PROCESSES OF INSTITUTIONAL INNOVATION: REFERENCE TOOLS FOR ECO-CITIES IN FRANCE AND DENMARK

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How does innovation come about in a highly institutionalized field like the construction sector? The construction sector is characterized by relatively rigid routines, strong professional boundaries, clear division of labor, and elaborate national legislation. It tends to lag behind other sectors of the economy when it comes to innovation, being perceived as mechanically responding to external (client) needs and as implementing innovations that originate elsewhere (Winch 1998, Harty 2008). Sustainable construction represents a remarkable break with this tradition with strong ambitions to boost construction in terms of its economic, environmental and social performance. In sustainable construction, new technologies are appearing, new 'best practices' are being formulated, and new managerial systems and labels are being introduced. For instance, innovations like zero-energy housing and eco-districts have emerged as novel ways to lower energy consumption and otherwise contribute to increased sustainability in the construction sector. Since a coherent template for sustainable construction has not yet taken form, this area offers a unique opportunity to study in real time how innovation emerges within a highly institutionalized field.

In this paper, we examine innovation through the angle of new design templates. A design template refers to a formalized set of technologies, practices or performance criteria related to an innovation, which implicitly or explicitly convey some "ingredients" of the innovation, and which is likely to frame and diffuse the innovation beyond its original context. Such a design template may eventually change work routines, legislative frameworks, taken for granted ideas, and performance measures, at which point it becomes institutionalized. Our focus is directed toward the micro-level processes that lead to the formulation of a new design template. More specifically, we trace antecedents to the

formulation of a new design template for sustainable construction. This topic is not only relevant for the construction sector, it is also theoretically interesting. A better understanding of the origins of new design templates, notably the conditions and processes that facilitate their emergence, can help shed light on the origins of new practices in institutionalized contexts.

Existing literature contains a number of theoretical explanations of innovation. One hypothesis is that innovation results from the invention and introduction of new technologies that, by their very availability, encourages new ways of working. An example is 3D imaging technology applied to the conception of buildings. Another hypothesis is that innovation flows from novel ways of organizing work-processes, such as the involvement of end-users in the conception phase. As a third hypothesis, innovations may arise from the adoption of imported practices, such as LEAN management, which has been imported from the Japanese automobile industry (Cusumano and Nobeoka 1998, Takahiro 1999). Other explanations have been proposed as well. Our study approach this topic empirically through a study of design templates for eco-districts.

An eco-district refers to a built community that is sustainable in a holistic sense. The exact components of an eco-district and its associated construction practices have not (yet) solidified into a commonly accepted definition. Multiple reference tools, i.e. tools, methodologies or evaluation systems for designing eco-districts and assessing their performance, are being proposed and many are still under development. reference tools, These reference tools present the dimensions of sustainability to be taken into consideration in an eco-district, the measures to be privileged in the assessment of each dimension, and the processes through which an eco-district should be conceived, built and evaluated. The current stage of development of eco-district reference tools makes them an interesting object of study. They are sufficiently developed to indicate a potential for the emergence of a new

design template in the construction sector, yet they have not yet crystallized into a stable template. As such, the sources and processes of innovation that gave rise to them are still visible. We thus have ample opportunity at present to explore the origins and variations of eco-district reference tools, and thus to theorize about the emergence of a new design template.

Our empirical study is designed as a multiple case study with eight cases selected from respectively Denmark and France. We have selected all proposals for eco-district reference tools that aim for nation-wide application and that are not identical reproductions of reference tools developed elsewhere or that are regional or global in scope. Our data sources include textual material, interviews and observations. Through a comparison of these eight cases, we shed light on some of the mechanisms through which new design templates might come into existence. Further systematic study will be needed to substantiate and refine our findings.

The paper is structured as follows. We first outline some sources of sustainable construction and key theoretical concepts upon which the empirical study rests. We then explain our methodological procedures, including data sources, data collection and data analysis. In the subsequent section, we present our preliminary results in the form of elements that seem innovative, or stimulating of innovation, within the analyzed eco-district reference tools. The paper concludes with a discussion of potential implications for our understanding of the processes through which innovation comes about in highly institutionalized contexts such as the construction sector.

SOURCES OF SUSTAINABLE CONSTRUCTION

The notion of sustainable construction refers to the construction of new buildings and the renovation of existing ones in such a way as to minimize the building's

negative environmental and social impact. Current efforts focus primarily on increasing the energy and resource efficiency through a careful selection of materials, energy sources, and spatial orientation, yet increasing attention is being devoted to the social and economic dimensions of sustainability as well. A variety of different mechanisms are currently being employed to stimulate the development of sustainable construction. Below we briefly outline some of the main drivers of these transformations.

Legislation represents one way in which sustainable construction is being encouraged. In parallel to national legislation, the European Union has taken a number of initiatives such as the *Energy Performance of Buildings Directive* (European Council and Parliament, 2002). This directive stipulates rules for minimum energy performance that corresponds to the regional climate. It also encourages the construction sector to investigate the technical, environmental and economic possibilities for developing and implementing alternative energy systems. Furthermore, it suggests strategies for increasing the building's thermal performance in the summer period, notably through the development of passive cooling techniques.

The adoption of certification and reference systems for sustainable construction represents another driver for sustainable construction. One well-known reference system is the *Leadership in Energy and Environmental Design* (LEED), which is intended as a way to ease the process of implementing legislation. Originating in the United States, LEED focuses on the creation of universally understood and accepted standards, tools, and performance criteria (U.S. Green Building Council, 2009). It encourages the integration of design and electricity sources, reflecting the concepts of net-zero-energy and zero-carbons-emissions, both of which seek to integrate alternative energy sources (e.g., photovoltaic technologies) with materials and architecture that lower the need for electrical light (e.g., high reflection paint) and air conditioning (e.g., slap radiant cooling) (Lewers,

2008). *Building Research Establishment Environmental Assessment Method* (BREEAM), developed in United Kingdom, represents another internationally known reference system for sustainable construction. Certification is considered to have a positive reputation effect.

A third way of encouraging sustainable construction consists in promoting the adoption of best practices from other sectors of the economy. LEAN management, imported from the automobile industry in Japan, emphasizes value for the end customer, work structuring, and control of the production process (Lapinski et al, 2006; Sedam 2007). LEAN does not specifically address sustainability but it is certainly being applied to sustainability.

A fourth driver is economic incentives. For instance, the development of economic evaluation criteria encourage private investors to recognize the economic benefits of using alternative energy sources (Eiffert, 2003), adopt sustainable design templates, and implement environmental designs (Miller et al, 2008). Economic benefits can also be realized through increased consumer demand for sustainable buildings and government subsidies to sustainable construction. For instance, developers are driven by economic concerns when they embrace LEED and other reference tools systems for the purpose of selling buildings in an eco-district at a greater price than they could otherwise.

