

Abstract

This research will analyze the formation and evolution of regional policy networks involving both public and private stakeholders in the emerging sector of Green Building Technologies¹ (GBT). Networks will be considered as a form of governance system and emphasis will be put in the formation and management of these networks as well as the way in which they decide about the selection and application of activities and policy instruments. The study investigate local stakeholder interactions as well as articulation and interdependencies with other actors in a multilevel environmental governance system². The general background of this study will be the process of implementation of policies on GBT which emanate from higher policy levels such as EU, and central and regional Spanish governments.

Keywords: environmental governance, innovation, networks, institutional capacity

1) Introduction

In the last two decades, an international construction system emerged among main cities in both industrialised and developing countries which strongly interacts with regional and local craft practices. Thus, the understanding of the pattern of development and diffusion of Green buildings Technologies (GBT) can not be separated from the broader technological, economic and political contexts confined to the urban sphere (Gann 2003) as well as factors regarding implementation of related policies can not be confined to a local arena of governance, or reduced to struggles between the central and local state (Bulkeley and Betsill, 2005; Shove, 1998; Schubert, 1999).

Recent studies have highlighted the need to improve our understanding of network activities in a multilevel governance system (Bulkeley and Betsill, 2005, Bulkeley, 2005, Corfee-Morlot et al., 2009). Other studies have focused on the complexity of the dynamic context within which policies are developed and implemented (Healey et al., 2003, Innes and Booher, 2003) and, thereby, the strategy of government to pursue integrated approaches that coordinate policy across different domains (e.g. environment, energy, industry, urban planning) by adopting a complementary, innovation friendly mix of policy instruments (Salmenkaita and Salo, 2002; Rohrer, 2001, Circo, 2007, Gouldson, 2008). Regarding the specific Building and Construction Industry (BCI), several studies have explained issues on networks for innovation

¹ GBT refers to building which primarily involve practice in the design, construction, and operation and other facilities in ways to reserve natural resources (Circo, 2007). The concept sustainable architecture will be used as well by considering a broader economic and business sense used very often within the case study

² Multilevel governance can be defined as a governing system where central government and other public and private actors interface to design and implement policies and programs from international to national and local level of actions (Hooghe and Marks, 2003)

(Seaden and Manseau, 2001, Gann and Salter, 2000, Beerepoot and Beerepoot, 2007, Bossink, 2004), however, there is still a lack of knowledge on how these networks operate within particular context of BCI (Blayse and Manley, 2004, Carmona, 2009, Harty, 2008b).

Thus, by considering network formation and operation within a multilevel perspective and the characteristics of BCI, this paper will contribute to the knowledge about how network the formation and management of these networks as well as the way in which they decide about the selection and application of activities and policy instruments. Emphasis will be put in highlighting the nature of networks as a mechanism for problem-solving that allow stakeholders to manage conflict between public interest and the profit making behaviour of the private sector. The general background of this study will be the process of implementation of policies on GBT which emanate from higher policy levels such as EU, and central and regional Spanish governments.

More specifically, two relevant conflicts can be highlighted as hampering factors for the introduction of GBT. First, from the private sector point of view, the main conflict arises from the time constraints imposed by the building sector business cycle. While manufactures of materials and components can push to introduce new technologies, these innovations represent an additional upfront cost for builders who may not necessarily profit from long term operational savings (e.g. water and energy management). Second, from a policy perspective, different government levels seek sustainability objectives through policy instruments (from regulation and subsidies to coordination and facilitation activities) to drive the behaviour of firms that are mainly driven by profit motives. This research will focus on the analysis of the network governance to increase knowledge about the ways in which these two conflicts (the first, internal to the BCI and the second, regarding public-private interest) can be addressed by networks mechanism.

The paper begins by providing a theoretical framework to understand the notion of multilevel environmental system and the main characteristics of BCI. Then, it moves to explore elements of institutional capacity building approach and its connections with concepts of environmental governance. Finally, key elements of the case of Valencia region as well as new question are highlighted to drive further research on the formation and operation of networks as mechanism of problem solving.

2) Environmental governance and policy networks in the building sector

In the last two decades, the BCI became less constrained by the local context and emerged to international markets. From an industrial perspective, two factors are critical in this movement: 1) technological developments in the supply side introducing new materials, components, and energy efficiency artefacts (Seaden and Manseau, 2001, Blayse and Manley, 2004, Pries and Janszen, 1995) and, 2) the transnationalization of big BCI companies (MCNEILL, 2008, Seaden et al., 2003, Cheah et al., 2004, Faulconbridge, 2009). From a policy perspective, the central issue is the new international commitments regarding environmental requirements which are taken individually by national government and finally implemented at local level. This last means a transfer of new competencies and responsibilities to local governments (Bulkeley, 2005, Corfee-Morlot et al., 2009, Betsill and Bulkeley, 2004, 2006).

Explanations about these changes have been developed by studies on environmental governance (Bulkeley and Betsill, 2005, Healey et al., 2003), sustainability in socio-technical systems (Rohracher, 2001, Smith, 2006) and environmental policy at local level (Flynn, 2000, Lovell, 2004). These studies have highlighted the fact that the understanding of the patterns of development and diffusion of new technologies as GBT can not be separated from the broader technological, economic and political contexts confined to the urban sphere. Similarly, the factors affecting network formation can not be confined to the local arena, or reduced to struggles between the central and local state ((Bulkeley and Betsill, 2005, Bulkeley, 2005, Gann, 2003, Shove, 1998); Schubert, 1999). Factors belonging to that broader context may explain how a variety of environmental techniques and approaches to sustainability have emerged in different locations by strongly combining innovations developed at international level with regional and local craft practices (Gann, 2003).

