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THE ROLE OF PUBLIC-PRIVATE PARTNERSHIPS (PPPs)
IN SCALING UP FINANCIAL FLOWS IN THE POST-KYOTO REGIME

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Abstract

The climate change agenda requires in the near future adequate financial flows in order to support mitigation and adaptation efforts and the low –carbon development of emerging and new economies. The potentials of Public-Private Partnerships (PPPs) - as a risk sharing structure in order to bring private funds on the table - are presented in the new climate change context, offering a fresh contribute to the discussion of climate finance and public finance practitioners.

The thesis, based on the analysis of a panel data of two decades (1990-2011), first presents global evidence that international climate agreements are among the key drivers of PPP renewable energy investments in developing countries, second it discusses and provides recommendations on PPPs as a good financing model to mainstream climate change into the development agenda of emerging and less-developed economies.

Sinossi

La lotta ai cambiamenti climatici è entrata oramai da tempo nelle agende degli accordi internazionali. Essa richiede nell'immediato futuro un flusso adeguato di risorse finanziarie, al fine di supportare la crescita "carbo-sostenibile" delle nuove economie emergenti e dei Paesi in via di sviluppo. Occorre garantire inoltre un'adeguata implementazione sia delle politiche di mitigazione delle emissioni di gas ad effetto serra, sia delle politiche di adattamento agli impatti che il cambiamento climatico sta già avendo e avrà sulle economie di questi Paesi. Il lavoro esplora il modello dei partenariati pubblico-privati (PPP) e la loro potenzialità di efficiente strumento di allocazione e suddivisione del rischio, nel nuovo contesto di sviluppo carbo-sostenibile, offrendo un contributo nuovo alla discussione oggi in atto fra i professionisti della "finanza del clima" e gli esperti di finanza pubblica.

Il lavoro, basato sull'analisi originale di un insieme di dati relativi agli ultimi due decenni (1990-2011), presenta in primo luogo la generale evidenza, nei Paesi in via di sviluppo, di una crescita degli investimenti pubblico-privati in energia rinnovabile a seguito della definizione di accordi internazionali sul clima. In secondo luogo discute e offre nuove raccomandazioni sull'opportunità offerta dal modello finanziario dei PPP, per rendere il cambiamento climatico una delle variabili decisionali chiave dei futuri piani di sviluppo in quei Paesi.

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Introduction

The rationale

The 17th UNFCCC Conference of the Parties (COP) held in Durban in 2011 reaffirmed the urgency of adequate financial flows in order to support both mitigation and adaptation efforts. In this occasion, convened Parties confirmed the commitment to reach the financial goal of 100 billion USD investments per year by 2020 from developed to developing countries.

The COP also noted *with grave concern the significant gap between the aggregate effect of Parties' mitigation pledges in terms of global annual emissions of greenhouse gases by 2020 and aggregate emission pathways consistent with having a likely chance of holding the increase in global average temperature below 2 °C or 1.5 °C above pre-industrial levels*¹.

Recognizing that a global effort is needed to enhance ambition and close the current gap effectively, participants to the COP highlighted several ways in which this could be achieved, including the role of national governments, international cooperation, the private sector and how to mobilize resources.

Stabilizing greenhouse gases (GHGs) concentration below levels considered dangerous will require low-carbon investment in developing countries of some \$139-175 billion per annum by 2030. In addition, between \$70-100 billion could annually be needed over the next 40 years to finance adaptation to the inevitable impacts of climate change in developing countries (Leitman & Bishop, 2011).

In a period of shrunk public resources, the emphasis given to the potential role of the private contribution appears obvious.

The Public-Private Partnership (PPP²) model has already been used as a risk sharing structure in order to bring private funds on the table in several contexts where they would usually not have been appeared.

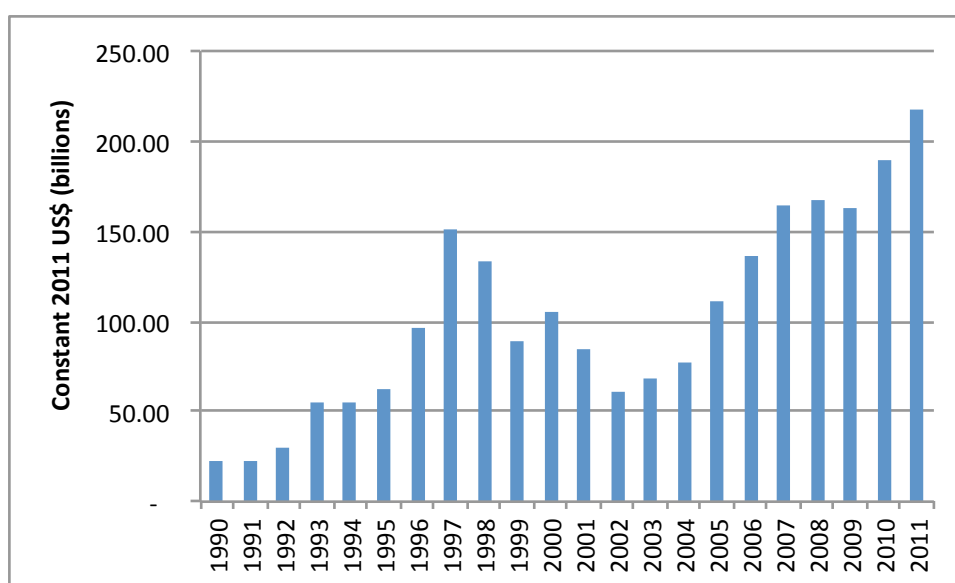
¹ Decision 1/CP.17

² In this document we will frequently use the acronym PPP which is obviously not to be confused with other well-known PPP acronyms introduced by OECD: PPP as Purchasing Power Parities used for GDP

PPPs are not a recent establishment, nor they are a modern era establishment. On the contrary, they indeed date back centuries. Public authorities have always perceived the cooperation with private entities as a tool to combat the limitations of public bureaucracy, in financial, technical and managerial terms.

In particular, PPPs are connected to the infrastructural development of countries. Countries like Italy, Spain and France, they all have utilised the PPP model in order to develop their national transport system³, the quality of which is often used as criterion to judge the country's competitiveness. Data from the private participation in infrastructure (PPI) project database of the World Bank and the Public-Private Infrastructure Advisory Facility (PPIAF) shows a steadily growth of investments in infrastructures in the developing countries (Figure 1) and national PPP programs account for a large share of investment⁴.