Finally, there may be pressures for conformity associated with the implementation of voluntary EU directives that favor a move towards sustainable construction across European countries. Although the explicit ambition may be to harmonize reference tools within Europe, the same directives may take somewhat different shape depending on the country in which they are being implemented. There is some indication that interpretations of the same sustainability elements vary somewhat across member states (Thomsen et al, 2009). This outcome is not surprising because EU directives encourage each country to implement EU legislation in accordance with their own priorities. Moreover,

implicit institutional factors may lead to different interpretations of the same directive and hence to different practices.

These drivers behind sustainable construction represent but a few of the elements that are considered salient for developing the sector. They are subject to much debate in as much as insight into the emergence and spread of new design templates is still rudimentary. A better understanding of how new design templates emerge (and spread) may enable a valuable fine-tuning of the various drivers for sustainable construction.

DESIGN TEMPLATES

The concept of design templates is located at the crossroad between organization theory and design theory, and is derived from the litterature on design and innovation management (Le Masson & al., 2010). This litterature focuses on the design process, i.e., activities that range from concept generation, via detailed design, to the marketing of new products and services. The approach is built on a central distinction between *rule-based design* and *innovative design* (Le Masson et al., 2010). Rule-based design has emerged over the last century as firms have made significant effort to rationalize their design activities in order to increase their performance. In rule-based design, innovation management is achieved by setting rules in four areas: i) stabilizing the business model and competition around stable performance criteria (e.g. cost, energy use, comfort, safety, etc.); ii) developing a stable and clear division of labor and for organizational and managerial procedures for coordinating a diverse set of expertise; iii) creating validation protocols (prototypes, experiments, economic tools) that can be used as milestones for the project; and iv) defining explicit design languages that are shared by diverse groups of actors. Although it is based on stable langage, coordination tools, and performance criteria, this *rule-based design* is not contradictory with innovation. On the contrary, the literature

indicates that rule-based design is the most efficient way of organizing design processes in a stable situation, i.e., for existing products and markets.

However, when new innovations are introduced or new social values adopted, one or more of these dimensions may be destabilized and render rule-based design ineffective. The design process changes to *innovative design* when goals, division of labor, technical expertise, validation protocols, or design languages have to be reconsidered. Innovative design seeks to integrate knowledge and actors into a coherent concept and project that bring value to the firm. Innovative design is not an objective in and of itself but a temporary state in which new models and rules are invented. Ultimately, with the routinization of an innovative design, a new configuration of rule-based design is expected to emerge.

As a result, a key concern within this literature is how actors, through innovative design, are likely to produce a new set of design rules and tools likely to become institutionalized and conventionalized into the more general form of *rule based design*. To investigate this question, we build on the notion of design template. We define a design template as a formalized set of technologies, practices or performance criteria related to an innovation, which implicitly or explicitly convey some "ingredients" of the innovation, and which is likely to frame and diffuse the innovation beyond its original context. A design template is an intermediate formalization that reflects parts of the innovative design in various forms: a tool, a protocol, a report, a methodology, etc. Although a design template can take a variety of forms, it plays the role of a boundary object (Star & Griesemer, 1989), in so far as it facilitates coordination between a network of diverse actors. Such design templates are central cognitive and institutional tools that mediate the relationships between radical / local innovations and wider institutional fields.

We set out to explore how actors contribute to the formulation of reference tools for eco-districts that may bring about a new design template for sustainable construction. Our theoretical interest is the role of actors in contributing to the transformation of practices and performance in the construction industry. Such mechanisms can be fruitfully framed in terms of how actors innovate in an institutionalized context.

ROLE OF ACTORS IN INSTITIONAL INNOVATION

Institutional innovation refers to the emergence of an alternative template to established and well accepted ways of thinking and practicing in a particular sphere of activity (Hargrave & Van De Ven, 2006). In response to the intriguing question of how alternative templates arise in a highly institutionalized setting, institutionalists traditionally turn to the (perceived) inadequacy of a taken-for-granted template in terms of solving a (socially constructed) problem (Oliver, 1991) or alternatively, to the occurrence of a major event that jolts the institutionalized order in an industry and provoke a search for alternatives (Greenwood, Suddaby, & Hinings, 2002). In both scenarios, institutions are distrupted prior to the emergence of an alternative. More recently, the institutionalist literature has expanded into mechanisms that involve actors who are able to craft and enact alternative templates without the prompt of a partial deinstitutionalization. This new literature on (institutionally embedded) actors is known as institutional entrepreneurship (Dorado, 2005; Garud, Jain, & Kumaraswamy, 2002; Maguire, Hardy, & Lawrence, 2004) or institutional work (Lawrence & Suddaby, 2006; Maguire & Hardy, 2009).

Attention is devoted to explain how actors bring about alternative templates for action. Focus is on processes and conditions that allow (socially embedded) actors to generate alternative templates for action. These processes include both the importation of models from other sectors or countries (Boxenbaum & Battilana 2005) as well as novel

combinations (bricolage) of existing models that were not previously associated with one another (Boxenbaum 2006). Once imported or selected for combination, existing templates become subject to intentional and unintentional change as they are communicated, enacted, and adopted in practice (Boxenbaum & Battilana 2005; Boxenbaum 2006; Czarniawska 1996; Georg & Füssel 2000; Georg 2006; Lippi 2000; Sahlin-Anderson 2001; Zilber 2006). In many instances, the process can be characterized as one of adapting or transforming existing templates rather than of creating an alternative template from scratch. Adaptations may result inadvertently from the act of interpretation; interpretive studies show, for instance, that actors who use different frames of references ascribe different meaning to the same phenomenon (Westenholz, 1993). A best practice may unintentionally produce different organizational practices, forms and artifacts once implemented in another industry or country. An adaptation may also arise from a more deliberate act on the part of actors to introduce organizational change. For instance, actors may have become familiar with an alternative template elsewhere and deliberately seek to apply it in an organizational setting that is unfavorably inclined toward the beliefs and practices that it implicitly conveys (Boxenbaum & Battilana 2005).

Such processes of translation characterize a number of innovations, and thus, by extension, may help explain the emergence of new design templates for sustainable construction. In the present paper, we rely on some of these ideas to trace the emergence of eco-district reference tools. Most importantly, we seek to identify and trace elements in the reference tools that carry a potential to bring about new practices.

