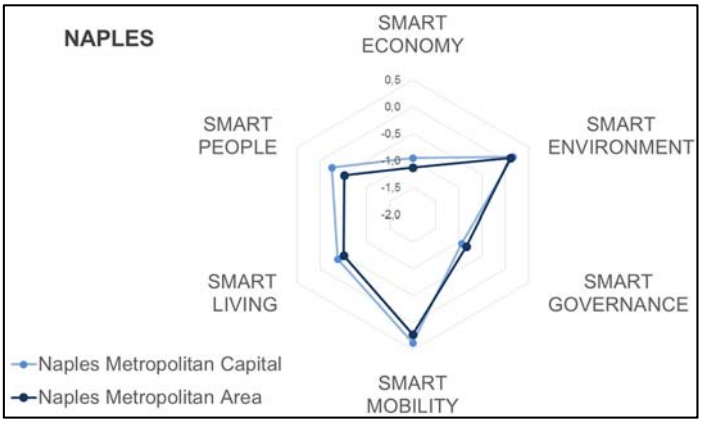
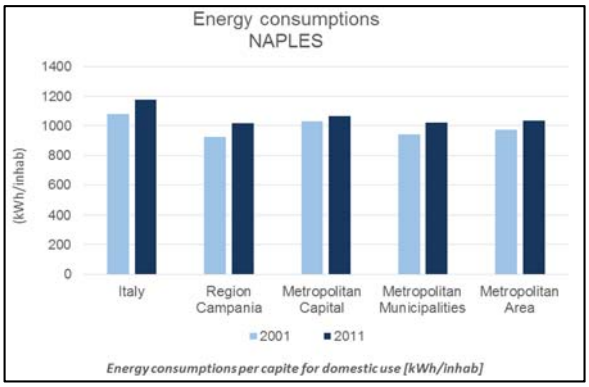


Fig. 7 Smart characteristics for Naples and its metropolitan area

Analysing the Neapolitan case, we can say that, regarding residential energy consumption, Naples shows slightly lower values than the National average both in 2001 and in 2011 (Figure 8, first part). The graph on the energy per capita produced by photovoltaic systems, also in this case, shows far superior values in the metropolitan municipalities than in the capital city, once again, probably because of the difficulty to install the facilities in the historical centre (Figure 8).



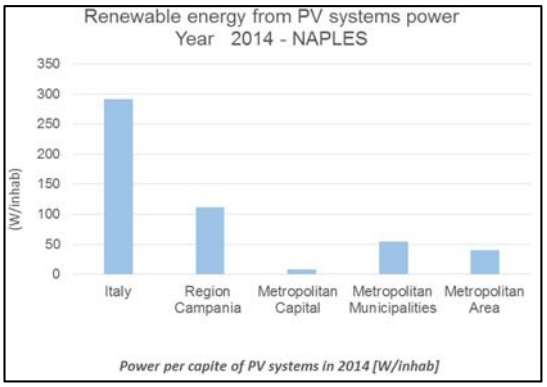


Fig. 8 Graphs related to energy consumption and renewable energy indicators for Naples

As with Genoa, in Naples the number of actions aiming at the Smart Environment is clearly superior to all other actions (Figure 9).