Figure 1 Investment commitments to PPI in developing countries, 1990-2011



Source: PPI Database, World Bank and PPIAF

international statistics and PPP as Polluter-Pays-Principle in environmental policy and in public finance

³ In 2011 68,8% (in terms of value) of PPP calls published in Italy is related to the transport sector (Presidenza del Consiglio dei Ministri, 2011)

⁴ According to a published IMF Working Paper, the total capital value of PPP in Korea was equal to the 6.7% of GDP at the end of 2008, while in Portugal was equal to the 5.6% at the end of 2007. For South Africa, Peru, and Canada the figures for 2008 are smaller: respectively 1.7%, 2.6% and 1.4% of GDP. (IMF, 2009)

On the other hand, there is a notable public debate about the impact of the global financial crisis on PPPs. The International Monetary Fund (IMF) published a paper on 2009, one year after the crisis explosion, aiming to assess the effects of the financial crisis on PPP programs (IMF, 2009). Availability and cost of credit, lower growth and unforeseen evolution of exchange rates threaten PPPs, and, as it has been highlighted by the European PPP Expertise Centre (EPEC) in 2010, following the credit crisis and the related lack of liquidity, the interest of financiers towards long-term investments, which are needed to support PPPs, is at serious risk (EPEC, 2010).

Notwithstanding the low recovery faced by the developed countries, developing nations are expected to continue to grow and will need massive investments in energy, urban systems, transport, agriculture. There is scope for developing countries to invest in a low-carbon future without sacrificing their growth.

In this context, this work aims to contribute to a deeper understanding of the opportunity that PPPs business model can offer to the developing nations financing needs, and to develop some policy recommendations and provoke innovative thoughts.

The structure

The present work focuses on PPPs opportunities in developing countries and on the role that PPPs can play in meeting their development goals. While adaptation investments are mainly advocated for developing countries, investments on mitigation (infrastructure investment) are required both in developed countries and emerging economies.

Existing literature on this issue is in fact very limited. International Finance Corporation (IFC), the “private” arm of the World Bank has recently dedicated the second issue (out of six) of its quarterly journal on PPPs “Handshake” to climate change. Other studies include the work done by PPIAF in its role of disseminating PPPs knowledge. Three years ago PPIAF introduced climate

change among its strategic themes. Since then, the activities conducted on PPPs and climate change seem to be limited in numbers and mainly related to pilot studies. Furthermore, despite the PPIAF PPI project database represents a unique and well-acknowledged web resource on PPPs, the climate change aspect of those projects is either not evaluated, or highlighted to a limited extent. The PPP Infrastructure Resource Center (PPIRC) provides other information on climate change issues⁵.

The present study aims to offer a contribution to this research area, providing advice to PPP facilities and practitioners on the investment needs generated by the climate agenda on the one hand, and advising the climate policy circle on a concrete instrument to support the climate action through private participation. PPPs could play, in fact, a relevant role in addressing both mitigation and adaptation sides of the climate change issues.

The first part of the study aims to define the conceptual framework building on two main areas of research: the general literature on PPPs and literature on climate change investments.

The literature on PPPs is very vast, and there is especially strong literature on principles of good governance in PPPs. In many countries, specific legal and regulatory frameworks on PPPs implemented in order to define the fundamentals and priorities of a PPP program are in an advanced stage of development.

The PPP process requires coherent policies that lay down clear objectives and principles⁶, a PPP policy is needed to set a roadmap for implementation, to

⁵ PPIRC is an initiative of the World Bank's Legal and Sustainable Development Network's vice presidencies, with funding from the Public-Private Infrastructure Advisory Facility (PPIAF), the International Finance Corporation (IFC), and the Norwegian Trust Fund for Private Sector and Infrastructure (NTF-PSI). The "Clean Tech" web site section (<http://ppp.worldbank.org/public-private-partnership/sector/clean-tech>) provides basic information on climate change laws and regulations and provide with a Renewable Energy Toolkit.

⁶ These include: UNECE (2008) *Guidebook on Promoting Good Governance in Public-Private Partnership*, Geneva, and Farquharson, E et al. (2011), *How to Engage with the Private Sector in Public Private Partnership in Emerging*

stimulate actions and to materialize aspirations into concrete projects. The governance challenge is not related to the climate change issue but it pertains to the overall institutional and legal frameworks that create the sound market conditions encouraging good public and private behaviours in a context of transparency.

The emerging literature on how climate policies can be designed to attract private investment to contribute to mitigate and adapt to climate change⁷ is broad. This includes the growing literature on investments needs in developing countries mainly coming from multilateral development banks (MDBs) and financial intermediaries studies such as studies conducted in occasion of the G20 meetings.⁸ The assessment of financial needs has to be coupled to the monitoring and recording the climate related financial flow, which is an issue *per se*. MDBs and international organisations like OECD⁹, are recently doing large efforts in defining common and agreed criteria for tracking the financial flows and harmonize the available data.¹⁰

More in particular, tracking the private component is one of the main challenges: apart from data coming from the transactions made in the carbon market (mainly the Clean Development Mechanisms of the Kyoto Protocol and the voluntary carbon market), today there is no official data on the private financial flows for

Markets, The World Bank and PPIAF, Washington DC and OECD (2007) *OECD Principles for Private Sector Participation in Infrastructure*

⁷ These include: OECD (2012) *Financing Climate Change Action* (Policy Brief).

⁸ These include the Advisory Group on Climate Change Financing (AGF) (2010), *Report of the Secretary-General's High-level Advisory Group on Climate Change Financing*

⁹ OECD (2011), *Monitoring and Tracking Long Term Finance to Support Climate Change Action*

¹⁰ These include: AfDB et al. (2012), *Joint MDB Report On Mitigation Finance 2011*, and AfDB et. al. (2012) *Joint MDB Report On Adaptation Finance 2011*. The two reports are prepared by a group of Multilateral Development Banks (MDBs) comprising the African Development Bank (AfDB), the Asian Development Bank (ADB), the European Bank for Reconstruction and Development (EBRD), the European Investment Bank (EIB), the Inter-American Development Bank (IDB), the World Bank (WB), and the International Finance Corporation (IFC), and they represent a first attempt to report data on the mitigation and adaptation finance provided by the MDBs for fiscal year 2011. Similar reports for 2012 will be published in May 2013.

climate-related activities. An overall estimation of the contribution of private finance has been recently made on the basis of the green Foreign Direct Investment (FDI) flows recorded by UNCTAD¹¹ and investments in the renewable energy sector. According to Buchner et al. (2001), the private sector is by far the dominating source of climate finance, providing annual resource flow up to 72.2 billion US\$ (the estimated range goes from 37 to 72.2 billion US\$) excluding the carbon market (which accounts, according to the same source of estimations, to only 2 billion US\$. PPPs represent one of the disbursement channels of investments in developing countries.