METHODOLOGY

The empirical study is designed as a multiple case study, composed of eight cases of reference tools for eco-districts. Relative to single or double case studies, multiple case

studies allow for comparison across a larger number of cases and hence for a more robust analysis of empirical patterns. This type of design is indicated when the ambition is to build theory about a relatively unexplored topic (Eisenhardt, 1989), which applies to our study. We seek to build theory about the mechanisms through which design templates emerge in a highly institutionalized setting.

Multiple case studies also allow for multiple levels of analysis in the same study (Yin, 2003; Pettigrew, 1988). In the present study, we examine first the project level and then the national level of analysis. Each reference tool is being developed as a project within a specific organization, and each organization has only one project of that nature. We compare the eight projects of eco-district reference tools to one another before proceeding to compare the cases at the national level, i.e. four Danish cases compared to four cases from France. The idea is to investigate if certain patterns observed at the project level can be traced to the national context. Through this embedded research design, we explore potential sources of innovation that, while being brought about by actors, can be traced to either the project level or the national level of analysis.

Case selection

Over the last decade, much effort has been devoted to promote sustainability in the field of construction. Eco-districts represent one such initiative within the sector. The rationale behind the emergence of eco-districts is that important sustainability issues related to transportation, social diversity, employment or functional diversity are best tackled at an integrated level of the city. Since many of these objectives cannot be achieved at the level of the individual building, eco-districts have emerged as an interesting arena. Numerous reference systems and standards have emerged across the world to guide the conception and design of eco-districts, and to help define and assess them. Among the most well-known are

BREEAM Communities in the UK, LEED for Neighborhood Development in the US, and CASBEE for Urban Developpement (Comprehensive Assessment System for Built Environment Efficiency) in Japan. A multitude of actor groups are currently engaged in the quest to develop reference tools to define what is meant by an "eco-district".

We have selected eight eco-district reference tools for analysis. They represent all the national level eco-district reference tools that we were able to identify in respectively Denmark and France. They are: *Eco-district Norm P99N* (FR), *Eco-district Label* (FR), *HQE Aménagement* (FR), *INDI 2011* (FR), *Realdania's Sustainability Process Tool* (DK), *Municipality of Copenhagen's Sustainability Tool* (DK), *Diakonissestiftelse's Sustainability Process Tool* (DK) and the *Danish Green Building Council's* forthcoming adaptation of the *DGNB Certification System - New Mixed City District (DK)*. We excluded reference tools that were developed abroad, such as BREEAM or LEED, but which were not adapted specifically to either the Danish or French context. This national focus was chosen for pragmatic reasons to facilitate selection within a sector that is undergoing rapid development.

Data sources and data collection

Our data on the eight eco-district reference tools come essentially from three sources: a) formal documents describing the reference tool and how to use it, b) observations of meetings, and c) in-depth interviews with actors involved in the development of eco-district reference tools. The main data source is the written descriptions of the reference tools, which contain information about the dimensions and indicators that define an eco-district and/or the process steps that developers should follow to conceive and build an eco-district.

We collected information on the identified reference tools on the internet or through contact to key actors that we encountered while observing meetings. We also

observed meetings and conducted semi-structured interviews with key actors. We conducted nine semi-structured interviews with key actors, three in Denmark and six in France, in addition to 14 in-depth interviews with actors involved in specific reference tools. The primary purpose of the interviews was to collect contextual data on the identified reference tool and secondarily to explore the potential existence of other, yet unidentified, reference tools. Our interview guide, reproduced in Appendix 1, explored the origins, the current status, and the future prospects of each reference system. Interviews lasted between 45 min. and two hours, they were recorded and transcribed. The meetings we observed were devoted to developing or presenting reference tools; we also collected written material, such as reports, books, and summaries of meetings, distributed at these meetings.

Data analysis

To analyze the reference systems and associated interviews, we first developed individual spreadsheets for each reference tool and each interview. We then inserted key data material from the individual spreadsheets into comparative tables. This table, reproduced in Appendix 2, contains key descriptive data about the content of each reference tool, its origin, and its connection to actors and established practices in the field of construction. It also contains our analysis of salient content. We considered salient all elements that were: 1) unusual relative to other eco-district reference tools and/or 2) highly specified, e.g. a calculation method or another measurable indicator. We singled out these components because they have the potential to pull developers in new directions or challenge them to reach specific and often difficult goals. They potentially push actors beyond the boundaries of established templates more so than do familiar measures and vague indicators. Among the specific components, we excluded the ones that directly reflect

European or national legislation. These components are already integrated into construction practice and hence not a source of novelty.

To validate our analysis of the most salient elements in the reference tools, we triangulated our findings with interview data and observations. After comparing the eight reference tools to each other, we searched for commonalities as well as differences in the eco-district reference tools under development in Denmark and France to identify patterns at the national level of analysis.

RESULTS

In this section we first present a general appraisal of the eight reference tools for eco-districts and then our findings on their innovative potential. As mentioned previously, this potential refers to elements within the tools that carry a potential to change the routines of construction actors because they are highly specific or unusual in scope. The key findings on this topic, reproduced in Figures 1, 2 and 3, constitute what we consider to be the salient components of the reference tools. We subsequently trace the origins of these components at both the project level and the national level of analysis in an effort to build theory about the emergence of new design templates.

General appraisal

Of the eight reference tools for eco-districts that we analyze, four are from France and four are from Denmark. All of them have been developed recently. Only one, INDI 2011, which was launched at the end of the 1990s, is more than five years old; the other initiatives are less than three years old. France seems to have started earlier than Denmark on developing these reference tools. The initators range widely from one project to another, including a norm-developer, a ministry, a municipality, a public construction

agency, a private construction foundation, a religious community, an NGO, and a private company. Most of the reference tools are still under revision or in development. They represent the first national initiatives that we can identify to develop reference tools specifically for eco-districts in France or Denmark.

The scope of the reference tools vary from the construction of new sustainable districts (e.g., cities) to the renovation of existing districts to make them more sustainable. Some reference systems are developed specifically for the former goals (e.g., MEDDTL[1]'s eco-city label) while others orient themselves toward the latter (e.g., INDI 2011). A number of them aim to be applicable to both new and renovated cities (e.g., Realdania Arealudvikling and HQE Aménagement). Naturally, the content of the reference system differs somewhat depending on the scope. For instance, it makes little sense to favor the preservation of local patrimony if the eco-district is being constructed on empty land. Likewise, the energy efficiency of buildings can be much higher if the city is newly constructed than if its buildings are protected national patrimony that are to undergo renovation.