More specifically, some studies have emphasised the role of government in the process of introduction of GBT. A cluster of studies focus in the intervention in the innovation process {{141 Beerepoot, M. 2007; 109 Seaden, G. 2001; 132 Dulaimi, M.F. 2002; 149 Pries, F. 1995; 119 Theaker, I.G. 2001; 179 Manseau, A. 2005}} by the exploration of how traditional activities and instruments facilitate innovation through support measures (e.g. funding public research institutes, R&D subsidies) and stimulate by mandatory regulations (i.e. norms and standards). However, other studies have highlighted the lack of knowledge about how to use those available activities and instruments to solve problems to innovate in a proper way (Circo, 2007, Seaden and Manseau, 2001). In particular, some studies emphasise the lack of knowledge about relationships between innovation influences and other aspects of business strategy and environment

(Blayse and Manley, 2004) and the specific context of construction industry (Miozzo and Dewick, 2004, Miozzo and Dewick, 2002, Gann, 2000, Harty, 2008a).

Developments on GBT as an emergent sector within the traditional structures of the BCIs involve a set of coordination activities between a variety of actors at different stages such as R&D activities, public demonstration—exposition of prototypes and commercialization. Those activities involve a rethinking of relationships between public and private sector within an environmental governance subsystem (Circo, 2007, Sunikka and Boon, 2003, Clark et al., 2001, Priemus, 2005, Stone, 1993). The management of those relationships become then part of a process of network formation between fragmented institutions of local governance (Entwistle et al., 2007) where hybrid arrangements can take place between a mix of state and non-state actors. Actors included may come from different levels of governance simultaneously, such as state actors, subnational governments, multilateral institutions, NGOs, businesses interests and scientists, constituting what has been referred to as a “multilevel governance” governance system (Bulkeley, 2005, Gann and Salter, 2000, Gann, 2003, Lovell, 2004, Lovell et al., 2009).

Difficulties in coordination of activities very often appear in this type of multiple actors and levels configuration which, according to (Entwistle et al., 2007), can be faced by promoting a “second generation of governance instruments”. These instruments are compatible with processes of networks formation and include instruments such as covenant, contract and communicative planning that can help traditional instruments (i.e. incentives and mandatory regulation) to go a step further to support the evolution of an emergence sector as sustainable construction. However, problems on network formation and operation may emerge when some critical hampering factors appear:

a) Conflict between actors.

Networks approaches have widely studied activities of multiple actors following a variety of purposes. The extant literature emphasises issues of trusts, size (coordination problems) and actors competencies, however, the logic of network governance can be mostly determined by interest divergence or goal consensus (Provan and Kenis, 2007, Messner and Meyer-Stamer, 2000). Autonomous actors with different but reciprocally dependent interest can use networks as an organizational form to deal with complex problems through negotiations between senior government and industry leaders (Seaden and Manseau, 2001). More specifically, in the case of GBT, balance between short and long term, public (safety, sustainability) and private (profit, market dominance) interests must be aligned and maintained (Circo, 2007, Seaden and Manseau, 2001, Carmona, 2009).

b) Significant misfit between policies at different levels

The environmental governance system involves new configurations of state and non-state actors playing a variety of roles under overlapping and competing authorities at different levels (Bulkeley, H. 2005). From this, the implications for local economies in term of the compatibilities (in term of objectives, activities and instruments) with higher political levels (e.g. EU) and global organisations (e.g. NGOs, MNC) are substantial. EU legislation (i.e. regulation of industrial activity and programs supporting R&D) effectively create the starting point from which local proactive strategies can proceed (Flynn, 2000).

However, by considering the multilevel perspective (i.e. EU policy and other national, regional and, even more, local policies) the coordination dilemma appears as long as there is a possibility that policies of one jurisdiction have spillovers or impacts (positive or negative) for other jurisdiction (van Bueren, E. 2005; 123 Flynn, B. 2000; 166 Glachant, M. 2001; 191 Jordan, A. 2003; 124 Hooghe, L. 2003). For example, environmental national or regional policies may impact negatively or positively on industrial and local development strategies. Then, divergence on policy objectives, outputs and outcomes can generate implementation problems (Borzel, 2000, Smith, 2000), and thereby, can force decision-makers to start again and to reformulate the policy objectives and strategies (Flynn, 2000, Glachant, 2001, Busch et al., 2005).

c) Lack of institutional capacity

The institutional capacity of a governance system can be built based on intellectual (knowledge resources), social (trust and social understanding) and political capital (the capacity to act collectively to develop qualities and captures external attention and resources) by which values and actions are actively created, constructed and modified (Healey et al., 2003). These elements may also overlaps with other two concepts widely used in literature: absorptive capacity and organizational resources. Absorptive capacity can be defined as technical competence to benefit from research and absorb results (Gann, D. 2001) while organizational resources may include a variety of elements such as culture of collaboration, existence of key actors as facilitators of innovation strategy, openness to new ideas

and dialogue and capacity to employ the critical mass of professionals {{118 Blayse, A.M. 2004}}. From this set of concepts and, regarding on network formation and operation, two dimensions should be considered:

First, some studies has highlighted a need for a better understanding of networks and the features for effective governing systems under different circumstances (Provan and Kenis, 2007, Entwistle et al., 2007) and, more specifically, the way the network is managed and operated through relationships created from emerged environmental governance configurations (Bulkeley and Betsill, 2005, Bulkeley, 2005, Corfee-Morlot et al., 2009). In particular, some authors claim more research is needed on the management of the set of activities and instruments to support the network (Circo, 2007, Seaden and Manseau, 2001).

Second, implementation problems at the local level are a critical issue to understand multilevel governance configurations. The lack of expertise and financial resources of local authorities may make it difficult to implement at the local level the policies originated at regional, state, national or even international scale (Flynn, 2000, Theaker and Cole, 2001). In fact, there is decoupling between general recognition of problems and the assumption of the capacity of existing institutions to solve them ((Hajer, 1995, Hajer and Versteeg, 2005, Sørensen and Torfing, 2009).

