

Title

Construction Research in Europe challengers: Problem to existing buildings and knowledge new energy solution

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1 ABSTRACT

Cities foundation and building construction in Europe was made before XX century. Most of the buildings were built before II° World War, some other between 1950 and 1987 (Bruntland's report year), other before the 90's (before 93/76/CEE SAVE, EN 832 and Conference of Kyoto). Most historical constructions were built before the industrial constructions and before the introduction of plant technique.

Only in the recent past the European Community started to produce directives for building energy-saving constructions. All the buildings built before these directives were built without any energy concept for a system building-and-plant.

This is the aspect of constructions in Europe now:

Most of the construction activities, materials, technique and transformation are applied to existent buildings, but local laws and Europeans directives apply only to new buildings.

A lot of problems come out when different kind of materials, technology and architectural typology are applied to existing buildings.

How is it possible to council all this difference between new and old techniques, materials, buildings?

A construction research objective, besides researching for innovative materials, techniques and project solution, should evaluate the possibility to be applied to existing buildings and even more become really understandable to the landlord in terms of benefits, costs, advantages.

Objectives for European research energy:

- Knowledge of the existent building compartment;
- Information and education for users, architects, builders, building contractor;
- Training for architects, political decision-maker, community administrator;
- Implementation and boosting of new systems and certifications.

2 INTRODUCTION

"Each invention knocking at the door, must waiting year, or century, before it will be introduced in real life"

European Community is an ensemble of people and nation. Architecture, Town and city are the expression of this different kind of people and history.

European buildings are expression of many local factor:

- different kind of site, orografy, sun position, river, sea, and climate condition (architecture typology), and solution to repair to the climate factor;
- different kind of material for construction and culture technologies;
- cultural and economics differencies.

The several architectural expression in Europe are a result of the different history of architecture and construction technology. The several architecture and city in Europe is a positive factor against the technological homologation and against the energy requirement homologation.

In Europe we have two different "level" of Architecture:

- courtly, "aulic level", with innovation, economy resources, and this kind of architecture his a Public Building, or Community Building. Innovations are concentrated in this sector and are representative of the community,
 - common architecture, vernacular or traditional architecture, for isolate building or "town texture".
- Each level could be subject to innovation.

The first level is take out of traditional technical and formal solution, for example the Brunelleschi's Dome, the "Tractat of Architecture" of Leon Battista Alberti, the Renaissance, Palladian, the Modern Movement (CIARM Bauhaus, L'Ouvre of Le Corbusier) and International Style, all of them are a trasnational architectural style.

The second level is inside local site the technological culture.

That is a typical vernacular architecture and it's a mix of local requirements and materials joint with a courtly style inspiration.

PERIOD	ARCHITECTURAL CONTEST	CONSIDERATION
Before XIX century	Building historian and historical centres This Architecture is being based on the town. Story of the Europe present mainly in the historical town	Historical and monumental architecture often bound and protected that well cultural. Typologies and building technologies glances, it is more significant example for the study and the definition of the architectural typologies
XIX-XX century	Building historical industrial XIX archeology This is the building monumental, palaces residential that industrial examples of architecture, town and constructions isolated	First historical an urban peripheries and foundation the structure of the contemporary town. Bound like well cultural. New introduction technologies building and plant
XX century	CIARM and Modern movement At the beginning of the past century and between the two wars develop themselves the architectural Theoretician of the avant-garde of the modern motion. Experimental districts. Building industrial second urban peripheries	Trust in the new technology model building. Introductions new building technique
'50-'70	Modern Construction, (the Must Diffuse Building) Building technologies and the theories compositive of the modern 70's motion become of common property aside of all of the designers	It confirms of the model building and architectural been derived from the modern motion winning on industrial large urban expansions. First Bio-Climatic architecture experience
'90-'00	Experimentations bio-climatic architecture and energy legislation. Consolidation of the news technical building material best-reduction of the consumptions. After the energy crisis of the 70's different lines of search interest themselves verse models building bioclimatic and in the reading of the building technologies of the past	Park building recent subject to the normative one of containments of the energy consumptions. Formulation aside of the European community of a series of rules to reduce the energy dispersion
XXI Century	Different lines of search and projects from the years '90 to today. Building and the planning like together of technologies.	The energy project enters to make part of the planning Directive 2002/91/CE of for example