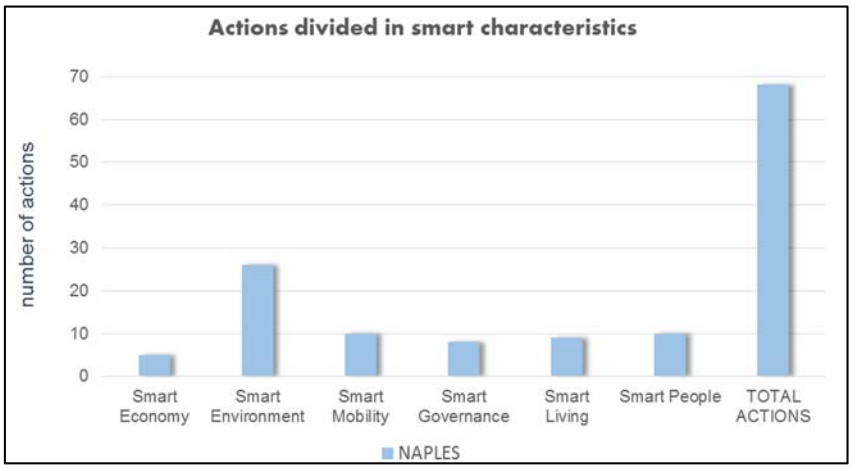
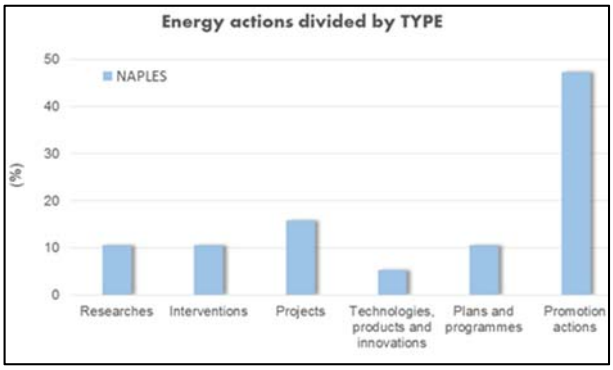


Fig. 9 Actions divided by characteristics in the metropolitan area of Naples

Regarding the type of actions that have been tested in the city, the first graph in Figure 10 shows that Naples is investing in promotion and awareness (47.4%), and this may refer to the need to "enhance attentiveness to the conservation of environmental resources". Companies and associations emerge strongly as the drivers of the actions, followed by research bodies, local authorities and institutions. Intersecting this information with the one above, we can derive a picture of how companies and associations are active in this field, especially through awareness raising and promotion activities (Figure 10, second part).



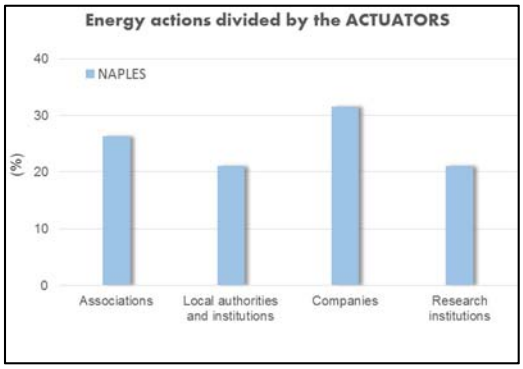


Fig. 10 Energy actions divided by type and actuators for Napoli.

Finally, the last graph shows the amount of energy actions compared to the total. As in the case of the Capital of Liguria, they are a very significant number (26%) (Figure 11).

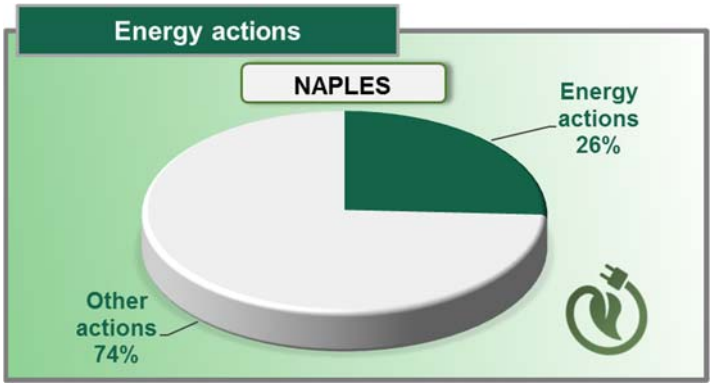


Fig. 11 Share of energy actions on the total actions for Naples

4.3 ACTIONS DEVELOPED IN BOTH CITIES IN THE ENERGY FIELD

The in-depth field analysis of ongoing actions has allowed the completion of the picture of the path undertaken by the two cities on the Smart City subject and, at the same time, the verification of their effective implementation. From the meetings with the different stakeholders consulted, the fact that Genoa represents a reference for Naples emerged, for its capacity to bring together different actors to initiate the actions in the fields of: energy efficiency, sustainable mobility, implementation of digital infrastructures, promotion of citizens awareness.