The second part of the study provides an in-depth analysis of the existing PPPs activities and an evaluation of their role in the climate change affected sectors.

In order to present the current evolution of PPPs, we first analysed the existing PPPs databases. The most comprehensive is the PPIAF database, a collection of more than 5000 projects in developing countries. The database is limited to infrastructure projects thus excluding social investments (i.e. PPPs on health sector or public transport) that might be relevant under the climate change perspective. Other region-wide sources of information include the ADB database for the Asian and Pacific region and the Infrastructure consortium for Africa. Country specific information have been also reviewed thanks to the availability of PPPs country specific websites managed by the national - and sub-national - PPPs Unit¹².

PPPs projects are usually listed by sector, such as water, transport, telecom and energy. None of those databases have labelled PPPs projects according to their contribution to combating climate change and to the joint MDB approach for reporting climate finance¹³ (AfDB et al., 2012a) (AfDB et al., 2012b)

¹¹ <http://unctad.org/en/Pages/Statistics.aspx/FDI/>

¹² PPPs Units of South Africa, India and Philippines, Pakistan, Brazil-Minas Gerais, Chile, Peru, Costa Rica report the complete lists of PPPs projects, other country specific websites report only information on their PPP policy and investment plans (for example Puerto Rico and Papua New Guinea).

¹³ An analysis of the efforts currently made to track the climate related aid and a description of the MDB approach is provided in the following chapter.

An “internal” version of the PPI project database (last update on August 15th 2012) has been kindly provided by the PPIAF to the author. The database has been sampled according to a well-defined methodology. For the first time, data from 1990 to 2011 are used and analysed according to several dimensions. The availability of this updated dataset, allowed an evaluation of the very recent trends registered in the energy, water and transport sectors, tracking the immediate effects of the 2008 and still on-going financial crisis. The most comprehensive analysis of the “internal” version of the dataset provided with further information on the current contribution of PPPs to the carbon credit mechanisms is performed in the energy sector.

After having analysed and assessed the dimension of the overall phenomenon, the third part of the study focuses on some selected case studies of PPPs project “climate change labelled”.

In order to select the most representative case studies, we reviewed the publicly available project portfolios of PPIAF, IFC Climate Change Group and the Climate Investment Funds, including Climate Investment Fund (CIF) programmes like the Clean Technology Fund (CTF) and the Scaling Up Renewable Energy Program in Low Income Countries (SREP)¹⁴.

All of the selected projects can be viewed as “best practices”. We will attempt to identify key elements of success along the projects development cycle: PPPs policy framework and governance, financing mechanism, role of advisers, procurement management, contract management, climate change co-benefits.

Case studies have been analysed according to the World Bank Group policy (World Bank, 2008) and the PPIAF indicators for PPPs activities. PPIAF has developed standard definitions and categories of its output and outcome indicators to more accurately track their results and thoroughly document the causal chain from outputs to outcomes to impacts¹⁵.

¹⁴ See the list of Case Studies reviewed.

¹⁵ Outputs are the direct deliverable as mandated in the terms of reference for the activity being funded by PPIAF. Outcomes are the action taken as a direct result of the outputs. These outcomes can usually be expected to occur within two to three years of completion of the outputs. Impacts are the

The bulk of available and emerging financial resources relates to mitigation; most of the reviewed projects belong to the renewable energy sector, such as the development of wind, solar or geothermal electricity power plant. Part of them has already applied for registration under the Kyoto Protocol Clean Development Mechanism (CDM). Others relate to the public transport sector, like the development of Chennai's Metro in India.

Even if climate change adaptation projects are still in their infancy, PPPs water related projects are already contributing to tackle the water scarcity and water distribution issue. By 2007, private water operators were delivering services to around 160 million people in emerging markets. These PPPs have delivered water access to an estimated 24 million people since 1990 (IFC, 2011a). The case studies examined focused in water irrigation development projects in Africa, large wastewater treatment projects like the new Cairo wastewater treatment plant and delivery of water services.

Global climate change escalates the risk of extreme events such as heavy rainfall, droughts, high sea levels, and possibly cyclones, with direct implications for disaster risks.

Despite the topic of private sector involvement in Disaster Risk Reduction has gained prominence during the United Nations International Decade for Natural Disaster Reduction (IDNDR, 1989-1999) which called upon national governments to “encourage their local administrations to take appropriate steps to mobilize the necessary support from the public and private sectors and to contribute to the achievement of the purposes of the Decade”, DRR has remained a relatively new area for public-private partnerships (PPPs) (UNISDR, 2009). One of the case studies focuses on the design and construction of an innovative disaster risk reduction infrastructure, but the issue deserves certainly further research.

changes at the government and/or direct beneficiary level resulting from implementation of the outcomes. Impacts usually take much longer to materialize, particularly in PPIAF's case, and usually are the result of several interventions.

<http://www.ppiaf.org/page/results/monitoring-evaluation/methodology>

Last section of the study outlines recommendations for strengthening PPPs for combating climate change, based on insights gained from expert consultation and the evaluation of case studies. PPPs, which have been extensively used in the past to promote the countries infrastructure development, today represent an interesting business model that need to be more extensively explored in its capacity to serve the implementation of the climate mitigation and adaptation agenda of developing nations. In the near future, policy makers will take more and more into account the opportunities offered by PPPs to best combine the public and private interest, while the climate action plans will represent for the private investors a new “good business” opportunity to bring their ingenuity and innovation.

Setting the context

The PPP model: a marriage or a wedding?

As a form of cooperation between the private and public sector, the public-private partnerships are not a new phenomenon or a new way of doing public policy. To incorporate the technical expertise, innovation, the financial capability, cost-effectiveness and economic efficiency of the private sector when providing public goods and services is not an idea of the last century.

A private postal service was in place at the time of Roman Empire along with the public one, being the private service devoted to the fast delivery. The *tabellari*, the private couriers, were able to use the public infrastructures in place along the roman routes, the *mutationes* and *mansiones*, public places where it was possible to change the horses and rest during the night.

The involvement of private sector in the traditional public policy investment has met with different degree of acceptance and resistance during the world development history. There has been a golden age of concessions contracts in Europe during the century following the industrial revolution; it was the time of the expansion of cities, of the development of public services for the water and energy supply and of the construction of big transport networks. Private entrepreneurs were deeply involved in the creation of railways at that time and the concept of involving and promoting the private enterprise was well supported by the new ideals brought by the French Revolution. (Bezançon, 2004)

First and second World War reversed the development trend of the collaborations between public and private: the role of the State became predominant together with the development of the concept of the welfare state and the influence of socialism and communism.