Smaller part of the building park
European former-ex-novo object of the
normative one

The technological innovation in construction, as iron, reinforced concrete and plant technique, was introducing at the start of XX century.

The Theory of Architectural Modern Movement introduced and elaborated this technologies in new project architectural criterion.

The result is the homologation of the above mentioned technologies solutions for each different kind of site, climate, activities, buildings and culture.

The LeCorbusian's error was to consider Architectural Design indifferent in respect of the contest and indifferent a specific climate, culture and plant technologies. This could be and error in the evolution of building sector. The excessive confidence in mechanics solution joint with a capillary diffusion of Modern Movement Theory could be the cause of the increase of energy needs in building sector.

The Le Corbusian's error was to give a mechanical solution for each comfort problem.

The innovation solution at beginning of XX century (reinforced concrete, iron structure, but must important a heating and cooling system, to water and hygienic solution) had been considerate in Modern Movement only a tools and not possibilities. For long time this plant technique was introduced after that project was been realized.

3 EUROPEAN BUILDING AND HISTORICAL CONTEST

Cities foundation and building construction in Europe was made before XX century. Most of the buildings were built before II° World War, some other between 1950 and 1987 (Bruntland's report year), other before the 90's (before 93/76/CEE SAVE, EN 832 and Conference of Kyoto).

Historical constructions was built before the industrial constructions and before the introduction of plant technique.

Only in the recent past, the European Community started to produce directives for building energy-saving constructions. All the buildings built before these directives were built without any energy concept to the building-and-plant system.

Tools take in consideration a new "Architectural Project" approach and planning must consider:

- Architecture and Building Design Innovation in site ,
- Technical system, physical factors and system for climate control,
- External system: culture, economy, customer.

4 ENERGY NEED IN BUILDING

Housing and office are architecture that uses low-technologies, low cost of construction and high cost of management.

This buildings are the principal energy actor [*energivory*] in city: for building it and for energy use.

To reduce energy requirement in building we could apply two cultural approaches:

1) If we reduce energy needs in a few building (over 10.000m³ as in Directive 2002/91/Ce for example) we would have a technique and project acknowledges for only one prototype building. This procedure can't be used for others project.

2) If we reduce a few energy needs dispersion in many diffuse housing and other buildings, we can change a total energy requirement and we could change the consolidated construction system.

A new challenge could be take of "I care my home and my E-core town", to make an architecture without standard model of project. A challenge could be not anonymous architecture but architecture with a specific solution for each climatic historical cultural social contest.

4.1 Strategy for innovation: 4 energy kind

The construction sector needs energy for building it (8-10% national energy requirement); and energy requirements during building, use-fruiton (40% of national energy requirement for heat, cooling, lighting, electricity, and water).

We propose a distinction to energy use in 4 kinds of energy, to reduce energy need and promoter energy saving in Building sector.

In town energy planning every activity consumes four types of energy:

- H.E. High Energy:

Great consumption of non renewable sources produced mainly by thermoelectric power stations, it is used for applications of medium and low potential absorption

- L.E. Low Energy:

Low resources consumption power (including co-generation) with use of R.E.S. (renewable Energy System) or potential high efficiency productions addressed at activities needing medium and low power for continuous time-lapses. Their production is similar to H.E. but they reduce increasingly their impact.

- S.L.E. Self Low Energy:

Local self-production done with alternative renewable energy systems or biomass. It is addressed to low absorption users directly linked to the source (example: small co-generation, solar panels, photovoltaic).