To sum up, there is an increasing literature on policy networks, multilevel governance and environmental policy that contribute to a better understanding of interaction between different actors and levels of governments. However, they have highlighted the need of a better understanding of the different mechanisms (e.g activities and policy instruments) to support and manage networks to solve conflicts and achieve multiple objectives. More knowledge is needed on explanations on the way the governance of networks emerges and adapts over time. This study has the aim to highlight issues on the formation of green networks and, to do so, emphasis will be put in the set of element to develop institutional capacity and how they affect the relate with the other two factors, conflict between actors and misfits misfit between policies at different levels. A summary of the key elements to be explored will be described as follow.

Institutional capacity building

The approach used in this paper to highlight changes in governance system and the formation of networks will be based in the factors described by Healey et al (2003) to analyse the process of development of institutional capacity: knowledge resources, relational resources and mobilization capacity. The purpose of applying this approach is firstly, mapping main governance system elements and, second, identify relationships between the flows of these resources and capacities and the sources for formation of networks. Healy et al (2003) exemplify knowledge resources, relational resources and mobilization capacity by four elements which are briefly described in the table below.

Table 1. The dimension of institutional capacity building

Knowledge resources	The range of knowledge resources, explicit and tacit, systematized and experiential, to which participants have access
	The frames of reference which shape conceptions of issues, problems, opportunities and interventions, including the conception of place
	The extent to which the range and frames area shared among stakeholders, integrating different spheres of policy development and action around place qualities
	The capacity to absorb new ideas and learn from them (openness and learning)
Relational resources	The range of stakeholders involved, in relation to the potential universe of stakeholders in the issue or in what goes on in an area
	The morphology of their social networks, in term of the density (or “thickness”) of network interconnections and their “route structure”
	The extent of integration of the various networks
Mobilization capacity	The location of the power to act , the reaction of power between actors and the interaction with wider authoritative, allocative and ideological structuring forces
	The opportunity to structure
	The institutional arenas used and developed by stakeholders to take advantage of opportunities
	The repertoire of mobilization techniques which are used to develop and sustain momentum

Source: Healey et al (2003)

Healey et al (2003) frame the concept of knowledge resources by considering social constructivist and focus on tacit knowledge and experiential understanding. The same elements are also used by Gann (2003) to identify the need to tackle social and environmental sustainability while encouraging economic activity by applying knowledge exchange at a number of different levels (project, organization and communities of practice) and scales (local, regional and international). Relational resources are drawn on institutional approaches by defining networks or webs of relations within which governance actors are embedded and, thereby, emphasizing the way in which different morphologies can affect the access to them and power relations (Healey et al. 2003). Similar to morphology, Provan and Kenis (2007) explore the issues of access and power in terms of network governance and the key elements as trust, consensus and competencies which can drive the form of network.

Finally, mobilization capacity is based on Tarrow (1994) approach which highlights structure, different levels and key agents, all of them are common on the arguments of (Entwistle et al., 2007, Bulkeley, 2005, Lovell et al., 2009) regarding the levels of configuration, process and strategies in a context of change and movements. These linkages between different approaches on networks and governance studies will be used to the identification of those elements by considering different dimensions of the governance system as the particularities of the BCI sector and the complexity of background policies, activities and instruments affecting the formation of network. Thus, the next section will describe the empirical approach to operationalize this context in the case of Valencia region.

3) ***Empirical study***

This study aims to contribute to the understanding of networks formation by focussing in the development of institutional capacity. There are two main points in this approach: 1) possible ways to manage conflict between actors, and 2) the use and application of activities and policy instruments to support network formation and operation. Implementation of energy and environmental policies will be the backbone of this research, which will rely on the study of Valencia region. The empirical research consisted in a case study project as part of the early stage of a doctoral thesis. The extended case study provides a means of assessing information and highlights the set of events and elements about changes in the environmental governance system, the internal factors and external influences that interact to determine network formation by considering a multilevel perspective.

Methodology approach

In order to carry on with the previous goal, four stages will be used to assess the case through elements from the resilience theory. The first stage includes a description of the key events, policy and programs at national and international level to understand the change operated in a multilevel perspective. The second stage focuses in the Valencia region specific case in order to exemplify changes in governance process and the consequent formation of new networks. Thirdly, networks will be treated through the analysis of the member's affiliation and the set of different activities and instruments involved. At final, elements referring to the dimension of institutional capacity (Table 1) will be analysed by the role in the formation of networks and articulations of different actors in the environmental governance system. At this stage, factors and a set of questions regarding further explanations on the networks formation, maintenance and operation will be drawn. The empirical exploration will be done by gathering data through websites, policy documents, normative and projects memories which are currently collated as the preparatory stage of the DPhil study fieldwork. Then, analysis of these data will be conducted by content analysis and statistical procedures under a case study approach.

Overview of the case: key events, policies and programs at National and International Level

The energy problem in Spain became an important issue since the second oil crisis (1979) mainly because of the scarcity of natural resources (mostly carbon and hydroelectric rather than oil) and the high risk of the external energy supply (more than two thirds of the total supply). Spain has a diversity of industrial sectors in terms of type and age of infrastructure which mainly constrain the possibilities of shifting the industrial structure.

