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# CHALLENGES FOR PUBLIC-PRIVATE PARTNERSHIPS IN IMPROVING ENERGY EFFICIENCY OF BUILDING SECTOR

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ABSTRACT

The provision of private capitals to build and operate of works bringing benefit to the community received a major boost during the last three decades, by the spread of public private partnership schemes all over Europe. Both project financing (contractual PPP) and public-private partnerships with shared capital (PPPI) were mainly used to build infrastructures able to generate income through revenues from users, recovering by this means at least a share of the investment costs. Some changes that have occurred over the last five years make it difficult in the near future the implementation of the cooperation models used in the past. The economic and financial crisis has dramatically worsened the supply of capital necessary to complete the projects, while the needs to which the public administrations are facing are rapidly changing. Over the most tried and tested field of big infrastructure and urban facilities, new priorities are emerging, such as the refurbishment of social housing stock and the supply of new homes at affordable prices or rents for low income households, as well as the rehabilitation of public school buildings.

As for environmental reasons, the achievement of high standards of energy efficiency is also an important variable for the feasibility of PPP scheme, in particular in retrofit and refurbishment of existing buildings. A reliable prediction of the achievable energy efficiency levels and their impact on operating costs of the buildings affects the

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structuring of public private partnership, and in some cases it may represent a main driver of its economic and financial sustainability. In this context, significant benefits can be derived from the use of several tools - mandatory, incentive, voluntary – made available to support energy efficiency by different levels of regulations - European, national, local. This paper investigates innovative business models for energy retrofitting actions and several available tools to subsidize their adoption. The paper comprises a case study selection, based on a detailed analysis of eco-innovations collected in Italy, and a focus on a significant case.

Key words: Public-private partnership, Energy efficiency, Payback period

#### Introduction

#### Evolution of Public-Private Partnership forms

Until the Nineties of the Twentieth century, the Italian experiences in the field of Public- Private Partnership (PPP) were mainly constituted by the so-called "concessions for build and manage" of major sections of the rail network (particularly during the period between the unification, in 1860, and the full nationalization of the network, in 1905) and of a large part of the motorway network (since 1958). These concessions (part of those relating to the highways are still in force) were mostly handled by public companies, or companies with predominantly public share capital, with financing guaranteed by the State [1].

Over the past quarter century, a further development of forms of partnership between public and private entities was experienced, partly related to transport infrastructures, and partly due to urban renewal interventions. The first experiences of "negotiating PPP" took place from the early 90s [2][3]: "integrated programs" of urban regeneration were first promoted by means of specific experiments by the Ministry of Public Works, as well as expressly provided in the legal system by means of a number of regional laws [4].

During the 90s two other peculiar forms of Public-Private Partnership were introduced in Italy; within the European Community context they are called respectively "institutionalized PPP" and "purely contractual PPP" [5]. The institutionalized PPP is represented by companies with public and private equity, initially conceived for the entrepreneurial management of local public services, then for the realization of urban renewal interventions [6]. In 1994, the reform of the Public Procurement Act has strengthened the concession for building and management and the project finance, both typical of the purely contractual PPP. Further regulatory changes introduced between 1998, 2002, 2006 and 2008 were aimed at simplifying the activation process, in order to improve the effectiveness and extend their use [7].

### Main fields of PPP's Interventions

The PPP's forms, established in the Italian context, have developed to meet specific needs, gradually changed during the time. Both integrated programs (the negotiating PPP) and mixed equity companies (the institutionalized PPP) were originally designed to address two peculiar issues: the reuse of brownfields embedded into urban fabric, and the rehabilitation of degraded residential areas.

Concessions and project finance (the purely contractual PPP) have been extensively used to build and manage transport infrastructure - some new sections of toll motorways and several public parking - and hospitals - replacing the old ones abandoned for the physical and functional obsolescence of buildings.

As far as the energy sector is concerned, a new framework began to emerge in the early 90s: the partial liberalization of the electricity production has encouraged the involvement of private investors. More recently, the measures taken to support the economic recovery from 2011 to 2013 were aimed at extending the PPP's application fields, e.g. involving the modernization of school buildings and using the savings from improved energy efficiency in order to remunerate the intervention of private entities.