In 2010 in the capital of Liguria, Genoa Smart City Association (GSCA) was constituted, with the task of coordinating sustainable actions and supporting the "information society" and also, especially, with the purpose of coordinating workshops with stakeholders (Local Authorities, companies, citizens associations, research institutions and universities). Another purpose is to activate actions by means of public/private partnership, in order to be more effective thanks to their joint participation and to accelerate the activation processes of actions in the city. More than twenty projects have been developed in the last three years thanks to the support of Genoa Smart City Association which, in this way, has represented a useful governance instrument, free from the traditional and sometimes muddled administrative procedures.

Based on the Association's success, in 2012 Naples followed its example, creating the premises to fund Naples Smart City Association (NSCA), born at the end of 2014. Taking example explicitly from the Genoese association, NSCA has among its objectives the creation of a forum where local stakeholders could debate on innovative projects and discuss about common issues to create critical mass and share experiences as confirmed by the stakeholders' interviews.

In Genoa and in Naples, some actions have been independently developed, to reduce energy consumption in the residential sector. Two such actions, implemented in Genoa and Naples, are the "Elih-med" project, promoted by the EU, and "Condomini intelligenti" promoted by Muvita association, that aim to the efficiency of the residential stock.

In detail, Elih-med (Energy efficiency in Low Income Housing in the MEDiterrean) is an EU transnational cooperation programme among the "Territorial Cooperation objective" of the EU Cohesion Policy defined by the frame work of the Med Programme – Objective 2.2. The project involves seven European countries Italy, Spain, Greece, Slovenia, Cyprus, Malta and France and was tested in four Italian cities including Genoa and Frattamaggiore (a municipality in the Neapolitan metropolitan area). Its attention is focused on energy

efficiency in low income housing (LIH) in the Mediterranean area and on the involvement of the inhabitants in energy retrofits. Its objective is to identify and test, through large scale actions, the feasibility of innovative technical and economically efficient solutions by means of financing mechanisms supported by European Regional Development Fund (ERDF). The final aim is the completion of the maximum number of possible interventions with particular reference to the Local Authority's social housing patrimony now neglected and equipped with total inefficient cooling and heating systems and building envelops. Because of this, pilot buildings have been chosen as case studies, to involve inhabitants in choosing technical solutions.
The Genoese pilot project involved two buildings localized in Valbisagno, precisely Lungo Bisagno Dalmazia (9 dwellings on two floors) and Piazzale Adriatico (36 dwellings on six floors), entirely owned by the Local Authority and destined to social housing. The energy efficiency interventions chosen were external insulation, the substitution of window and door fixtures, the roof insulation, and the installation of cooling and heating systems. These improvements brought the energy class of the dwellings from G to B or C.
The pilot intervention in Frattamaggiore involved a multistory building with 18 dwellings. It included the substitution of window fixtures with triple glazing windows and thermal fixtures, the installation of a 1,4KW solar PV plant per dwelling, a 1,8 m^2 solar thermal collector per dwelling. The expected result of these operations was a 40 to 60% reduction of energy consumption; this is now verified.
The Condomini Intelligenti project is also focused on the reduction of energy consumption of residential multistory buildings. Nevertheless, unlike Elih-med, which uses European funds, Condomin Intelligenti takes advantages of the virtuous mechanism of ESCos (Energy Service Companies), which shoulder the economic risks of the interventions. This project started in 2011 from an initiative of the Muvita Foundation, (100% Province of Genoa), which developed an integrated system to evaluate the feasibility and manage the interventions, promoting, at the same time, citizens' awareness and involvement in the processes.
After the first intervention on a super-multistory building in Genoa, the system was structured through preliminary energy audits on condominiums all over the metropolitan area to identify a methodology to draft "guidelines" for the energy efficiency actions. The condominiums can independently apply to the public call submitting an agreement with an ESCo, which funds the operations. Annual saving obtained by the reduction of energy consumption of each building forms the ESCo's payback, until the total interventions costs are refunded (usually 10 years). The initiative's success is, on the one hand, in setting up a self-financing mechanism, thanks to ESCos, so that the only expense for Local Authority is the initial drafting of the energy audits; on the other hand, in improving citizens' awareness, by organizing seminars for specialists and apartment block administrators.
Once again, Naples chooses to start experiences successfully experimented in the capital of Liguria. Thus, in November 2013 an agreement was signed between the two cities to import the Condomini Intelligenti package within the Neapolitan boundaries. National Association of Building Constructors (ANCE) of Naples has promoted this initiative. The funding for the first step of energy audits was requested to the Economic Development Ministry in order to let the operations start as soon as possible.