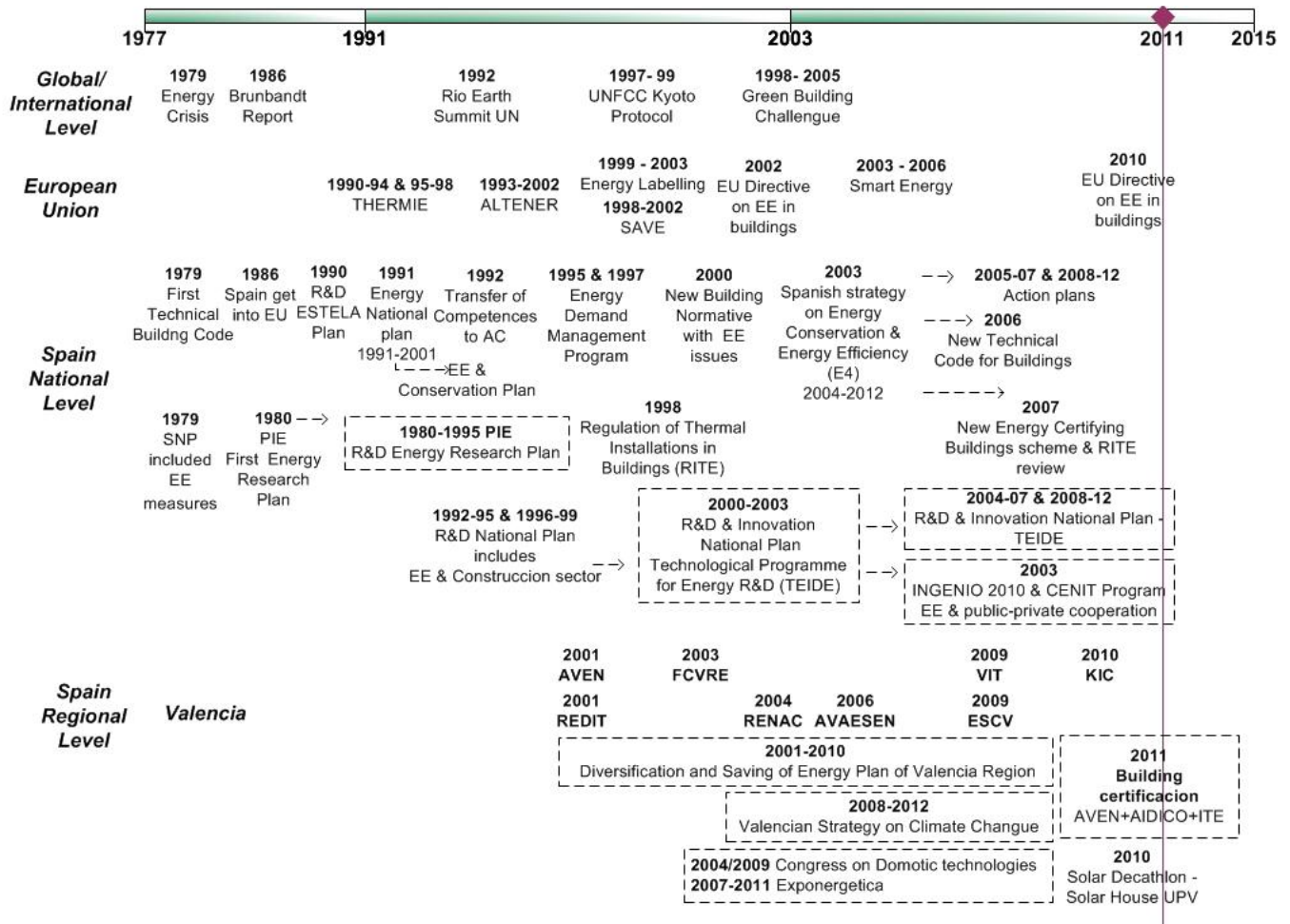
The building sector activity is a particular case within Europe, which has shown an outstanding growth³ and a particular dynamic in terms of expansion and transformation of infrastructure⁴. That dynamics was also driven by some lack of

³ The total value of production in construction sector has increased 169% in the period 1999-2006 compared with other countries as UK (94%), France (74%), Germany (-2%), Netherlands (63%), and Italy (84%). UNCTAD(2008)

regulation in the construction activity which differs significantly from region to region (Morata and Font 1999; CEPAL, 2001).

Two key elements may account for the growing prominence of energy and environmental concerns in the building sector, and for the development of GBT: the entry of Spain into EU and the decentralization process. Both processes allow: 1), the development of R&D programs encouraging innovation and improvements in the local technological base (basically in the 90's) and 2), institutional change and the formulation of policies on energy efficiency and regulatory frameworks for buildings (mostly after 2000). The whole chronological picture of this multiple dimension process is summarised in Fig A1 and analysed in Fig A2

Fig A2. Key events in International, National and Regional Level



Regarding R&D activities, energy, building and industrial energy-related sectors were promoted by the National R&D and Innovation Plans from 1998 until current date. Also specific programs such as Plan for Energy Research (PIE-1980-95) and INGENIO 2010 program (2003) provided significant amount of resources to different actors such as public institutions, universities and R&D laboratories with the main objective of promoting public-private cooperation on R&D and innovation. On the other hand, Spain joined in 2000 the "Green Building Challenge", an international cooperation project which develops evaluation methodologies for energy and environmental performance of buildings. In 2002 the Spanish GBC team won the prize of Best Methodology for environmental evaluation of buildings which is now used by the other countries associated to the program. In that line, the national government, main technological and energy companies and research institutions has developed the Technological platform on CO2(2006) and Spanish platform on Energy Efficiency (2008) to promote collaboration in R&D an innovations in Energy efficiency and environmental protection.

⁴ The annual level of built surface has increased 190% between 1996 and 2006 but the annual level of demolished surface has increased 282% for the same period which means that the sector growth implies important urban transformation rather than single expansion. INE(2008).

Simultaneously a process of institutional changes took place toward the whole period. Central and local stakeholders increasingly make policy strategies by negotiating; cooperating and coordinating actions to deal with the combined challenges of global competition and the restructuring of regional economies. In terms of decentralization, while regions and local authority have few if any roles in the policy formulation, they got the responsibility of effectively implementing both national⁵ and EU regulations where some domestic pressure for adaptation to directives is generated by the interaction of regional councils with interest groups (business and industry), over the implementation of urban and industrial energy and environmental issues (Borzel, 2000; Torres and Pina 2001, 2004; Kemp, 2001). Therefore, large cities, which have sufficient competences and resources, have been able to develop their own policies, often in collaboration with other local and international partners (Borzel, 2001; Hanf and Jansen, 1999; Monclús, 2003; Marshall, 1996).