# Effects of the Economic and Financial Crisis on the Public- Private Cooperation

#### Cooperation Models in the PPP

The typical cooperation model of the PPP is focused on the establishment of a project company. It is a Special purpose vehicle (Spv), namely a new entrepreneurial entity created to implement a specific intervention (Figure 1).

The establishment of a project company may occur on the initiative of a public subject, as in the case of mixed equity companies, or on the initiative of private parties, as in the case of project finance initiatives.

Private shareholders of the project company both ensure the coverage of the investment costs and provide the entrepreneurial skill required. Therefore, these private partners are mainly composed by construction companies, plant engineering and facilities management ones.

The project company shall obtain additional funding sources in the form of debt capital. The role of funders can be taken by the lenders, who provide capital at market rates, or by institutional investors, who provide capital under favorable terms.



Figure 1 : Cooperation model typical of the PPP

# PPP's Critical Issues Due to Economic and Financial Crisis

To deal with the recession of the global economy since 2008, all developed countries have adopted urgent measures, which have in turn increased the dependence of economic systems by the actions of governments [8]. However, the conditions of public finances, especially in the EU countries, allow recourse to this action only in exceptional and temporary basis. Despite this perspective, the financing of major public programs relating to strategic infrastructure could provide a significant boost to a renewed economic growth. Owing to the limited availability of public funds to be allocated to investment programs, further diffusion of PPP seems to be the best way to fund projects implementation [8].

However, over the past few years the PPP has been progressively slowed down by the changed conditions emerged in the capital markets. In Italy, this is particularly evident for debt capital provided by lenders (Figure 2). During the period between 2004 and 2008, the Annual Percentage Rate (APR) applied in loans to the manufacturing sector had a spread compared to the Euribor rate close to 1.4%. From 2012 to date, the average spread is further increased, reaching 4.5% over the Euribor rate. The rising cost of some sources of funding has reduced the affordability of interventions achievable with the involvement of private entities.



**Figure 2 :** Euribor rate and APR applied by a sample of Italian banks to the manufacturing sector (sources: European Money Markets Institute and Bank of Italy, Statistical Bulletin)

#### Role of Energy Efficiency as a Driver of Feasibility for PPP Interventions

### The Promotion of PPP Model for Energy Efficiency at the EU Level

Horizon 2020 Funding Program fosters the participation and the creation of Public-Private partnership (COM(2013) (July 10, 2013)): "Public-private partnerships, a powerful tool to deliver on innovation and growth in Europe, through the complementing the JTIs, the Commission in FP7 also engaged in structured partnerships with the private sector to seek direct input into the preparation of the work programs in areas which were defined upfront and which are of great industrial relevance." Horizon 2020 crosses Public-private Partnership programs with the promotion of innovative financial instruments (art. 32 of the General Regulation). The new financial instruments promoted by the EU have the Support of the EIB, and the big national banks of development (e.g. KFW in Germany, CDC in France and CDP in Italy).

The Commission fosters the adoption of PPP, also through other programs and cofinancing initiatives:

- connecting EUROPE program (Trans-European network policy in energy, transport, ICT sector, Risk-Sharing Finance Facility (RSFF) and Loan Guarantee Instrument for TEN-T projects (LGTT);
- structural funds as JASPER, JESSICA, JEREMIE e ELENA, from BEI and FEI funds with the supervision of EPEC (European Consulting Centre), which has the mission of strengthening the capacity building of PPP;

• Energy Efficient Buildings sector represents a crucial area for the adoption of PPP, which is considered a possible way to tackle the economic crises/recession and boost the economy though infrastructure investment in existing or new structures.

The European PPP Expertise Centre (EPEC) of the European Investment Bank has defined the challenges for the development of Energy Efficiency (EE) approaches in the public sector.