Later in the eighties and nineties of the 20th century, liberalizations and privatizations saw a renewed impetus of the private role in the entire developed world and an expansion in the emerging economies.

In UK the Private Finance Initiative has been introduced in 1992 by John Major's Conservative government as a way of bringing private funding to pay major public investments. Despite recent severe criticism to the PFI model which led to the launch of a reform process of the PFI (a call for evidence has been published on December 1st 2011 seeking forward proposals in order to better achieve the principle of maximum value for money), the UK government still believes in the importance of private contribution to deliver the amount of infrastructure required. According to the National Infrastructure Plan 2011, with a pipeline of more than 500 projects worth over £250 billion to 2015 and beyond, only less than 20% will be fully publicly funded, the remainder will be either privately funded (60%) or will be funded through public-private sources.

Well established public-private partnerships programs are today in place in most of the developed countries like Australia, USA and many continental Western European countries; at EU level, concessions awarded in water, waste, health and transport sector were estimated to be worth € 138 billion annually¹⁶ and a new European Directive proposal¹⁷ is currently under discussion on the award of this most established form of public-partnership contracts, while the Obama administration just announced a ground-breaking public-private partnership to prevent health care fraud.¹⁸

Infrastructures represent the chief support of a modern country, the backbone, affecting the growth and productivity of the economy, and all the emerging economies are investing their efforts in promoting the involvement of the private sectors. India, China and Brazil, but also Nigeria, Chile, Mexico, Colombia, South Korea and Philippines have activated public-private partnerships programs at country level with different degree of maturity and they are planning to use it to bring to reality their infrastructures needs.

¹⁶ <http://europa.eu/rapid/pressReleasesAction.do?reference=MEMO/11/932&format=HTML&aged=0&language=en&guiLanguage=en>

¹⁷ COM(2011) 897 final of 20.12.2011. *Proposal for a Directive of the European Parliament and of the Council on the award of concession contracts*

¹⁸ <http://www.marketwatch.com/story/obama-administration-announces-ground-breaking-public-private-partnership-to-prevent-health-care-fraud-2012-07-26>

But PPPs role is not confined to the investment in infrastructure. As part of the European Economic Recovery Plan adopted in November 2008, the Commission launched, in 2009, three Public-Private Partnerships (PPPs) to tackle the consequences of the global economic downturn. The aim of the three PPPs was to fund research and innovation in three key industrial sectors - manufacturing, construction and automotive - in order to boost competitiveness and support employment, while at the same time significantly contribute towards a more green and sustainable economy.¹⁹

Looking for a definition of PPP

Despite its long history and due to its complex nature, the concept of public-private partnership has not yet been commonly defined since no uniform definition exists in order to demarcate a Public-Private Partnership (PPP) from other forms of cooperation between the public and private sectors. The statement “*there is no clear agreement on what does and what does not constitute a PPP*” is quite meaningful. (IMF, 2004)

Several definitions can be found instead.

Savas (2000), for example, using a broad definition that fit in with a large variety of forms of cooperation, defines a PPP as

“any arrangement between government and the private sector in which partially or traditionally public activities are performed by the private sector”.

An inclusive definition is used also by Delmon (2011), while the limit to the infrastructure sector is only due to the limited scope of his publication. According to Delmon, in fact, the PPP term is used to mean:

¹⁹ European Commission /EC (2012), *New public-private partnerships for research in the manufacturing, construction and automotive sectors*

any contractual or legal relationship between public and private entities aimed at providing and/or expanding infrastructure services, but excluding public works contracts.

Forrer et al. (2010) offer a more detailed definition, which includes more detailed elements that characterise this form of cooperation:

“Public–private partnerships are ongoing agreements between government and private sector organizations in which the private organization participates in the decision-making and production of a public good or service that has traditionally been provided by the public sector and in which the private sector shares the risk of that production.”

At European level, the EU Commission, in its green paper²⁰ of 2004, which started the discussions on the need of a new Directive for concessions and other forms of PPP, opts for “functional definition” and after having stated that

The term public-private partnership ("PPP") is not defined at Community level. In general, the term refers to forms of cooperation between public authorities and the world of business which aim to ensure the funding, construction, renovation, management or maintenance of an infrastructure or the provision of a service

set the hallmarks of this form of cooperation:

- 1) duration of the cooperation: the relationship between the private and public sector organisations is a long lasting relationship, a traditional contract for the provision of goods or services cannot be categorised as a PPP;

²⁰ COM(2004) 327 of 30.4.2004. *Green Paper on public-private partnerships and community law on public contracts and concessions.*

- 2) source of funding: the funding method of the project can implicate complex arrangements between the various players. The presence of private funding is crucial to the project, however, the public funds - in some cases rather substantial - may be added to the private funds
- 3) clear definition of the partners' roles: the private economic operator is involved at different stages in the project (design, completion, implementation, funding) thus sharing rights and responsibilities during the duration of the contract and participating in the decision making as to how best to provide a public good or service. The public partner concentrates primarily on defining the objectives to be attained in terms of public interest, quality of services provided and pricing policy, and monitoring compliance against them;
- 4) risk allocation: the relationship implies a negotiated sharing of risks between the public and private sector according to their appetite to risks. It is probably the most important feature of a PPP. The public sector transfers to the private sector part of the risks traditionally borne when delivering the specific public good or service. The private organisation will bear the risks according to its specific capacity to assess and manage them.

All the above-mentioned points help us to design the main functions of this particular form of partnership. A similar definition, has been also adopted by IMF (2008):

The term PPP covers arrangements usually characterized by the following:

- 1) An agreement between a government and one or more private partners whereby the private partner(s) undertakes to deliver an agreed upon quantity and quality of service;*
- 2) In return for the delivery of the agreed upon quantity and quality the private partner(s) receives either a unitary charge paid by government or a user charge (e.g., a toll) levied by the private partner on the direct recipients of the service;*

3) *An emphasis on a whole-of-life approach. The private partner(s) is usually responsible for both the construction and operational phases of the project;*

4) *Some degree of risk sharing between the public and private sector that in theory should be determined on the basis of which party is best able to manage each risk, thus ensuring that the PPP optimizes Value for Money.*

We will use these “functional” definitions for the purpose of this study.

PPP contractual types

PPPs, as defined above, can be formalized through a wide range of contract agreements. Again, there is not a uniform categorisation of PPP contract forms and the nomenclature can vary across PPP programs.

Nonetheless, the functional definition set above, help us in identifying a particular form of PPP according to the following characteristics (WBI and PPIAF, 2012):

- Type of asset: does the asset already exist or not?
- Function provided: what is the function the private party is undertaking?
- Payment method: how is the private party paid for the provided functions?