All eight reference tools contain a proposal for which elements to take into consideration in the making of an eco-district. Most of them rely on a classical division between environmental, social, and economic dimensions of sustainability. One of them (INDI 2011) diverges from this classical division and introduces instead a number of cross-cutting themes that apparently exclude economic factors. Each dimension is subdivided into a number of topics or indicators. Most commonality is found within the environmental dimension of sustainability, which all include energy, transport, water, and waste. Similarly, social diversity is a commonly used indicator in the social dimension. Other indicators

[1] French Ministry of ecology, sustainable development, transport and housing

appear in some tools and not others. In the environmental dimension, we see landscape, bio-diversity, patrimony, and construction materials in several reference tools. In the social sphere, where it seems particularly difficult to come up with universally applicable indicators, there is a tendency to include local governance, health, access to employment, and education and training. Finally, the economic dimension often include financial costs of the project and the contribution to local economic performance.

Most reference tools include also a section on the processes through which an eco-district should come into existence. Some reference tools emphasizes the defining features of an eco-district while others highlight the work processes. For instance, some reference systems let the actors select which themes and indicators they want to work with as long as they follow the outlined working procedures (e.g., INDI 2011 and HQE Aménagement) while others insist on using pre-determined indicators and are more flexible with the processes through which these elements are taken into account in the making of the eco-district (e.g., Eco-District Label and Realdania's Process tool). The two former are oriented toward a certification of the work process like an ISO certification while the two later pursue an assessment of eco-districts as a sustainability product. They thus vary according to what they first and foremost seek to standardize: product or process.

The reference tools also contain some information about evaluation. All of the reference systems that we analyze use subjective evaluation criteria. To measure performance, several of them have a quantifiable rating system that rely on scores between 0 and 3 (Michelin-inspired) stars (MEDDTL), between 1 and 5 (Realdania Arealudvikling), or between -3 and +3 (INDI 2011). HQE Amenagement has no quantifiable rating system but engages actors in the setting of specific goals that can be integrated into a contract. The three quantifiable reference systems use 'spiderwebs' as a graphic representation of eco-city performance. Some of them assign a weight to the different dimensions to calculate a score

(e.g., Realdania Arealudvikling) while others formulate an action plan to facilitate further work (INDI 2011). The output is often tied to an ambition of eventually carrying out a certification of eco-cities (e.g., MEDDTL) or of achieving a specific result for the contractor (e.g., HQE Amenagement).

Innovative potential

Most defining components of the eco-district reference tools are so vaguely formulated, e.g. 'favor social diversity' and 'protect local patrimony' that they do not require construction actors to develop new practices. Only a small number of elements carry a potential to stimulate innovation and provoke a change in routines. These elements are found in two places: the categories defining sustainability and the recommended processes for how to use the reference tool. As for the former, Figure 1 represents our findings related to a) unusual components or b) highly specific components (without reflecting European or national legislation). We notice that most of the unusual components in the French reference tools relate to the protection and integration of agriculture while the Danish reference tools are particularly attuned to the management of rain water. An interesting object of analysis is the origin of these patterns.

A parallel analysis of the proposed work processes in the eco-district reference tools shows that most of the process-oriented steps in the reference tools are continuous with existing construction practice; hence, they are unlikely to provoke innovation. In fact, some tools have explicitly aligned the processes with established and validated practice (e.g., HQE Aménagement and Municipality of Copenhagen's Sustainability Tool). A few notable exceptions do stand out. Figure 2 represents processes that we deem to be either unusual or potentially dependent on external contingencies, and therefore infused with a potential for rupture and innovation. Interestingly, most of the novelty in process relates to financial

assessment procedures, notably in the MEDDTL's Eco-district Label (FR) and Realdania's Process Tool (DK). Two other tools open up for external actors to shape the eco-district project through respectively a contracting of objectives (HQE Aménagement, FR) and a public hearing (Municipality of Copenhagen's sustainability tool).

Taken together, the content and process descriptions of the tools show limited potential for innovation at present. Several of the tools do however lend themselves to a gradual upgrade into a version that could with time become more constraining and specific, and hence more likely to encourage actors to develop innovative practices. The potential for constraint in the evaluation procedures are represented in Figure 3. This figure shows the evaluation procedures at present as well as the potential for, or ambition of, a future tightening of the criteria.

	Unusual components	Highly specified (unregulated) components
Eco-district Norm P99N (FR)	Action area 5 (privilege local food production): Percentage of served meals on the territory that contain at least 50% local foodstuff	Action area 10 (decarbonate the economy): TeCO2 assessment (ADEME)
HQE Aménagement (FR)		
Eco-district Label (FR)	Ambition 15 (preserve economic viability of non-urban and urban operations): introduce policies that protect agricultural territory and reinstate agricultural activities closer to city centers.	
INDI 2011 (FR)	Target 3b: Regeneration of brown-fields and polluted sites and soils. Target 20b: participation of residents to decision and projects related to the neighbourhood.Target 21c: Cultural links across the globe	
Realdanias Process Tool (DK)	Element 10 (operational expenditures), ind. 45 and 49: what are the municipal costs, respectively the societal costs, of dealing with rain water in the way previously proposed?	Ind 9 (element 3, water): percentage of rain water led into the sewer system (points attributed to percentages).
Municipality of Copenhagen's Sustainability Tool (DK)		Con 4: water consumption max 110 l/ per person/day in residences; 34 l in business. Con 6: maximum 15 min. by foot to a park, a beach, a nature resort, or a harbor bath facility.
Diakonissestiftelsen's Sustainability Assessment (DK)	Ind 6: pathways that create a feeling of closeness and safety. Ind 10: Trash recycling as an activity to stimulate the creation of social relations. Ind 8: degree to which the area supports recreation, social interaction and Christian Rituals. Ind 22: Presence of strong Christian profile in the development. Ind 23: senior homes of high quality and with Christian values.	Ind 9: % of water led into the sewer system.
Danish Green Building Council – inspired by German DGNB Certification System - New Mixed City District (DK)	Themes : local food production, fiscal effects on local authority, property value stability, efficiency of land use, public art. (Indicators not yet finalized).	

Figure 1: Categories with innovative potential in eco-district reference tools.

	Unusual process steps	Contingency on external actors
Eco-district Norm P99N		
HQE Aménagement		Step 3, choice and contractualization of objectives: contracting of objectives.
Eco-district Label	Ambition 3 (theme 1): optimize the financial arrangements to meet qualitative objectives; ensure their pertinence by integrating the global cost of the project and its life cycle. Ambition 5 (theme 1): privilege and develop research and innovation at all levels.	
INDI 2011		
Realdania's Sustainability Process Tool	Phase 5, assessment of financial implications at multiple levels: project construction, operational expenses, municipal finances, and societal costs.	
Municipality of Copenhagen's Sustainability Tool		Phase 6, municipal process: political approval and public hearing.
Diakonissestiftelsen's Sustainability Assessment (DK)	?	?
Danish Green Building Council – inspired by German DGNB Certification System - New Mixed City District (DK)	Certification takes place in three phases: Planning, Development and City District	City District (?)