5 TWO DIFFERENT PATHS FOR A COMMON GOAL

The general picture of the current propensity to smartness of Italian metropolitan areas has highlighted the existing similarities. Indeed, from the analysis of the experiences and policies initiated in the metropolitan areas of Genoa and Naples, among the many themes defining Smart City, the energy component emerges as a central subject. Findings showed that in both case studies, smart actions are primarily aimed at energy saving or, alternatively, at environmental protection. The analysis of the two case studies allowed us to draw a comparison on the state of the two cities. The Comparison of the indicators relating to the six characteristics of smartness showed that the metropolitan area of Genoa performs better than its Capital, while the situation is reversed for Naples, recording the best values for the capital city. In light of the

analysis conducted, it seems possible to state that the two cities are undertaking a common path in the implementation of strategies to transform into a Smart City, focusing especially on the energy aspect.

On the one hand this development path begins also thanks to the EU's guidelines and funds, on the other, it is evident that the relationship between energy and the city becomes more and more crucial in the major European cities' agendas (Gargiulo, Pinto and Zucaro, 2013).

In spite of the relevance of this aspect, from the in-depth analysis of literature on the Smart City, it seems like indicators measuring the effectiveness of strategies are almost neglected.

Moreover, at least in Italy, though remarkable progress in terms of open data, finding up to date data related, for example, to energy consumption at different scales seems to be still very difficult.

Furthermore, while actions at building scale are numerous, they are few and isolated examples at the urban scale. Indeed, the most important Italian regulation introducing prescriptions on energy planning issues, is the Law n.10/1991 "*Regulations for the national energy plan for the rational use of energy, energy saving and development of renewable sources of energy"*. This law, rather outdated by now, introduced the drafting of plans that address the deployment of energy from renewable sources, the identification of territorial energy basins, the localization of the electric energy systems and the energy balance of territorial jurisdiction (Battarra, 2014). Although this regulation compels the municipalities with more than 50.000 inhabitants to draft specific Municipal Energy Plan (PEC), only few Italian municipalities have complied.

Only recently (indicatively from 2008) some cities, at least in theory, are performing actions improve energy efficiency and increase the use of renewable sources, which seem to be integrated, mostly after the voluntary adhesion to the Covenant of Mayors and the drafting of Sustainable Energy Action Plan (SEAP) (Verones, Zanon, 2012).

The importance of the Covenant of Mayors is in having brought to the local stakeholders' attention the energy issue and to government instruments such as the Town Plan.

As a matter of fact, the EU proposed the Covenant of Mayor as a bottom-up initiative for virtuous communities that intend to take part to a coherent implementation of European policies at a local scale. The operative instrument, represented by the SEAP, could realistically affect the local scale if it is mainstreamed in the regular urban planning, and could become an opportunity to initiate interventions and to evaluate the actions that has been proposed. Without these premises, even the adhesion to the Covenant of Mayors would not bring the expected results for the participant communities and would not influence the resource management procedures (De Pascali, 2015).