Projects involving the construction of a new plant or facility are usually referred to as *greenfield* projects (opposite to *brownfield*), where the private partner can be involved in the construction, management and financing of a new asset, or alternatively the private party takes the responsibility to manage or rehabilitate or take over the operations of an existing state owned asset²¹.

Very often a PPP is named according to the function (and the related risks) that the private party will undertake within the defined partnership. Functions

²¹ In case of *permanent* transfer of the ownership of a public owned asset to a private party we will refer to a *divestiture or privatization*. Privatization shall not be confused with PPPs: PPPs require long lasting relationship between the public and private party, which clearly does not occur in privatisation.

normally refer to the project cycle phases such as *design, finance, build, rehabilitate* (or expand or upgrade), *operate, transfer*²². A detailed categorisation of the PPP projects according to their specific functions is provided in a following paragraph dedicated to the description of the PPI database.

As defined above we will concentrate our analysis on long lasting contractual forms of cooperation between public and private sector. In this type of agreements the public sector usually transfer substantial (and negotiated) financial, technical and operational risks to the private party which in turn receives a financial return: an important distinction among PPPs is the method of payment of the private party:

- user-Fee PPPs
- availability-Based PPPs

In the case of the *user-fee PPP*, the public party grant the private party the right to build, and / or operate a public-owned facility. This scheme is usually known as a *concession* contract granted for a fixed period of time. It is probably the most common form of PPPs, as we will further discuss in the subsequent part of the study. The main feature of this form of PPP is that risk associated with the demand of the asset -owned by the public-, is transferred to the private side. The private will recoup its investment by collecting a fee charged to the users. The clearest example is the toll-road, a port, or the provision of services, like energy or water.

In the case of the *availability-based PPP*, the payments to recoup the investment made by the private side are directly made by the public. There is no transfer of the demand risk, the public use the PPP to allocate other risks like the operating and maintaining risks of the asset. In this case the payment is usually know as capacity charge, which is paid to the private party for the availability *capacity* of the project. This means that the payment is not made on the availability of the asset itself, but on the capacity of the asset to perform its service function. This

²² At the end of the contract the asset is usually transferred again to the public. See note above.

form has been recently used for social services projects, like hospitals or prisons, but the availability-based PPP originated in the energy sector with the so-called IPPs (independent power-producer) projects, according to which the private party design and build a power plant that will sell the electricity produced to a public-owned energy utility.

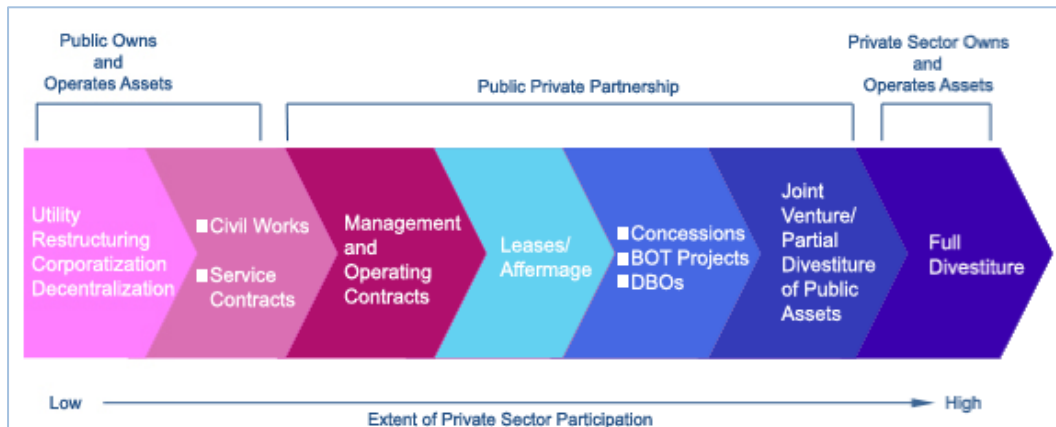
The choice between the two forms of payment of course depends on the payment capacity of the public party and on the market readiness to pay for a service both in terms of users affordability and willingness to pay. These considerations are of utmost importance when planning a PPP project in a developing country. The solution may involve the use of official development assistance funds or other form of concessional finance, or mixed form of payment methods. (Farquharson et al, 2011)

PPPs types can also be categorized according to their degree of private participation and risk taking; PPPs shall not be confused with traditional forms of public procurement or with forms of privatization like divestiture.

The establishment of a PPP as an alternative to a traditional public tender is based on the logic of an optimal risk sharing approach with the private partner, which can offer a better value for money than the public sector.

As pointed out by Delmon (2010), the popular approach to plot the forms of PPP against a continuum (Figure 2) - used for the World Bank's PPP Resource Centre Website, the UNCITRAL model law, PPIAF toolkits and others - endeavours to show the flexibility of PPP, and the lack of clear delineation between different forms of PPP, by demonstrating the movement of PPP structures across the continuum. However, it clearly provides only a very rough classification against the general concepts of private sector risk and control. It also implies that the sub-parts of the continuum are subject to clear and exact definition.

Figure 2 From public procurement to privatization



Source: <http://ppp.worldbank.org/public-private-partnership/agreements>

Parties of a PPP project and financing structure

A successful PPP project is the result of the intertwined work of several parties. We underline the adjective “successful” because it is essential to recognise that one of the key features of this form of project realisation is the cooperation among different parties (private and public) who together define the best way to share and overcome the risks inherent to a specific project: to be successful, the work of those parties shall be perfectly intertwined.

Despite the fact that a PPP project can be implemented according to multiple forms of agreements, the following actors are typically present:

1. The grantor
2. The project company
3. The sponsor
4. The lenders.

Those four main actors constitute and build the core nucleus of the partnership and of the contractual structure of the PPP.

The PPP contractual agreement will define the relationship between the public and private side of the partnership.

We refer to the *grantor* as the public side of the PPP. It can be the national government or a local government but more commonly a government agency or a

regulatory authority, which is the interface between the private side of the PPP and the government. The grantor has the authority to assign, to grant, the PPP contract to the private party²³.

We usually refer to the *project company*, as the private side of the PPP project. Typically a limited liability special purpose vehicle company (SPV) is established in order to implement the project and to enter into contract with the grantor. One of the main features of a PPP is the allocation of risks among parties: the SPV company has the primary role to allocate the risks borne by the private side among the private parties themselves. The SPV, or project company, is established by the *sponsors*, which have initially identified the project and decided to put their efforts together in order to prepare the bid. They are the shareholders of the SPV. The SPV raises the necessary finance through a balanced combination of equity and debt contributions. The sponsors, as shareholders, provide the first, while additional sources of finance are made available to the project company by the *lenders* through loans, bonds or other financial instruments. The lenders can be commercial banks, export credit agencies, institutional investors, or, when investing in developing countries, multilateral and bilateral development banks. In some cases, the government of the country hosting the project can also provide debt contribution.