A turning point in term interaction/coordination among level of governments and different stakeholders as well as use and selection of mechanism of interaction was introduced in 2003, the Spanish strategy on Energy Conservation and Energy Efficiency (E4) 2004-2012, where the 50% of the funds have been distributed on condition that every Autonomous Community (CCAA) should fund supplementary actions in the field of saving and energy efficiency promotion, whether they are included or not in the E4. Thus, it provides a platform where the different levels (i.e.: central administration, CCAA and municipalities) and sectors of public administration collaborate and coordinate their actions on two main issues: 1) improvement of current and future building infrastructure and, 2) energy efficiency and standards to transpose the 2002/91/EC and the following 2010/30/EU directives on energy efficiency in buildings⁶.

In this general context characterised by multilevel links, a series of policies and measures were developed and implemented locally, most of them still in place. A main characteristic is the formation of networks to face the new challenges coming from those implementation processes. Regarding the Valencia region, they are briefly below.

The Valencia Region

The Valencia Region has experienced a fast growth in terms of urban area and construction activity during the last 20 years, Urban area in Valencia has increased 27% from 1990 to 2006 (Atlas digital de las Areas Urbanas, 2010). The region is characterised by plain mixed use landscape with plenty of farms locations inner city and in peripheral areas. There is a significant variety of urban configuration after regeneration projects.

The national growth trend in the BCI was reinforced at regional level by the influence of regional suppliers as the ceramic cluster, one of most important worldwide⁷. Furthermore, the performance of Valencia BCI in terms of share of regional GDP (11.1%) seems to be higher than other main regions as Community of Madrid (9.2%) and Catalonia (8.8%) as well as the national level (10.3%). Regarding Green Building Technologies, two main aspects will be detailed: 1) set of policies and normative implemented and, 2) formation of new related networks

Implementation of policies and normative

Energy efficiency and climate change issues have been also introduced into regional policy agenda through long term plans on Energy efficiency and Climate Change as “Plan de Ahorro de y Eficiencia Energética de la Comunidad Valenciana” and “Estrategia Valenciana ante el Cambio Climático 2008-2012” as well as application of activities and economic instruments (see table 1), both programs designed to support the the local implementation of national (E4) and international policies. These actions have been coordinated by the regional energy agency AVEN (Agencia Valenciana de la Energia - created in 2001) and supported by the Valencian Institute of the building (IVE). More specifically, during 2011, AVEN has developed a joined project with IVE and two Valencia’s research institutes AIDICO (BCI sector) and Energy technological Institute (ITE) to implement an online software for the energy certification of buildings.

⁵ Local government act of 1985 (competences of municipalities) and Law 9/1992 (transferred competences from national to regional)

⁶ This Directive lays down requirements as regards: (a) the general framework for a methodology of calculation of the integrated energy performance of buildings; (b) the application of minimum requirements on the energy performance of new buildings; (c) the application of minimum requirements on the energy performance of large existing buildings that are subject to major renovation; (d) energy certification of buildings; and (e) regular inspection of boilers and of air-conditioning systems in buildings and in addition an assessment of the heating installation in which the boilers are more than 15 years old.

⁷ It concentrates More than 90% of the Spanish ceramic tile production. Spain is the European leading producer and the second worldwide after China in terms of square metres produced (Gabaldón Estevan et al.,)

Table 2. Comparison of different goals and activities by current Energy Plan. Spain and Valencia

Plan	Spain	Community of Valencia ⁸
Name	Energy Conservation and Energy Efficiency (E4) 2004-2012	Energy efficiency and Conservation Plan 2001-2010
Objective	Energy demand	
Expected impact (reduction)	From 4.9% to 3.9%	747.4 ktep
Target	Existing and new buildings	
Activities described in the plans	<p>Two big blocks:</p> <ul style="list-style-type: none"> • Improve the energy efficiency of old buildings, thermal installation, isolation and lighting and • Application of new EU directive on energy efficiency for buildings 	<ul style="list-style-type: none"> • Subsidies for installation of renewals energy in houses and buildings • Energy audits in commercial and public buildings • Development of Conservation and Energy Efficiency Guide for Hotels and municipalities • Energy labelling for houses equipments and lighting • Measures for minimization of energy consumption in air conditioned and heating systems • Improve natural lights in buildings • Application and diffusion of Energy certification for buildings

Local authorities and research institutions has also supported a few examples of sustainable architecture such as the green building “Palacio de Congresos” and the prototype UPV solar house competing in the Solar Decathlon Europe 2010. Additionally, Multiple actors such as industrial associations, R&D institutions and different level of government actively support BCI expositions The most important series of forums and expositions are the energy efficiency exposition (Exponenergetica 2007-2011), Glaze and ceramic exposition (CEVISAMA) and Congress on Domotics by UPV 2004-2009.

Creation of networks and business associations

R&D and technological innovation related activities are driven by several research centres within a wide range of sectors. The most important is glaze and ceramic lead by the Instituto de Cerámica y Vidrio, and the Instituto de Tecnología Cerámica. RENAC network (Network for application of Nanotechnologies in materials and products for construction and the habitat) and AIDICO (Instituto Tecnológico de la Construcción) cover a variety of techniques and construction systems. Finally, university labs and private firms have increased significantly the area of energy efficiency and sustainable construction which has been highly promoted by forums and expositions like the energy efficiency exposition described before.

The presence of a multiple agents and industrial associations is very important for the region, for example FEVEC, Valencian Federation of construction companies (FEVEC) and other ceramic, manufacturing and industrial associations such as ASCER, ANFFECC, ASEBEC, ATC and ANDIMAC. They play a critical role in the industrial policy for innovation and international trade.

However, beside the significant number of institutions such as industrial associations, chambers of commerce’s and professional associations (i.e. architect, engineers), the sector has seen in recent years the rise of specialized networks supporting sustainable related innovation in the Building and Construction Industry (BCI). These new networks are highly promoted by traditional and new created agencies in different areas and levels. Five relevant cases can be identified:

FCVRE (Fundación Comunidad Valenciana Región Europea). The foundation (created in 2003), beside other objectives, looks for create bridges between Europe and the Valencia region by encouraging co-operation between

⁸ Information not available at city level

different public and private actors and ,thereby, raising partnerships to bringing them closer to European projects, institutions and actors. Regarding the BCI, the FCVRE participate in the EU program Climate KIC (2010) as part of the international networks in areas of low carbon living and low carbon mobility.