REFERENCES

ABB – Ambrosetti (2012). Smart Cities in Italia: un'opportunità nello spirito del Rinascimento per una nuova qualità della vita. Retrieved from http://www02.abb.com.

Battarra, R., (2014). Energy and Smart City Planning, some Italian best practices. In R. Papa (ed.), *Towards Smart City a scientific approach*. (pp. 87 – 100). Roma: Aracne. ISBN: 9788891711250.

Benevolo, C., & Dameri, P. (2013). La smart city come strumento di green development. Il caso di Genova Smart City. *ImpresaProgetto. Electronic journal of management*, (3), 1-38.

Between (2014). Smart City Index. Retrieved from http://www.between.it/ita/smart-city-index.php.

Cittalia, Siemens (2012). EfficienCITIES. Città-modello per lo sviluppo del Paese. Retrieved from https://w5.siemens.com.

Cnel-Istat (2013). Urbes - il benessere equo e sostenibile nelle città. Retrieved from http://www.istat.it.

Cohen, B. (2012). Key Components for Smart Cities. Retrieved from http://www.ubmfuturecities.com.

De Pascali, P. (ed.). (2015). L'energia nelle trasformazioni del territorio. Milano: FrancoAngeli. ISBN: 9788891711250.

Dipartimento Interateneo di Scienze, Progetto e Politiche del Territorio (2013). EU-POLIS Smart Torino, Rapporto finale. Retrieved from http://areeweb.polito.it/ricerca/eupolis/progettidiricerca_allegati/Torino_Smart/EU-POLIS% 20rapporto% 202013_lq4.pdf.

Euromobility (2013). La mobilità sostenibile in Italia. Retrieved from http://www.euromobility.org/.

Forum PA (2014). ICity Rate. La classifica delle città intelligenti italiane, Retrieved from http://www.icitylab.it/line-dati-di-icity-rate-2014/.

Gargiulo, C., Pinto, V., & Zucaro, F. (2012). City and mobility: towards an integrated approach to resolve energy problems. *TeMA. Journal Of Land Use, Mobility And Environment*, 5(2), 23-54. doi: http://dx.doi.org/10.6092/1970-9870/920.

Gargiulo, C., Pinto, V., & Zucaro, F. (2013). EU Smart City Governance. *TeMA. Journal Of Land Use, Mobility And Environment*, 6(3), 356-370. doi: http://dx.doi.org/10.6092/1970-9870/1980.

Giffinger, R., Fertner, C., Kramar, H., Kalasek, R., Pichler-Milanovic, N., Meijers E. (2007). Smart cities. Ranking of European medium-sized cities, Final Report, Centre of Regional Science, Vienna UT. Retrieved from http://www.smart-cities.eu/download/smart_cities_final_report.pdf.

Il Sole 24 ore (2013). Qualità della vita. Retrieved from http://www.ilsole24ore.com/speciali/qvita_2013/home.shtml.

Istat (2013). Dati ambientali nelle città. Retrieved from http://www.istat.it/it/archivio/129010.

Legambiente (2014). Ecosistema Urbano. Retrieved from http://www.legambiente.it/contenuti/articoli/ecosistema-urbano-2014.

Maltese, I., Mariotti, I., Boscacci, F. (2013). Smart cities and housing markets: evidence from Italy. *Proceedings XXXIV Conferenza italiana di scienze regionali,* 2-3 September 2013, Palermo, Italia. Retrieved from http:// www.aisre.it /images/old_papers/AISRE13_MMB_SmartC.pdf.

Verones S., Zanon B. (eds.). (2012). Energia e pianificazione urbanistica. Verso un'integrazione delle politiche urbane, Milano: FrancoAngeli. ISBN: 9788820417314.

IMAGE SOURCES

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