The equity contribution bears the highest level of risk: the equity investors receive distributions only in case the project company is in profit, while they hold the lowest priority in contributions, but potentially they can receive the highest returns (Delmon, 2011) from the project activities. On the contrary, the debt contributions have the highest priority among the invested funds, but since the debt is held by the SPV, the lenders recourse is limited to the project revenue stream and to the project assets.

The financing structure described above is known as *project financing*.

²³ As an example, the Moroccan Agency for Solar Energy (MASEN), established by the Government of Morocco with the specific aim to develop the Morocco Solar Plan, is the grantor of the concession contract of Ouarzazate Concentrated Solar power Station as described in the case study.

The project financing offers an alternative to the corporate financing and the government financing, other common sources of financing for infrastructure investments.

The main feature of the project financing is that it enables the sponsors to finance the PPP project on a limited resource basis thanks to the establishment of the SPV. In the corporate financing the sponsor borrows the money and invests it in the project using its credit profile (in the government financing case, the government will have to borrow and provide money to the project, with limited resources competing with a number of possible initiatives); in the project financing structure, the finance – both equity and debt - is directly raised by the SPV: the debt is on-balance sheet of the SPV and the shareholders will not have a direct liability to the lenders, but is off-balance sheet for the shareholders and/or the government, thus providing a limit to the effect of the project on the cost of shareholders' existing debt or future debt capacity²⁴.

The project financing has the comparative advantage of promoting a transparent and an efficient allocation of risks among the PPP parties: each party will bear and manage only the risks according to its ability, the shareholders and the grantor credit capacity will not be affected by the debt acquisition and the average cost of capital of the SPV will result better weighted and balanced than in a pure equity financing structure.

Figure 3 summarizes the relationships described above and highlights the differences existing in the three financing options. The diagrams depict a simplified version of the net of relationships that occur in the reality, which is often characterised by a higher level of complexity and where more than one financing structure can be observed at the same time.

²⁴ In the case of the government, keeping the debt off-balance sheet should be considered carefully as it could conceal the nature of the government fiscal space or the existence of government liabilities, and reduce the effectiveness of government debt-monitoring mechanisms. (Delmon, 2011)

The grantor, the project company, the sponsors and the lenders are the four main players of a PPP project, nonetheless other actors play relevant roles adding competence and skills or helping to define the risk sharing structure of the project.

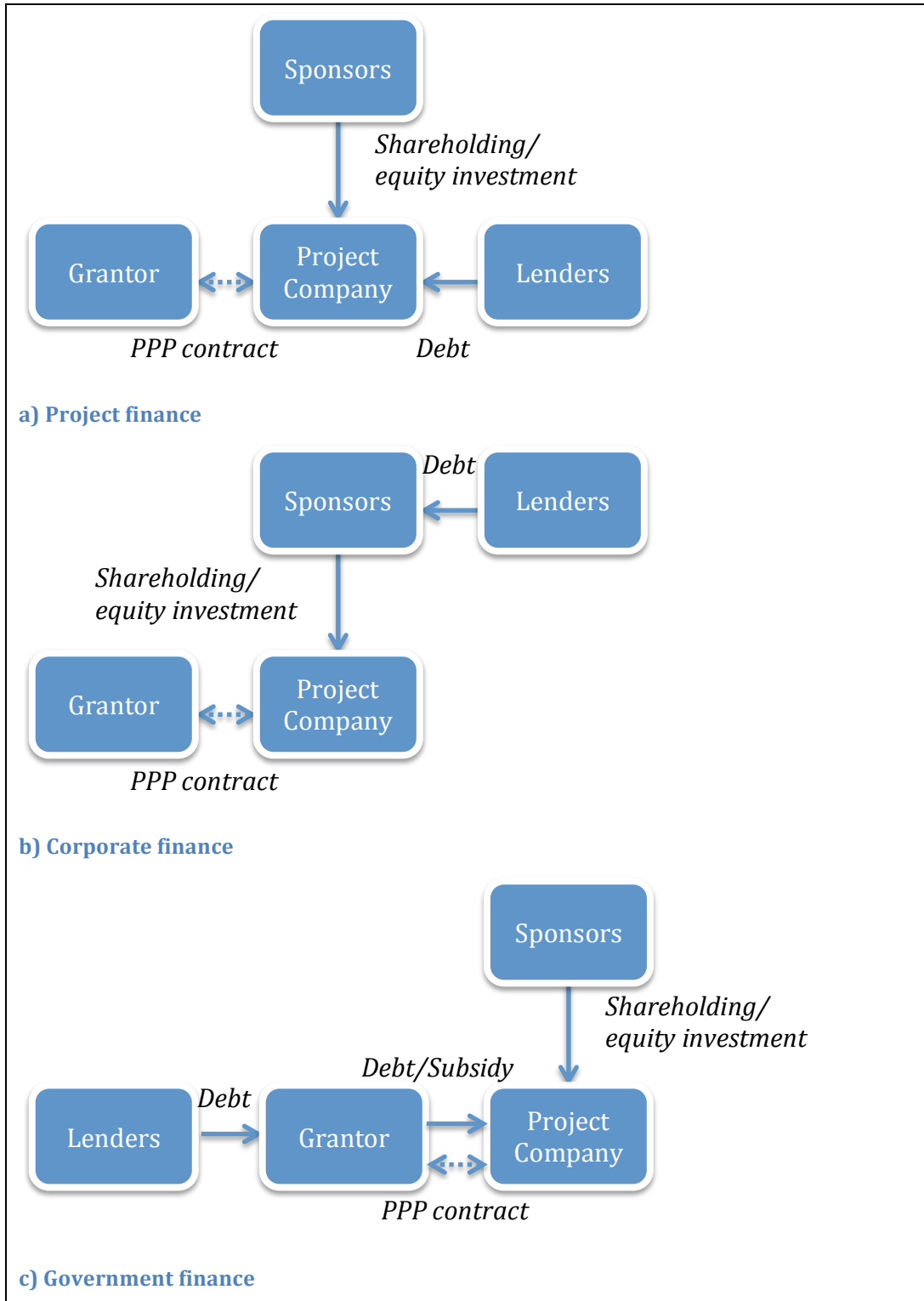


Figure 3 Main financing structures

In many countries, where specific legal and regulatory frameworks on PPPs have been developed in order to define the principals and priorities, the establishment of national units specifically dedicated to PPPs²⁵ has coupled the institutional context. The establishment of the PPP units came well after the origination of the PPP projects. Figure 4 shows the development of the PPP units worldwide, the authors set the 2000 as the year when the first PPP units were created in UK, South Africa and Canada, while already in July 2002 the Government of Mauritius established a PPP unit at the Ministry of Economic Development, Financial Services and Corporate Affairs to design a policy framework, including appropriate legislation, the first example among developing countries²⁶.