- S.E. Save Energy:

Waste and dispersion reduction. Saving actions are not always considered as an energy source but are the best and less expensive example. [image 2]

These four energies are used without any specific criteria while HE is the most widespread and common. Within a strategic approach in buildings and energetic sustainability of construction activities, it would be necessary to integrate their absorption directing user's consumption, autonomous systems (SLE) and builders themselves (SE). In this way HE and SE would be integrative and used mainly for industrial productive activities

5 B4E STRATEGIES FOR INNOVATION

The European Community has many different environments, a different architectural heritage; vast environmental history studies.

The problem for Europe is the detachment between innovation and currently building production; and lost of the theory and model behind to technical tradition.

The challenge in Building for Europe Strategy should be the use of simple knowledge instrument.

Main strategy point for Innovation in European Architecture Research are [image 1]:

- **KNOWLEDGE** of the existent building compartment;
- **INFORMATION** and education for users, architects, builders, building contractor;
- **TRAINING** for architects, Decision-Makers, community administrator;
- **IMPLEMENTATION** and boosting of new systems and certifications.

In Europe in building sector each country have own specify problems.

The standard shouldn't be a solution because each country have his own history, economic, climate and culture.

Instead of using standards would be better to use a European method of knowledge and architectural project.

5.1 Strategy Point Objectives in building for Europe B4E.

5.1.1 Objectives point 1--Knowledge of the existent building compartment;

The Modern Movement and International Style (and international technologies or comfort standard system) approach had failed.

A Historical lecture of energy in building and town process will give a specific local solution.

The Architecture and History of Architecture is a result of environmental matrix. Architecture and town has been the adaptive solution for human activities to repair at natural accidental factor.

The architecture typology are a result of environmental matrix and they are model of Houser habit and culture. That's relation influence a typology model a contest with an existing building.

To know a low energy solution, in technological sector and in architectural project (relation between space form ad energy comfort parameters) we need to acknowledge past tractates and past architecture handbook.

The acknowledge of past *Tractates* and *Handbook* made understandable a low energy solution, when a building were without plant.

Line of Acknowledge research:

- Historical existing building stock to study a typology and ambient matrix;
- Recent existing building stock to know an energy flow need at relationship to habitat model.
- Input parameter to European acknowledge model:
 - [historical and typology matrix] Architectural typology and energy flow , compared with a climatic condition;
 - [environmental matrix] Relationship between: city town or rural poor and building, empty and built space, green surface, density of urban site;
 - [energy matrix] energy balance between existent (restructuring) and a new element (materials, plan, space) and climatic contest,
- Data Bank
 - -data bank for research on this three parameter: typology environmental and energy flow in existing building and in urban site,
 - -traditional parameter of comfort and building models in different European area, parameter of bank loan and other economic factor.

5.1.2 Objectives point 2 Information and education

One of the problem in building sector is circulation of innovation research.

Each innovation have a gap compared with built technique habit

Built habit is different compared with a traditional built technique.

The innovation should be the communication to the energy-saving-logic in the project.

The builder could be investing in new solution with an economic gain.

The builders (bricklayer joiner carpenter for example) are not keen on changes a traditional construction system, because they don't have the possibility to know a new solution without a learning course.

5.1.3 Objectives point 3 Training for architect, civil engineering and plant engineering politician decision markers, community administrator

Construction activity cannot be determinated against natural elements, especially in Europe where human activity had changed environment.

Construction activity in Europe is in relation with historical contest include economic and social factor.

Architectonic and planning project should include:

- Relation with town and environment (cultural background of architect, history):
- Architect project design, plant, structure (formal factor and structural factor)
- Economic project: built cost, maintenance cost, energy cost in Life Cycle Assessments, Cost for innovation and new solution.

The hegemony of construction technique is present in more sectors especially in medium or small building contractors.