- Technical challenges: lack of the technical background and expertise of Public building owners to understand EE methods and technologies for reducing energy consumption and/or replacing the consumption of fossil fuels with renewable energy sources. Possible pathways could be:
  - improving the consciousness of the public building managers of the gap between the level of energy consumption of the facility they are administering and the level which could be achieved;
  - o understanding the financial value of EE measures;
  - demonstrating the convenience (less expensive and/or less polluting) of reduction energy consumption or substitution of the energy consumed with other forms, through proven technologies, methods and services.
- Economic challenges: difficulties in demonstrating the cost-effectiveness of EE projects: it could be difficult to convince managers to undertake projects which might become uneconomic when energy prices decline for a limited period. Guarantees regarding the profitability of such investments are key, both from a technical (physical savings) and economic (financial savings) point of view.
- Budget challenges: public entities often encounter difficulties in raising finance for investments: they may not be able to finance their whole investment program directly from public funding; the capacity of public entities to leverage debt is increasingly limited: this may be the result of restrictions imposed by the regulatory framework.
- Legal and institutional challenges: the introduction of EE measures or the implementation of EE investments in public buildings may also be hampered by a series of issues relating to the legal, regulatory or institutional framework.

# Financial Tools to Support Energy Efficiency

In the last years, the Public-Private Partnerships structure has been used increasingly for implementation and finance EE measures. EE is a European priority of governments, but the recent economic crisis makes the public sector more and more aware of the specific barriers related to development, financing and implementation of Energy Efficiency Projects [9].

The structuring of policy measures as PPPs (e.g. Public body-ESCO partnership) enables to deliver market-oriented instruments that target specific EE market barriers, without the need for direct government subsidy programs. It also allows public bodies to achieve their EE targets with a little amount of the public funding that would otherwise be required, with the private sector taking on both the financial and performance risks [10].

The International Energy Agency identifies the three most widespread PPP mechanisms for energy efficiency financing, capable of addressing different financing barriers, as reported in Figure 3.

Type of PPP		PPP Features					
	Brief Description	Agreement between public and private entities	Allocation of risk between partners	Mobilization of private sector financing	Payment to private sector for providing services		
Dedicated credit lines	Mechanism under which governments or donors provide low-interest loans to LFIs to encourage them to offer sub-loans to implementers of EE projects	Loan agreement between partners	Project financing risk shared between partners	Private partner generally provides co-financing	LFI earns fee by on-lending funds at higher interest		
Risk-sharing facilities	Mechanism where governments or multilateral banks offer guarantee product to absorb some EE project risks and encourage involvement of LFIs in EE financing by reducing their risk	Guarantee Facility Agreement (GFA)	Public partner absorbs some financial risk	Risk reduction mobilises additional private-sector financing	LFI earns interest on additional loans mobilized		
Energy saving performance contracts (ESPCs)	ESCO enters into term agreement with public agency to provide services, with payments contingent on demonstrated performance	Energy Services Agreement (ESA)	Performance risk generally borne by ESCO	ESCOs mobilize private-sector financing	Performance- based payment to ESCO		

Figure 3 : PPP mechanisms in the policy pathways (IEA Report 2011)

These three types of PPPs are not mutually exclusive, but could be matched. For instance, a dedicated credit line or a risk-sharing facility may be combined with policies and regulatory initiatives to facilitate ESPCs.

#### The Use of the Energy Savings Performance Contract

In recent years, the Energy Savings Performance Contract (ESPC) has proven to be a very effective tool in some countries for implementing energy retrofit projects, able to overcome some of the financing barriers to EE implementation. Nevertheless, in many countries the number of projects funded by ESPCs still do not form a significant part of the total investment budgeted by public institutions for energy retrofits (Figure 4).



**Figure 4 :** PPP European Market (2003-2013). Number of projects and volumes. (EPEC 2012)

The role of the PPP in ESPC is twofold:

- creating the enabling environment through legislative and regulatory changes that facilitates the implementation of ESPC;
- providing the public facilities in which the private sector will implement EE projects using an ESPC (acting as the "client" for the ESPC services).

# Case Study Analysis of Eco-Innovation in Italy

The case study selection is based on a detailed analysis of eco-innovation cases collected in Italy: ten key-projects of urban refurbishment in the area of real-estate & services are presented as test-cases for PPP policy. The main features of the case studies are collected in the following Table 1.

Municipality of Vignola is undergoing through the nearly complete renewal of public lighting. Approximately 3000 spots will be discarded (approx 80% of total), being replaced by new highly efficient devices. Besides lamp replacement, the public lighting plan will rely on technology aimed at energy saving, low maintenance cost, smart applications such as Wi-Fi, video surveillance, charging devices for electric cars and bikes. Overall, the Municipality gains more than 60% of energy saving, at the same time providing better lighting standards, broadening public lighting and video surveillance coverage either town, offering new services. The amount of money saved on energy bills is enough to finance the plan, conveying financial sustainability. This project is part of Vignola SEAP and has benefited from "Elena" measure from BEI.