Note that the PPP unit is generally not the contracting authority (the grantor): this responsibility remains in the hands of the government body (central, regional or local) or of the government agency that has the authority and the budget for the procurement and implementation of the project.

²⁵ PPP units are typically located at central level under a ministry of finance or treasury, or in a strong national economic planning agency (like the Italian UTFP - Unità Tecnica Finanza di Progetto, located within the CIPE - Comitato Interministeriale per la Programmazione Economica), but regional units can be found depending on the size and structure of the government. In developing countries regional PPP units have been, for example, established in India and Mexico. In case of large municipal authorities PPP units at city level may also be found: in the UK the Leeds City Council set up a PPP Unit, while the Philippines PPP Center has recently published a PPP Manual for Local Government Units. (PPP Center, 2012). In any case the coordination role of a central unit appears fundamental.

²⁶ Many other PPP units are today in place in the developing world. The UNESCAP website provides an updated lists of web link to PPP units in the developed and developing world <http://www.unescap.org/ttdw/ppp/pppunits.html>

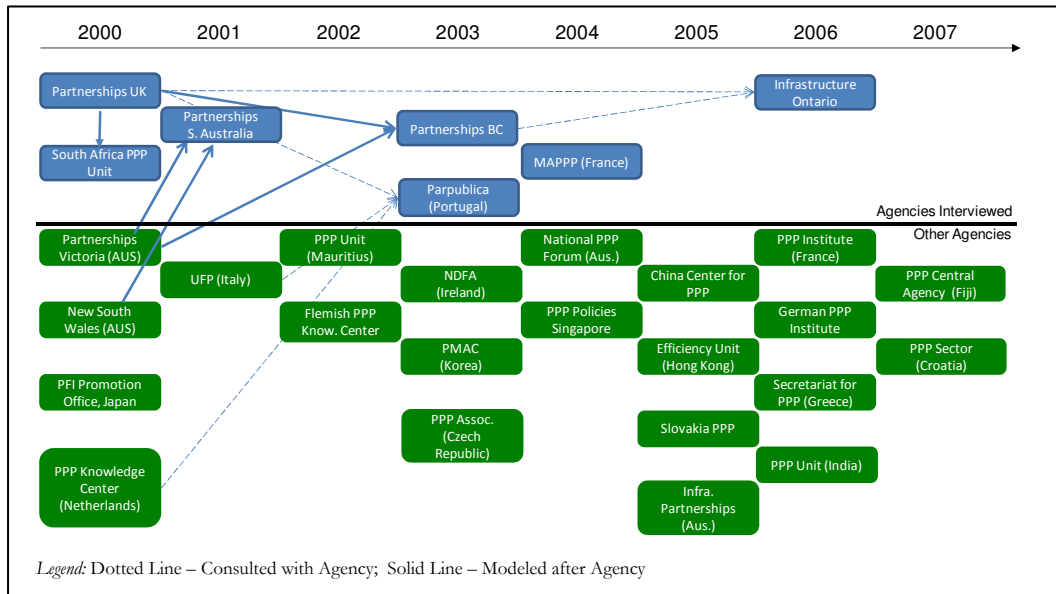


Figure 4 Origination and evolution of PPP units (Source: Farrugia, Reynolds, and Orr, 2008)

The PPP unit is specifically designed to play a *supporting* role. The establishment of the PPP unit should aim, in fact, at filling specific knowledge gap existing in the public side: PPPs substantially differ from the traditional forms procurement, therefore the governments must learn new skills and should be equipped with new and specialised resources. The PPP unit may play a wide variety of roles²⁷: it may perform a general role of information and guidance for example providing guidance material to the interested parties on standard contracts and procedures, or disseminating the PPP policies and opportunities available to the private sector, but in several cases, the PPP unit provides more specific support to government

²⁷ A paper of the Collaboratory for Research on Global Projects, an interdisciplinary research centre at Stanford University, “*Public Private Partnership Agencies, A Global Perspective*” defines two types of PPP units (“agencies”): (a) Review Bodies, responsible for reviewing project business plans and providing recommendations to decision-making bodies, thus having a more regulatory function and (b) Full service Agencies, that have, in addition, a consultancy role, develop the PPP market in their jurisdiction and sometimes offer capital or additional services. A third type has been identified as Centres of Excellence, with a capacity building role, but this type of agency was considered an intermediate step before implementing a well structured and staffed PPP agency (Farrugia, Reynolds, and Orr, 2008). EPEC (European PPP Expertise Centre) established by the European Investment Bank capitalizes on the experience of its members and serves as centre of excellence for all the PPP national and regional units across the EU Members States.

departments on the project selection and preparation, managing the procurement phase with a leading role in the deal closure, or monitoring the PPP contract once awarded. In some other cases, the PPP unit may be directly involved in the appraisal and final approval of the PPPs, like the Treasury's PPP Unit in South Africa, the BOT Centre in the Philippines or the Gujarat Infrastructure Development Board in India (Dutz et al., 2006).

As pointed out by Sanghi, Sundakov, and Hankinson (2007), who performed a qualitative assessment of eight PPP units in developing and developed countries, to be successful, a PPP unit should be designed with a specific decision-making power functional to the achievement of its specific mandate; the role played by a successful PPP unit shall be distinguished from a mere *advisory* role.

The PPP unit may also advise on the required advisors to be involved during the entire PPP implementation phase. Figure 5 shows, in a simplified way, the complex system of contractual and non-contractual relationships among the main actors in a typical PPP project.