5.1.4 Objectives point 4: Role of Decision maker and boosting of new systems and certification

The decision maker could be changing a town, politics and a quality of life in town if they decide to introduce innovation in builder construction, but they need to know and understand this solution. Each innovation must be audit and check by administrator and decision maker. And this could be a prestige factor

The European community has different line of research and development to change a normative with Directive EN832, SAVE THERMIE ALTENER, and Directive 93/76/CEE, Directive 2002/91 /CE about energy saving in building sector.

With this flow scheme the technician proposal have the politician filter. The politicians don't have an instrument to known and to comparative the technician proposal.

The technician proposal could be to be against the political good value (convenient).

6 CONCLUSION

Problems of linked to Sustainable Development Environmental are the industrial increase and the growth of technical solution in construction sector, LeCorbusier's error (believe home is a machine, to "live in machine") and a fidelity in plant technique.

This factors changed architecture project, form and the technological solution and increases the change the environment (against environment).

After energy crisis, the energy requirement and comfort indoor standard is satisfy with plant. The world community introduced the Sustainable Architecture.

Europe introduced different directive to reduce energy requirements, and to change the CO₂ emission and toxic factor in indoor air quality and in other sector of construction.

Europe is a melting pot of culture; history, climate and each population have a typical architecture that is built in relation to the climatic contest.

Europe has to identify his own peculiarity and owner habitat, and don't follow the hegemonic model of climatic standard with pant.

The challenge for Europe, in building sector, is to believe in development of project model and construction technologies in the existing contest and that derived from it.

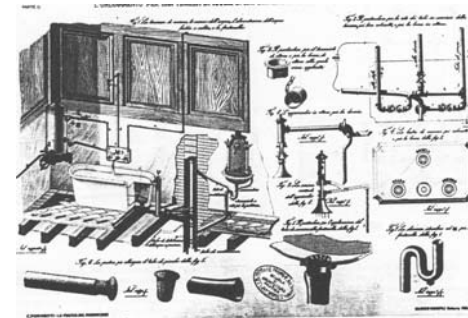


Image.1

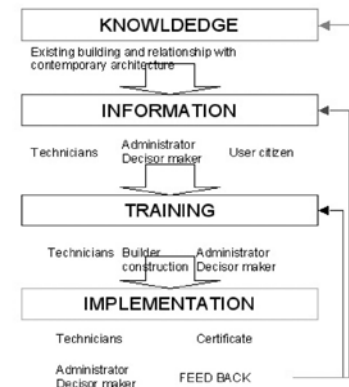


Image.2

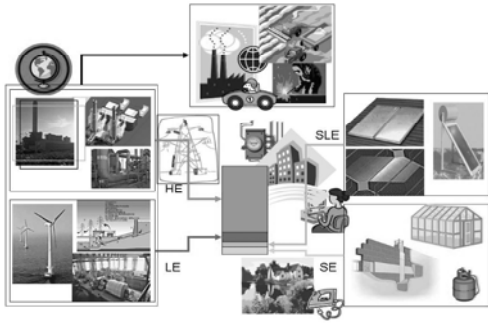


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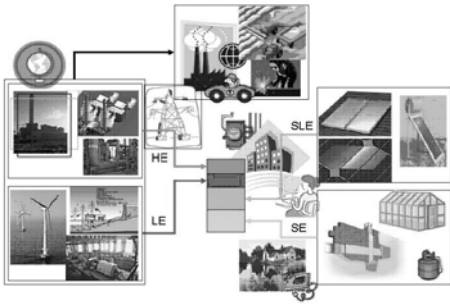


image 4



image.5

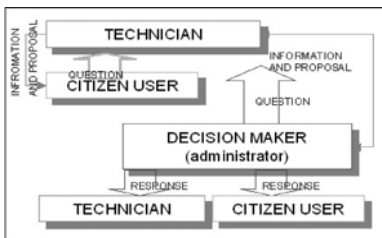


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