*I-Vignola Lighting system* project, financed through ESCO scheme and supported by "ELENA". It was implemented in the early 2013 and included also installation of smart

(remote sensed) poles, allowing to activate further public services such as Wi-Fi or video-check of streets and buildings.

- Final investment by the awarded ESCO: 2.7 Mil Euro;
- Lighting points renewed: 2961;
- Energy savings: 249 GWh/year;
- CO2 savings: 154 tCO2 eq;
- Cost savings: 60%.
- 70% of the current public lighting cement supports and over 20 km of the electric lines will be remade.

	Financial dimension		PPP	Promoter	Public Bodies	Private funders ≠ promote rs	Timing	
	Funding (mln eur)	Neg.	Conc./pf				Start	Deadline
Luoghi comuni - 2250 m2 - 27 units	5		Х	Bank Foundation	Torino Municipality	Property Fund	2011	2013
Ivrea 24 - 9890 m2 - 122 units + 58 hotel rooms	14,5		х	Bank Foundation	Torino Municipality		2010	2011
Abit@giovani - 207 units			х	Bank Foundation & IMCO	ALER Milano	Property Fund	2013	2014
Via Padova - 36.3954mq - 46 units + 4 stores	11		х	Bank Foundation & IMCO	Lombardia Region	Property Fund	2011	2014
CENNI di cambiamento - 124 units + 6 commercial units	21,7		х	Bank Foundation	Milano Municipality	Property Fund	2012	2013
Ri-eco - 9.800 m2 - 140 units	36,9	х		Building company			2012	
Ronco Maggiore - 40.000 m2 - 300 units		х		Joint venture (2 building companies)			2007	2011 (first stage)
Unicum ex mof – 8000 m2 - 102 units	34	х		Joint venture (2 building companies)				2014
UNICA - 1.390 m2 - 28 students units			х	Public company	Firenze Municipality			2008
I-VIGNOLA - Lighting points renewed: 2961		Х		Vignola Municipalit y		ESCO		2014

Table	1	:	PPP	key-1	oro	jects
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The contract the Municipality has signed with the awarded ESCO will last 20 years, in order for the ESCO to return of the investment made. The social manager collects and keeps the rents of the apartments and the businesses to cover operating and maintenance costs, and it assume the risk of facing losses resulting from vacancies and arrears; the social manager is also required to allocate an annual share of revenues to the creation of a fund for the extraordinary maintenance and repairs, so as to fairly divide the costs among the various managers who eventually will succeed one another over the years.

#### Conclusion

The increasing need for renovation, replacement, or construction of new infrastructure projects and provision of more and better public services, is actually faced with the fact of international economic crisis and therefore with the lack of necessary resources to finance social policy mechanisms.

The collaboration between public - which gradually moved from the role of direct operator to the role of organizer, regulator and controller - and private sector could be a driver to achieve public interest objectives, through the adoption of PPP as an effective tool for the exercise of public policy.

Despite the conflicting opinions for the effectiveness or otherwise of PPPs as a way of financing public infrastructure and services the PPPs gains more and more attention in countries around the world and have contributed substantially to improve public services, providing government with much needed resources to reduce the infrastructure gap, with a lot of examples in various sectors (transport, energy, water sewerage, urban facilities of schools, etc.), both in industrialized countries and in emerging economies.

Through the analysis of the PPP measures adopted in the ten case studies, it was possible to define common features: less availability of public co-funding, generally not in form of direct money contribution, but by devolution of properties; the achievement of cost savings in the management of public stock and services as the main driver of all the PPP initiatives.

The study leaves some open questions. How to combine PPP financial structures with future improvement needs of the building and services systems? How to preserve the services and systems performance during concession lifetime? How to measure communities' satisfaction and environmental effects of the PPP initiatives not only on quantitative base, but also in qualitative terms?

In particular, this last question opens the way to further research lines about innovative and integrated parameters and indicators, which should be inclusive of social, economic sustainability and environmental impacts into private-public contractual agreements.

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