Figure 2: Processes with innovative potential in eco-district reference tools.

	Evaluation
Eco-district Norm P99N (FR)	A guide of best practices, expected in 2011, will specify the category of 'follow-up and evaluation'. Performance required to respect the norm/ obtain a certification is also under development
HQE Aménagement (FR)	In the last process step (assessment - value), there is an assessment and performance measure that could be used to reinforce the contracted objectives, but no suggestion is made to this effect.
Eco-district Label (FR)	Ambition 4 (theme 1): Ensure that the initial objectives are achieved and respected. The aim is to make a label in 2012 where the material required for assessment can be collected at less than 2000 EUR per project. Required performance level to be determined.
INDI 2011 (FR)	Phase 3: Quantitative evaluation of scenarios that include sustainable construction targets (INDI, ENVI, ASCOT). Tool assesses the scenarios, not the objectives per se. Visual representation (spider web), using points.
Realdania's Sustainability Process Tool (DK)	All 14 elements are assigned a score between 1 and 5 where 2 is the national average. The resulting map (spider web) of scores is descriptive and places the project relative to other Danish projects.
Municipality of Copenhagen's Sustainability Tool (DK)	Scores between 1 and 5 assigned to each of the 14 considerations, 3 being average or mandatory level. Description in spider web.
Diakonissestiftelsen's Sustainability Assessment (DK)	Scores between 1 and 5
Danish Green Building Council – inspired by German DGNB Certification System - New Mixed City District (DK)	The different projects/developments/districts will awarded a "bronze, silver or gold DGNB" according to their total performance index. Target values (best practice): Score of 100. Reference Value (stage of technology): Score of 50. Limit Value (legal requirement, average std): Score of 10.

Figure 3: Evaluation measures in eco-district reference tools.

Role of actors in introducing potentially innovative components

Our interviews indicate that the actors involved in developing eco-district reference tools had little prior experience to rely on in their conception of a reference tool. As one actor mentions, it would have been helpful to have better methodologies for urban planning:

> *"Sustainability has been a growing issue, [but] it has not been so detailed regarding sustainable urban planning. It has been a discussion, what you call it, some headlines …, so when I came here 2 years ago, we started discussing how we could go further into details with how to handle sustainability in urban planning and development … and we found out that there was not that much information about it. You could find sustainability, sustainable tools or what you call it, talking about buildings …it always came back to the building …/ Between the building and so on was more a black box./ So we have tried, in collaboration with some consultants, to find ways to address the problem, to find some tools that we could use easily." (Realdania Arealudvikling)*

In fact, except for the case of HQE Aménagement, the actors we interviewed did not make reference to specific eco-city projects in Europe, such as Vauban in Freiburg (Germany) and Bedzed in the United Kingdom. Generally, no reference was made to specific exemplars as a source of inspiration.

Some actors took inspiration from pre-existing national standards or initiatives. For instance, since HQE® has become a central and legitimate reference to sustainability among construction actors in France, it adds legitimacy to include HQE in the title of a French eco-district reference tool. Even alternative methodologies (such as Eiffage HQVie approach to sustainable urban planning) are built in reference to HQE:

> *With local collectivities, we want to enter via HQE®, everyone asks for HQE®, but through HQVie® you can do both, in fact you do more than HQE®. It is a sort of Trojan horse if you like. [But]… we also wanted to create distance to the optional logic which prevails within HQE [the ability to select some indicators and disregards others which may be more critical in terms of sustainability], which we and our contacts consider completely counter-productive. Everyone in the sector is shocked by this approach. (Eiffage)*

And, as members of the HQE Aménagement initiative explain:

> *"Local collectivities were asking us to develop some HQE urban planning programs, and some actors were beginning to say "we have an HQE district", and that is how HQE Aménagement was initiated, the association wanted to keep a tight control over the methodology." (I. Baer, Snal)*

Effort is also made to be different from other initiatives. For instance, HQE Aménagement presents itself as a quality framework clearly distinct from the Operational Management System (SMO), which details actors, stages and associated actions/decisions.

The national context also provided input into the development of the reference tools. One actor explains in the following words how the national context was taken into consideration:

> *"We started with some international consultants, we started with Ken Young, who is a very famous architect, but that was again about putting green on the walls, on top of the roof and so on. That could be sort of sustainability for the environment in the urban part of town, but that was not exactly what we wanted to do. Then we have been discussing it with a big engineering firm [with experience from Shanghai] …, but we found out that if we should have a good tool we could use in the daily work, we had to be in a Danish context. We had to start there, talk with some consultants who understood the Danish way of thinking, the Danish way of doing urban development, so that is why we want back to a firm in Denmark." (Realdania Arealudvikling)*

Some actors considered using LEED (North American) or BREEAM (United Kingdom) as inspiration for their own reference tool. Green Building Council Denmark decided recently to adapt their emerging reference tool from a German equivalent. Other actors sought specifically to avoid any mirroring of foreign reference tools, seeking instead to develop a tool specifically conceived for the national context in question. For instance, Realdania Arealudvikling decided to develop its own tool:

> *"We have been thinking that when you make a BREEAM UK, you have some questions which are totally different from the situation in Denmark, specially also in US with LEED there are some other questions which are much more relevant. They have a discussion of going from car to bike, which is much more difficult for them than it is for us, for instance, and so on. It's difficult to translate. There is no international scale. It's easier to do that with a building – in a way." (Realdania Arealudvikling)*

These quotes show the uncertainty experienced by actors and the sources of inspiration they used for developing their reference tool.

Actors involved in conception of a reference tool seem to experience uncertainly also when it comes to selecting performance criteria. Several of the interviewees point to the

difficulty in defining performance criteria, particularly for the social and economic dimensions. As explains one actor:

> *"The five environmental elements are rather easy to find because talking about buildings and talking about environment, these are easy- energy, transport, water, and so on. So, this is the easy part of the work. But when we come down to the social-health dimension, it's much more, when you talk about the urban development projects I think it's much more difficult to find out what is the element and after that what are the indicators and what do you ask about and how do you measure, so that part has been really difficult, and I would say the same for the economic dimension" (Realdania Arealudvikling)*

Performance criteria do remain poorly defined in several reference systems. According to actors associated with HQE Aménagement, work on this topic will be undertaken in the near future. Others state that they will not go very far along the axis of providing certification. In the words of an actor from Realdania Arealudvikling:

> *"We will not open for a certification. I don't know if anybody will…. I think what we are talking about – urban development – it's VERY difficult to make a certification." (Realdania Arealudvikling)*

Yet others are eager to include certification. Actors involved with HQE Améangement, for instance, recognize that a reference tool cannot specify technical solutions and that objectives must be defined at the local level. Yet they support the granting of a label as a way to certify sustainability of an eco-district much in line with the label that HQE has already adopted for the building level.