RENAC (Network for the application of nanotechnologies in construction and habitat materials and products). The network (created in 2004) is formed to answer the need of researching, developing and exploiting the commercial, social and competitive benefits of innovation that nanotechnology can contribute to in construction and habitat activities. Industrial association, governmental agencies, universities and other public and Private R&D are part of this network. Some of the main activities of RENAC are organizing technical seminar and “Business forums”. These events look for encouraging cooperation between firms and R&D institutions and thereby create specific research lines towards further business opportunities.

Forum ESCV (Forum on sustainable construction of Valencia Region). The forum (launched in 2009) is an initiative launched by Edification Valencia Institute (IVE) which has had already two main events (Jan and Nov 2009) and the third expect in Nov 2010. These main events are created for networking and debate as well as the diffusion of innovation in technologies, normative and policies. ESCV also organise regular technical seminars on specific topics related to sustainability and BCI.

VIT – Energia. Scientific-Business network on energy sector sponsored by local government. The network (created in 2009) main objective is the knowledge and technology transfer by a variety of activities as business forums, training and publications. It encourages public-private cooperation for R&D and innovation activities on energy sector.

REDIT- The Network of Technology Institutes of the Valencian Region is a private, non-profit association that was created in 2001 by the Technology Institutes of the region and in collaboration with the Valencian Regional Government.

Additionally to these specific networks, and regarding BCI and energy sector, two relevant business associations can be identified in Valencia Region:

AVAESEN. The Valencian Association of Companies for Energy-Sector-, created in 2006, has over 160 member companies, representing about 80% of companies conducting activities related to the energy sector in their area. Its main activity is fostering relations between partners, both economic and collaborations in R&D.

TECNIMED. Association of Engineering Consultants, Architectural Studies and Technology Services of the Valencian Community, established in 2006 with the intention of defending the professional interests of consulting firms in the sector and to promote awareness and reputation of the profession consultant. The association is part alongside other regional-level partnerships TECNIBERIA national association with more than 300 members.

Finally, **FEVEC** Valencian Federation of Construction Entrepreneurs, an already mentioned, traditional and very well establish institution in the regional BCI sector will be included in the list. It is an organization for the representation and defense of the Construction business in any of their professional activities created in 1977. The main activities are formation, internationalization and networking, dissemination activities as well as legal and technical advice.

All the networks and business associations (N&BA) have particular features in their origins, size and scales but they share some common characteristics. FCVRE, Forum ESCV and VIT energy have as *leaders and coordinators* foundations with strong presence of authorities, the first two are connected with regional and the last with local government. However, the origin and current role of FCVRE is to build links between Valencia region and other regions and institutions at European Level. In the other hand, RENAC was created by a set of technological institutes which in fact are business associations. Regarding business association, AVAESEN and TECNIMED has recently created. While the first one has a strong link with R&D technological institutes that emphasise the regional identity, the second one is focusing in consulting activities and is part of a bigger structure with members that operate at national scale.

Regarding *internal organization and governance structure*, the institutions closer to agencies and government (FCVRE, Vit energia) present more hierarchical structures characterized by the presence of designed government officers in the main roles. REDIT, RENAC and the Forum ESCV present more horizontal configuration by incorporating governing boards, the last one present a set of Working Groups which decide about the activities of each of the areas of the forum (energy, water, sustainable design, materials, etc). In the other hand, the business associations (AVAESEN, TECNIMED, FEVEC) present a similar hierarchical structure leading by main position (president) and activities conducted by governing boards and executive and thematic directors.

However, these structures may not have a clear relation with *activities* develop by the networks and associations. The Table 3 shows a description of the set of activities that are been develop⁹. The data shows that distribution of activities may not have a particular pattern among each one of the cases, however, more specific activities can be found in RENAC and Forum ESCV as well as common networking strategies (i.e. Internationalization, partners search) can be found for the business associations. Formation activities are included in almost all the cases as well as information and dissemination activities are present in all of them.

Table 3. Main activities of BCI networks and business associations

Activity	FCVRE	RENAC	Forum ESCV	VIT Energia	AVAESEN	TECNIMED	FEVEC
R&D	Dissemination partner	Applied research	-	EU Applied & social research	EU Applied & social research	-	-
Regulation & legal advice	EU programs		Building directives	-	Legal and technical	Legal advice	Legal and labour advice
Technical support	-	High tech laboratories	-	-	Financial, IPR, Insurance, subventions	-	Insurance
Networking	Partners search	Members	-	Partners search	Internationalization, Partners search, trade missions	Internationalization, Partners search	Internationalization, Partners search
Formation	-	-	Workshops and seminars	Workshops and seminars	Workshops, courses and seminars	Workshops, courses and seminars	Workshops, courses and seminars
Information & dissemination activities	R&D program diffusion	Online info & Newsletter	Events and online Info, & technical documents	Newsletter & technological surveillance	Events, newsletter and online	Events, newsletter and online	Events, newsletter and online

Source: own elaboration based in online information

Complementarities and overlaps may be possible by considering the distribution of activities; however, the analysis of member's interaction can be a possible way to improve the understanding of the context of application of those activities.