There is no indication at present that the evaluation criteria push actors to perform beyond their previous capacity (i.e. to potentially innovate). We note, however, that some tools lend themselves better than others to an eventual introduction of clear performance criteria. This is the case for reference tools that have an explicit ambition of offering a label or a certification (i.e., Eco-district Norm P99N and Eco-district Label). Another interesting observation is that some Danish tools, such as Realdania's sustainability process tool, seek to assess projects relative to other projects , which is relevant for the architectual competitions in which they engage, while others aim to develop new market opportunities

(e.g., Danish Green Building Council). Some French tools aim for absolute criteria (Eco-district Norm P99N and Eco-district Label) while others give preference to criteria that are specific to the individual project (HQE Aménagement and INDI 2011). The evaluation criteria are thus tied to the purpose for which the reference tool is being developed.

DISCUSSION

Our analysis of eight emergent reference tools for eco-districts in Denmark and France shed some light on potential antecedents to the emergence of an innovative design template for sustainable construction. We examined elements contained within these reference tools that are either unusual and highly specific (without being legally mandated). Through this angle of analysis, we have identified some of the components that could push users of a reference tool to develop new practices. Vague or common indicators carry less such opportunity for novelty to emerge. Our analysis was primarily descriptive, focusing on the components that define the notion of an eco-district and the processes through which it should come into existence.

Certainly, the presence of an unusual or specific component does not automatically produce an innovative practice, let alone a new design template, but it contains a grain that could sprout under certain conditions. We did not examine such conditions in this paper, but it could be an interesting object of future research. An intriguing question is how do key actors diffuse a reference tool and encourage its adoption among construction professionals? It would be interesting, for instance, to explore the dynamics through which different actor groups in the construction industry come to engage in the development and use of eco-district reference tools. Such an analysis would shed light on how unusual or highly specific elements in a given reference tool spread within an industry, eventually shaping practice through its inclusion in a new design template.

This paper identified some of the novel elements and also began to trace how these elements made it into a reference tool. We examined the role of key actors, investigating their sources of inspiration and their rationale for including unusual or highly specific elements in the reference tool. This work has only just begun; much remains to be done in terms of tracing the intricate pathways leading from past or contemporary sources of influence to the inclusion of select components within a reference tool for eco-districts. A more thorough analysis of such transfer and adaptation mechanisms could be an interesting object of inquiry for future research.

Our analysis focused on two countries, Denmark and France, comparing four reference tools from each setting. We found elements that were unique to a specific reference tool, such as the importance of promoting Christian values (Diakonissestiftelsen). We also identified some recurring patterns within each country. For instance, there is particular attention given to the accumulation and recycling of rainwater in Denmark as indicated by very specific measures. It would be interesting to explore if national patterns are prompted by imitation of other national-level tools or by frequent movement of actors among different projects or, alternatively, whether national policy or public debate about certain topics are directly influencing reference tool developers. There may also be historical traditions in each country that influence the choice of elements and the selected sources of inspiration.

One difference we notice between the two countries is the level of legitimacy associated with international inspiration. Although the actors in both countries seem to be equally aware of the most well known reference systems for sustainable construction in the world, notably LEED (from the United States) and BREEAM (from the United Kingdom), they take a different stance in relation to them. The Danish initiatives sought inspiration from international consultants and/or reference systems at the very early stages of their

development process before deciding to develop their own (e.g., Realdania's Sustainability Process tool) or to adapt a foreign reference system to the Danish context (Danish Green Building Council). In contrast, the French initiatives seem to explicitly avoid international imitation. They either take inspiration (or borrow the label) from national initiatives, such as HQE, which has become an established national standard for sustainable buildings, or they make efforts to be unique, or to appear as such. Yet, many of the French reference systems make explicit reference to different legislative and normative guidelines from France (e.g., French norms), Europe (e.g. European legislation), and the United States (e.g., ISO) upon which they build. Hence, we cannot conclude that there are objective differences in how much inspiration actors in the two countries take from abroad, only that it seems to be more legitimate and desirable to do so in Denmark than in France. Future data collection may help illuminate whether there are any objective differences in their respective sources of inspiration. If so, this element may potentially lead to the development of different design templates for sustainable construction in the two countries.

The data we collected for this paper are preliminary and as such cannot identify characteristics of an emergent new design template for sustainable construction. They can, however, help shed us light on some of the micro-level mechanisms through which actors contribute to innovation in a highly institutionalized field like the construction sector. The very concept of an eco-district seemed to have been prompted by a collective realization that the individual building is insufficient to address sustainability. In response to the vague notion of an eco-district, many different actor groups have engaged in struggles to define it. In so doing, they seem to draw on their existing knowledge and networks to generate a more comprehensive, yet also coherent and operational, conceptualization of an eco-district. Their efforts to integrate a variety of disparate elements also represent an interesting avenue for future exploration. How do they

select components and construct coherence among them, and how do they seek to make the reference tool operational for practice? Such insight would help advance our knowledge of how a new and coherent design template emerges from an odd collection of various novel components.

CONCLUSION

Our theoretical quest in this paper is to integrate two theories that address complementary levels of analysis: innovation theory (Le Masson et al. 2010) and organizational institutionalism (Greenwood et al, 2008). Whereas innovation theory is concerned primarily with processes of innovation at the organizational or project level, organizational institutionalism focuses on institutional dynamics within the organizational field (such as an industry). These two levels of analysis are complementary and their integration represents a promising avenue for explaining institutional innovation. Collectively, they can help explain how institutionally embedded actors contribute to the emergence of a novel design template, i.e. one that breaks with the institutionalized order.

Design templates are intriguing analytical objects because they integrate cognition, practice, and material expression. Institutional innovation includes all three components. It is important to note that innovative design is a temporary state of emergence, not the end goal. Once an innovative design becomes consolidated into a coherent set of beliefs, routines, and objects, a new design template is said to have emerged. Such a new design template represents a new institutional order. Our contribution lies in partially explaining how institutionally embedded actors contribute to the process of institutional innovation as expressed through the emergence of a new design template for sustainable construction. We highlighted some of the potentially innovative components that actors have introduced in eco-district reference tools; we also started to explore the origins and

rationales behind their inclusion. This contribution represents but a small step in the direction of explaining how actors contribute to institutional renewal on an arena that does precious little to encourage innovation.

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Appendix 1: Interview Guide - Standardization / eco-cities

Theme 1: The origin of the reference system

This theme explores the context in which the reference system has been created, the actors involved, the targeted objectives, its financing, events that provoked its emergence, etc.

- Who participated in elaborating it?
- Who supported politically and/ or financially the creation of the reference system – and with which objective in mind?
- Have there been particular events that stimulated its creation?
- Which components of the reference system were considered from the very beginning to be essential and which ones were added later (why)?

Theme 2: Its current status

This theme seeks to shed light on the current diffusion, as precisely as possible, before exploring its current level of use.

- How is it different from/ similar to other reference systems available on the market and also relevant for eco-cities?
- Who is currently using this reference system?
- Why, according to you, do some actors choose to use your reference system (why do other actors not use it)?
- Has the reference system been as popular as hoped for at the outset? If not, how do you explain this development?

Theme 3: Its future prospects

This last theme seeks to understand the political engagement that supports its future diffusion as well as the obstacles that may slow down such diffusion?

- Are there actors, in your group or elsewhere, that are currently fighting for this reference system to become more widespread (what do they do exactly)?
- What are the prospects, in your opinion, that this reference system will become one of the most widespread ones in Denmark/ France ten years from now?
- What are the most important obstacles to its diffusion?

APPENDIX 2 - Assessment of reference tools

	FRANCE				DENMARK		
Title	**Eco-district Norm P99N**	**HQE Development**	**Eco-district Label**	**INDI 2011- 2012**	**RealDania Process Tool v.1.1**	**RealDania Process Tool v.2**	**Municipality of Copenhagen's Sustainability Tool**
BACKGROUND							
Author	AFNOR (French association for standardization)	Association HQE (Association for High Environmental Quality)	MEDDTL (Ministy of ecology, sustainable development, transport, and housing)	SUDEN (European association for sustainable urban development) and La Calade (consulting office). Created by Catherine Charlot-Valdieu (consultant) and Philippe Outriquin (consultant).	RealDania Arealudvikling (DK)	RealDania Arealudvikling (DK)	Municipality of Copenhagen/ Niras (DK)
Type of organization	Privatized organization (established 1941)	Parapublic organization (law of 1901)	Ministry	Suden is a non-profit organization while CSTB is a para-public organization under ministerial supervision.La Calade is consulting firm in sustainable development.	Parapublic organization (private fund with a public good mission)	Parapublic organization (private fund with a public good mission)	Municipality and associated consultancy
Phase	In development. First pilots expected in 2012.	Developed. 10 pilots in 2007, 18 in 2011. Tool to be commercialized in Sept 2011.	In development. Piloted in eco-territory competitions in 2008 and 2011. Label expected in 2012, pending 2011 report to Minister.	In developmen.Already experienced in four Ecodistricts. Doccument be completed in May 2012. Official launch in October 2012.	In development. Piloted in eco-territory competitions in 2010 (Køge Kyst) and 2011 (Fredericia C.).	In development. Piloted in eco-territory competitions in 2010 (Køge Kyst - version 1) and 2011 (Fredericia C, Thomas B. Thriges Gade Odense - version 1.1).	Developed. Initiated in 2007 and piloted in the conception of two eco-territories: Grønttorvet i Valby (2007) and Nordhavn (2009) .
Additional info	AFNOR aims to extend this norm to ISO and GEN (European Committee for Standardization) in 2012.			The repository HQE2R has not evolved, but the authors have developed a new repository - INDI - with a 2005 version and 2011 version which aims to attract a public Ecodistricts new designers.		The tool has been dramatically reduced from 51 to 23 indicators. Furthermore, a number of "automatic calculation" excel sheets have been attached in order to make teh application of the tool cheaper. Some critics say it is not a sustaibility tool anymore, as the emphasis in optimization is great - specially in energy, downplaying other elements.	Applicable to projects of more than 50.000 m2 (multi-storey surface) that require municipal approval.

CONTENTS							
Type of assessment	Matrix of six themes, divided into 15 action areas with 19 associated indicators	Three global themes: 1. ensure the integration and the coherence of the neighbourhood with the urban tissue and the other territory levels, 2. preserve natural resources and privilege the environmental and sanitary quality of the construction project, 3. promote social life in the local environment and attend to economic dynamics. The three global themes are divided into 17 themes and 50 suggestions for possible indicators (actors are at liberty to select their own indicators).	Four themes: 1. objective and process, 2. Living context and usages, 3. territory development, 4. preservation of resources and adaptation to climate change. Each theme has 5 ambitions with 404 proposed indicators for action.	INDI 2011: INDI is structured in 4 issues or pillars with 120 indicators (qualitative and quantitative): 1) The energy management in project design 2) The energy management in buildings 3) The ambient lighting 4) The travel management	Three themes (environment, social/health, finance), with a total of 14 elements: 5 for environment, 4 for social/health, and 5 for finance that flow from the previous 9. These elements are further divided into 51 indicators.	Three themes (environment, social/health, finance), with a total of 9 elements: 4 for environment, 4 for social/health, and 1 for finance. These elements are further divided into 23 indicators.	Three themes (environment, social, finance), with a total of 14 considerations: 5 for environment, 5 for social, and 4 for finance.
Indicators/ themes with unusual elements or highly precise measures	Action area 5 (privilege local food production): Percentage of served meals on the territory that contain at least 50% local foodstuff. Action area 10 (decarbonate the economy): TeCO2 assessment (ADEME)	The categories are suggestions. Since there is no requirement to fill out all categories, there are no constraints on action	Ambition 15 (preserve economic viability of non-urban and urban operations): introduce policies that protect agricultural territory and reinstate agricultural activities closer to city centers.	Target 3b: Regeneration of brown-fields and polluted sites and soils. Target 20b: participation of residents to decision and projects related to the neighbourhood. Target 21c: Cultural links across the globe. Lacks analysis of the 120 indicators.	Ind 9 (element 3, water): which percentage of rain water is led into the sewer system (points attributed to percentages). Element 10, operational expenditures, particularly ind 45 and 49: what are the municipal, respectively societal, costs of dealing with rain water as proposed?	Ind 7 (element: water): which percentage of rain water is led into the sewer system (points attributed to percentages). - This indicator is taken out and is replaced by a "qualitative" answer, which some arquitects argue overlaps with indicator 12 (green/blue elements).	Con 4: water consumption max 110 l/ per person/day in residences; 34 l in business. Con 6: maximum 15 min. by foot to a park, a beach, a nature resort, or a harbour bath facility.
Processes	Nothing (yet)	Focus on process and negotiated goals. Six steps: 1. pre-project launch, 2. pre-project (initial) analysis, 3. choice and contractualization of objectives, 4. project conception and sustainable action plan, 5. construction, 6. evaluation. Documents must be produced at each step.	First theme is entirely about process and contains five ambitions: 1. Initiate and collaborate transversally, 2. clearly situate and define the project, 3. ensure financial, technical and judicial feasibility of the project, 4. manage and evaluate the project and the neighbourhood, 5. ensure project continuity.	Four phases: 1. the toolkit basis, 2. analysis, 3. decision upon the action plan; 4. action and evaluation INDI is the repository for use in all stages or phases of a project of eco-district: initial diagnosis, design, pre-program, program ... as a tool for the design and implementation or as a monitoring and evaluation. Ways forward derived from successive evaluations and develop an action plan is part of the process.	Five phases: 1. vision and initial objectives, 2. concrete objectives of each of the 15 elements, 3. assessment of concrete conception proposals, 4. detailed assessment of obejctives and overall balance among themes, 5. assessment of financial consequences for project, operation of eco-city, municipality, and the larger society.	Not clear what the new process is after the change from v1.1 to v.2.	Six phases: 1. information - dialogue (city and developers), 2. information prioritization, 3. evaluation and qualification - development of program, 4. evaluation and qualification - development of project description, 5. evaluation and qualification - assessment of project(s), 6. Municipal process - formulation of conditions and local development plan.
Processes that are unusual	N/A	Step 3, choice and contractualization of objectives: contracting of objectives carries potential for rupture.	Ambition 3 (theme 1): optimize the financial arrangements to meet qualitative objectives; ensure their pertinence by integrating the global cost of the project and its life cycle. Ambition 5 (theme 1): privilege and develop research and innovation at all levels.	N/A	Phase 5, assessment of financial implications at multiple levels: project construction, operational expenses, municipal finances, and societal costs.	The finance side of of the tool has been totally re-designed (Eva, please look at confidential documents)	Phase 6, municipal process: political approval and public hearing.