Analysis of Network affiliations

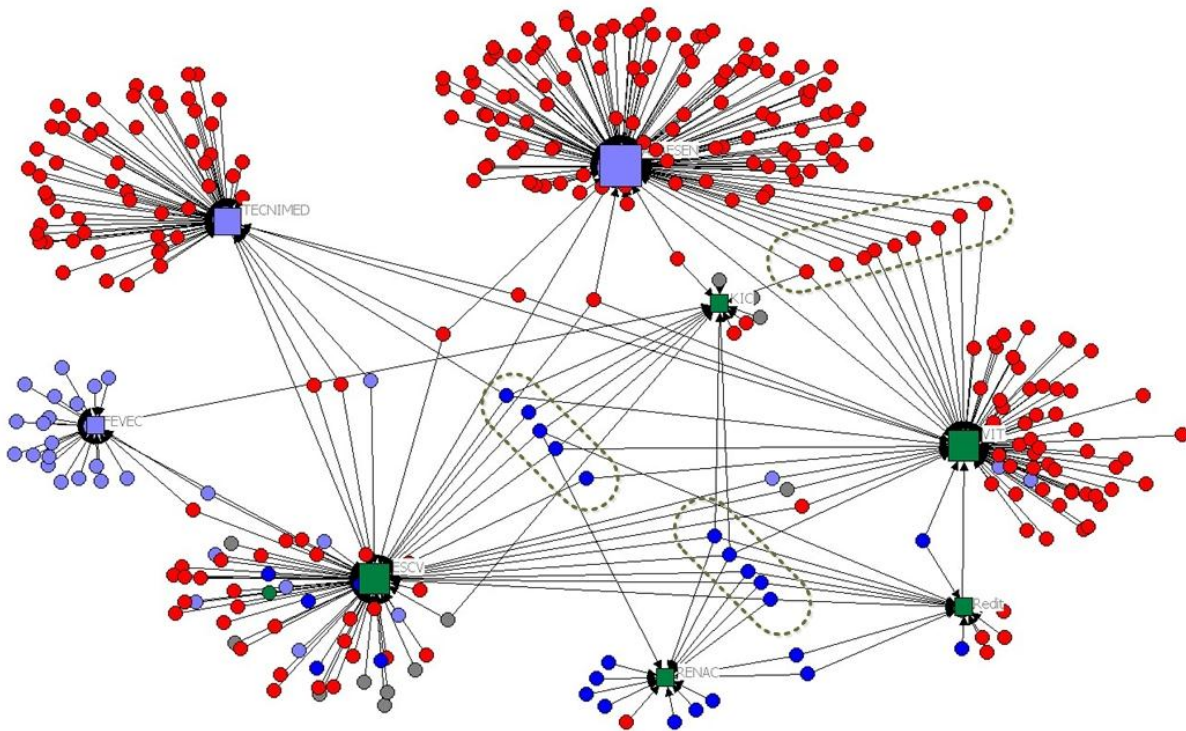
The Fig. 1 shows a scheme of N&BA by affiliation in the Valencia Region^{10,11}. The rounded nodes are the members of the networks and mentioned business association (both square), node colours distinguish the type of organization: firms (red), blue (R&D), light blue (business association) grey (professional association) and green (network). From a first view, three main aspects of the figures can be easily identified. First there is a set of firms affiliated to the two energy related business associations (AVAESEN and VIT energia). Second, several R&D institutions showed in the centre of the figure present more than two affiliations, which can be explained by the similar configuration of REDIT and RENAC. Finally, all the N&BA seems to be linked to each other by at least one member. The exception maybe the traditional association FEVEC, which just holds links with two networks.

⁹ The data has been obtained from websites and other public documents available online

¹⁰ Information on member's affiliation was obtained from public data available in each website and analyzed by UCINET software.

¹¹ KIC refers to the network formed by members of the EU Climate KIC program managed by FCVRE for the Valencia Region. Further affiliation analysis is required on the project of FCVRE.

Fig1. Affiliation Scheme of BCI networks and business associations



Source: own elaboration based on online (websites) public data

The number of affiliation by type of organization can be seen in Table 3 where, again, R&D institutions show most of the cases of multiple affiliations. To sum up, the general picture shows that almost 90% of the members of selected N&BA have got just one affiliation, over the total of firms, just 7% has got more than one affiliation. Regarding sectorial issues, the members are this distributed as follow: Construction (15, 8%), Energy (55.3 %), Construction/energy (13.0%) and others (15.8%).

Table 3. Affiliations of BCI networks and business associations by type of organization. Total number and share of total. 2011

	Firms	R&D	Professional association	Government	Total	
Total	274	26	12	11	323	
Share	85%	8%	4%	3%	100%	Share
Affiliations						
5		1			1	0,3%
4		3			2	0,6%
3	3	4			8	2,5%
2	15	3	2	2	22	6,8%
1	256	14	10	9	289	89,8%

Source: own elaboration based on online (websites) public data

Having done the description of the empirical case, some key elements will be picked up to identify possible correspondence in term of the theoretical arguments mentioned on the development of institutional capacity.

Highlighting factors affecting the dimension of institutional capacity building

The Valencia Region has experienced some significant changes related with the environmental governance system of the BCI and energy sector. Most of those movements have to do with the challenge of implementation process of energy-climate change policy and the consequent tensions regarding resource competitions, responsibilities and the search for market opportunities.

The implementation process of energy-climate change policy in this region seems to be highly influenced by the broad country characteristic which can be considered as a “laggard” in this policy area, or in other words, politically less powerful country with less advanced environmental policies compared to more influential northern European member states such as Germany or UK (Borzel, 2000). That influence seems to be reflected in the relatively new establishment of relational mechanisms and other coordination actions in this arena in terms of links with national and EU objectives. So, are these changes in the environmental governance system contributing to a better operation of the BCI in the energy sector within a multilevel scenario? How the variety of N&BA recently created helps to face that challenge? Does this new configuration generate overlaps, synergies in terms of roles and activities?, the next section seeks to increase knowledge to face the challenge of addressing further answers to these questions.

- Knowledge resources

As it was described before, Valencia region has a rich variety of institutions related to BCI and energy sector. The strong presence of firms in the glass and ceramic industry together with the prominence of higher education and R&D institutions provide a wide range of actors and mechanisms of knowledge flows, from specialized R&D activities to annual expositions and business forums. However, much of the mechanisms of knowledge flows are currently framed by policies, programs and instruments regarding energy and climate change issues such as technological platforms (e.g.: CO2,EE) and building certification tools (e.g.: Green Build Challenge, IVE- Valencia). Simultaneously, integration of different political spheres was given by the need to articulate the implementation process at local level of norms and directives on the BCI sector. Furthermore, agencies were created to face that challenge (e.g.: FCVRE, AVEN) and provide better mechanisms to transfer knowledge among different actors and levels.

- Relational resources

Most of technological institutes in Valencia region take the form of business associations which work together with universities and local authorities. That mixture provides a context for interaction and contributes to the development of common initiatives. The networks “Forum ESCV” and “VIT Energia” are good examples of that variety. In terms of morphology, there are some key elements to highlight: 1) internal structures are more hierarchical in business associations than in networks, what is an expected result and, 2) there is a low share of multiple affiliations among members of all the N&BA, with particular low rate for firms and high for R&D institutions. Finally, integration of the N&BA seems to be given basically by the participation of R&D institutions and specialized agencies. They are together with other public authorities the linkages at regional level and somehow key actors to manage connections between them. However, more knowledge is required to analyse their role in R&D projects, management of local and international resources as well as other types of cooperation activities.

- Mobilization capacity

The two key elements regarding changes on energy and environmental concerns in BCI sector (i.e. the entry of Spain into EU and the decentralization process) seem to be critical factors for the articulation of stakeholders. From that, a new structure emerges based on the set of policies and programs at different levels and, thereby, the need to generate coordination mechanisms not only to face the responsibilities but to take opportunities to develop new lines of business and research. FCVRE and AVEN are two good examples of agencies created to articulate resources and responsibilities (EU and National) with local stakeholders. This structure provides access to different broader technological, economic and political contexts (or institutional arenas) not confined to a local arena of governance. Both policy background and changes in structure rely on the provision of a new set of supporting instruments that also work as mobilization actions such as specialized formation, coordination and partner search for R&D projects, technical assistance on normative, building codes as well as different actions regarding networking and internationalization. Again, critical actors in this process are public agencies and R&D institutions which participate and articulate actions among each of the N&BA. However, more analysis should be taken to understand the purpose behind those actions, some of the actors may look for changes in the process and traditional mechanisms by, for example, mitigating anticipatory myopia of the private sector (i.e. agencies) while others may just seek to take a better use of opportunities (R&D institutes).

Reviewing relations between institutional capacity, public-private conflicts and policy misfits

As it was analysed before, the introduction of changes regarding BGT in Spain was defined by a significant growth of construction and a policy implementation process as background context. The understanding of the new market logic as well as the internal logic of BCI sector can be characterised by the confluence of new needs and opportunities featured by knowledge flows and creation of relations among a broader variety of actors. That context differs notably from the old traditional structures of BCI industry and emphasizes the role of new actors which may play an important role in the

articulation of actors in the system. Thus, public interest and profit making behaviour of private sector seems to be preliminary addressed by creating of new capabilities. Formation, networking and technical assistance are key activities for both type of objectives. National plans rely on transfer of competence for the implementation process which may have an impact in term of coordination issues at different levels. That situation is a possible explanation for the emerging role of institutions such as agencies or R&D institutions regarding articulation and knowledge transfer. The pattern of multiple affiliation of these key actor can be a proxy variable to start deeper analysis on that hypothesis.

However, the articulation mechanism has changed beyond the governance structures. New mechanisms for applying and managing resources do not rely any more in intermediation between levels of governments so; local actors can have access to EU resources at the same time they have to access to other resources by regional or national negotiations. That complexity may be a factor that can contribute to the understanding of supporting structures such as networks and Business associations.

4) Conclusion

A cluster of literature on governance and environmental policy has recently highlighted the emergence of new structures to solve problems at local level. They emphasise the need to broaden the context to analyse the way in which problems are solve at local level by considering multiple dimensions. In the other hand, innovation studies have focus in the evolving structure of BCI sector regarding innovation, creation of knowledge and relation between actors. Both set of studies has emphasised the prominence of a set of instruments designed to support and drive changes.

By considering that perspective, this paper has applied the concept of institutional capacity building to highlight evidence on the formation of networks and Business association as mechanism to face that new context. The Valencia Region was the case approached where particular features were highlighted: the entry of Spain into EU and the decentralization process. On the other hand, the creation of regional networks and business associations was a critical process to reconfigure relation between actors and facilitate the management of both new resources and responsibilities arising from higher political spheres.

In spite of the strong presence of industrial capacity and R&D activity regarding BCI, the emerging N&BA do not preliminary seem a clear specialization strategy in term of activities and objectives, where formation, internationalization and R&D activities are common. Furthermore, as it was expected, horizontal and hierarchical governing structures coexist where agencies and R&D institutions seems to have a main role, as managers and facilitators of resources. That fact can be evidenced by the analysis of affiliation structure of members of all N&BA. Those actors are the main elements for a weak but clear integration of all the N&BA.

Regarding institutional capacity building, Knowledge resources seem to be managed by a set of mechanism that interconnect wider context with the particular features of BCI sector in Valencia Region. This is clearly supported by the recently created N&BA with not only are the key instrument for improve the stock and quality of relational resources but also take part as facilitator of mobilization mechanism such as the set of available policy instruments at local and international level.

Finally, the description of the case has provided a set of elements to contribute to further research on the hypothesis of networks as mechanism of problem solving, however, new questions has emerged. In term of the nature and dynamics of knowledge flows, which are the main relationships, differences and compatibilities between R&D strategies at different levels? How much generated knowledge by R&D and private sector expertise can be absorbed by networking activities?. Regarding the morphology of networks and association, is there a logic behind the internal structure and the selection of activities and instruments?, if not, is there a relationship with the final performance?

Further advance on this direction will require deeper understanding of relations between policies, programs and actions in term of objectives and activities developed at different levels. In the other hand, improve the knowledge on the nature of N&BA as well as the process of formation, maintenance and evolution will require the matching of the needs and expectation of the members and the original objectives of the N&BA. Content analysis and interviews are suggested to face the first challenge while a survey to all the N&BA members plus a random sample of firms and institutions not

affiliated is considered appropriate to generate indicators on the second question. Currently, those activities are been undertaken.

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