Evaluation	A guide of best practices, expected in 2011, will specify the category of 'follow-up and evaluation'. Performance required to respect the norm/ obtain a certification is also under development.	In the last process step (assessment - value), there is an assessment and performance measure that could be used to reinforce the contractualized objectives, but no suggestion is made to this effect.	Ambition 4 (theme 1): Ensure that the initial objectives are achieved and respected. The aim is to make a label in 2012 where the material required for assessment can be collected at less than 2000 EUR per project. Required performance level to be determined.	INDI 2011: Visual representation (spider web), using points, SWOT grid, qualitative report.	All 14 elements are assigned a score between 1 and 5 where 2 is the national average. The resulting map (spider web) of scores is descriptive and place the project relative to other Danish projects.	All indicators are assigned a score between 1 and 5 where 2 is the national average. Introduction of a rather detailed calculation process (Eva, see attached confidential documents). New version downplays the resulting map (spider web) of scores, which was very visible in previous versions.	Scores between 1 and 5 assigned to each of the 14 considerations, 3 being average or mandatory level. Description in spider web.
POLITICAL CONTEXT							
Actor support	Bougyues, and private companies paying around 3000 EUR to participate.	Tool developed with support from a range of different stakeholders, including architects, city administration, ministerial actors (MOA, SNAL, ADEME, interministeriel unit of equipement/housing/ culture, DGUHC, UNSFA).	French Environment and Energy Management Agency (ADEME); Caisse des Dépôts et Consignations (public financing); Association of Mayors in France (AMF)	No intitutional support (only Le Moniteurs edithor).	Co-developers: Carlsberg Ejendomme A/S (housing project), By & Havn I/S (Copenhagen harbour area), RealDania (para-public construction fund)	Co-developers: Carlsberg Ejendomme A/S (housing project), By & Havn I/S (Copenhagen harbour area), RealDania (para-public construction fund)	
Actor opposition	MEEDTL (AD¤4unit) opposed in 2008			Competition with HQE Amenagement.		Expected competition from DGNB Certification System - New Mixed City District, where Realdania is sitting in the committe investigating the probability of its' translation to Denmark.	
Specific law/policy references in tool	Action areas 1, 10, 11: "Carbon footprint TeCO2" developed by the French Environment and Energy Management Agency (ADEME). Action area 13: "Technical guidelines for sewerage of cities" (CG 1333, 1949) published by the French Ministry of Reconstruction and City Planning). Goal: integration into ISO and GEN (European Committee for Standardization)	In multiple process steps: Use of AEU tool (Urban Environmental Analysis) developed by the French Environment and Energy Management Agency (ADEME) and ISO 14001 and ISO 9001.	Grenelle Laws 1 & 2 : National Plan of adaptation to climate change from June 2010 and Territorial Climate Plans (chapter II, article 8).	EcoQuartier Label, RT2012, BBC,Grenelle de l'Environnement (Laws 1 & 2)	Ind 1 & 2: Ministerial Energy Agency measures for CO2 emissions ; Ind 3 & 12: Energy consumption according to Danish building regulations (BR2010/BR2015, passive house, and plusenergy house). Ind 11: SBI (national construction research office) statistics on average energy consumption. Ind 14: target water consumption based on pilot experience from Amager Fælled eco-city. Ind 37: Ministerial Energy Agency's measures for electricity prices.	It is expected that the "helping tools" use regulation as benchmark - however, these calculation are most likely to be black-boxed for the users.	Con 3: reference to Danish building regulations (BR) and standards for low energy houses.
Sources of inspiration	French Environment and Energy Management Agency (ADEME), notably its carbon footprint (AEU)	Proposal to use tools from B.E.E.P. (Bati - Environnement - Espace - Pro), a ressource network for energy efficiency and environmental quality.	Several of the 20 ambitions take inspiration from Agenda 21 (Rio 1992) and the Framework for Sustainable Cities (R.F.S.C), developed by the EU and piloted in France. National sources of inspiration aside from Grenelle Laws I & II include the National Strategy for Sustainable Development, Nature in City Plan, the Ecological Solidarity Pact, and the Eco-City Neighnourhood.	HQE2R, Objectives are inspired by the five primary goals of Agenda 21 (Rio 1992): participation, transversality, shared pilots, continuous improvement, evaluation. Also inspiration from HLM (French Social Housing) Fremworks of European Sustainable Cities and EcoQuartier Label		The"original" tool was used in Nordhavn - we have not made research about it.	Multiple web-links to area development plans, climate plan, city development plans, transportation plans for city, water consumption policy of city, water treatment plans, etc.