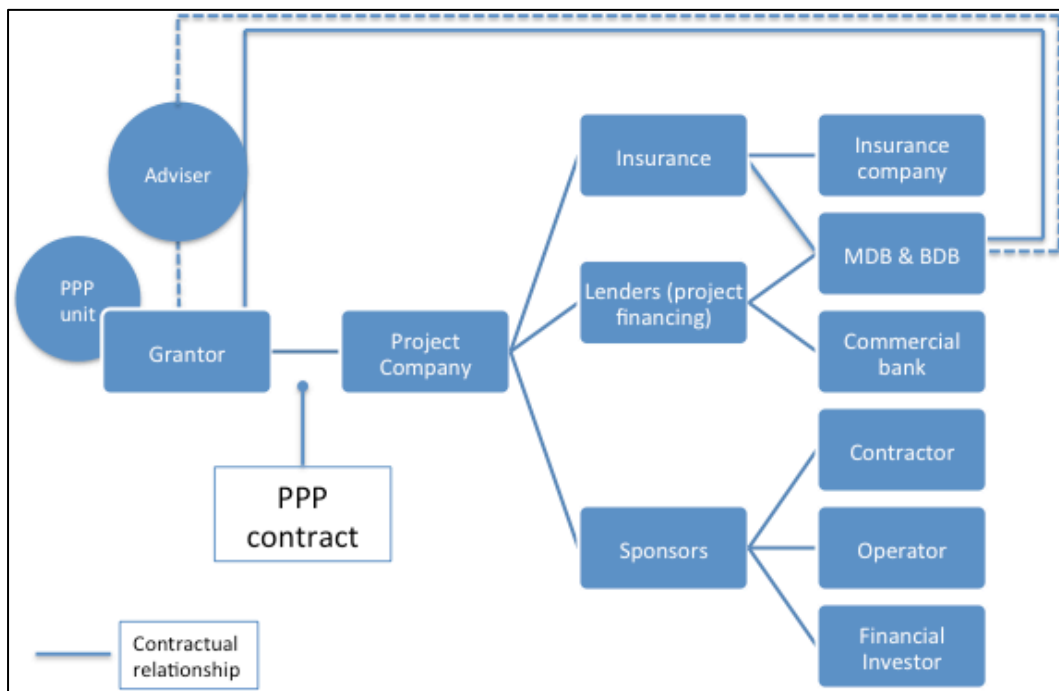


Figure 5 Actors and risk sharing relationships in a PPP project

Multilateral Development Banks (MDBs) and, in general development finance institutions, have a long-time history of activities mainly devoted to build the capacity of developing countries in attracting the private investments.

In 1999, the multilateral Trust Fund PPIAF, housed at the World Bank, has been created with the mandate to act as a catalyst to increase private sector participation in emerging markets. It provides technical assistance to governments to support the development of a sound environment conducive to private participation in the provision of basic infrastructure services. The PPIAF has a primary role in knowledge creation and best practice dissemination. It finances capacity building projects aiming at defining policies, norms and institutional reforms in developing countries and is also involved in designing and implementing pilot projects.

MDBs and development finance institutions, furthermore, play of course, an important role in providing long-term funding or other forms of guarantees. Those institutions require the project developers to meet their terms of finance. By doing so, they increase the credibility of the project and they reduce the associated risks perceived by the other lenders and investors (see for example the Moroccan case study).

They can also provide a crucial advising role when involved at a very early stage of the project development since they can act as a sounding board on the project viability.

The Climate Change policies and co-benefits

Responses to climate change include a portfolio of measures (IPCC, 2007):

- Mitigation – actions that reduce net carbon emissions and limit long-term climate change.
- Adaptation – actions that help human and natural systems to adjust to climate change.

- Research on new technologies, on institutional designs and on climate and impacts science, which should reduce uncertainties and facilitate future decisions.

Societies can tackle the climate change issues both by abating their emission of greenhouse gasses in atmosphere and adapting to its unavoidable impacts.

A number of available mitigation and adaptation policies are already viable across sectors.

Table 1 reports the adaptation options and strategies by sector selected by IPCC in its Fourth Assessment Report but a number of further examples are provided by the emerging literature.

Adaptation initiatives to be more effective and reduce vulnerability should be part of broad sectorial interventions. Nevertheless a number of barriers limit the implementation of such measures especially in developing economies. Financial constraints and limitation in the available technologies constitute the main reasons behind the limited application but institutional capacity, human capital, knowledge development and governance issues are, among others, important “soft” variables that equally influence the capacity of a society to adapt.

Table 1 Examples of Adaptation options by sector from IPCC AR4

Sector	Adaptation option/strategy	Underlying policy framework	Key constraints and opportunities to implementation (Normal font = constraints; <i>italics = opportunities</i>)
Water	Expanded rainwater harvesting; water storage and conservation techniques; water re-use; desalination; water-use and irrigation efficiency	National water policies and integrated water resources management; water-related hazards management	Financial, human resources and physical barriers; <i>integrated water resources management; synergies with other sectors</i>
Agriculture	Adjustment of planting dates and crop variety; crop relocation; improved land management, e.g. erosion control and soil protection through tree planting	R&D policies; institutional reform; land tenure and land reform; training; capacity building; crop insurance; financial incentives, e.g. subsidies and tax credits	Technological and financial constraints; access to new varieties; markets; <i>longer growing season in higher latitudes; revenues from 'new' products</i>
Infrastructure/settlement (including coastal zones)	Relocation; seawalls and storm surge barriers; dune reinforcement; land acquisition and creation of marshlands/wetlands as buffer against sea level rise and flooding; protection of existing natural barriers	Standards and regulations that integrate climate change considerations into design; land-use policies; building codes; insurance	Financial and technological barriers; availability of relocation space; <i>integrated policies and management; synergies with sustainable development goals</i>
Human health	Heat-health action plans; emergency medical services; improved climate-sensitive disease surveillance and control; safe water and improved sanitation	Public health policies that recognise climate risk; strengthened health services; regional and international cooperation	Limits to human tolerance (vulnerable groups); knowledge limitations; financial capacity; <i>upgraded health services; improved quality of life</i>
Tourism	Diversification of tourism attractions and revenues; shifting ski slopes to higher altitudes and glaciers; artificial snow-making	Integrated planning (e.g. carrying capacity; linkages with other sectors); financial incentives, e.g. subsidies and tax credits	Appeal/marketing of new attractions; financial and logistical challenges; potential adverse impact on other sectors (e.g. artificial snow-making may increase energy use); <i>revenues from 'new' attractions; involvement of wider group of stakeholders</i>
Transport	Realignment/relocation; design standards and planning for roads, rail and other infrastructure to cope with warming and drainage	Integrating climate change considerations into national transport policy; investment in R&D for special situations, e.g. permafrost areas	Financial and technological barriers; availability of less vulnerable routes; <i>improved technologies and integration with key sectors (e.g. energy)</i>
Energy	Strengthening of overhead transmission and distribution infrastructure; underground cabling for utilities; energy efficiency; use of renewable sources; reduced dependence on single sources of energy	National energy policies, regulations, and fiscal and financial incentives to encourage use of alternative sources; incorporating climate change in design standards	Access to viable alternatives; financial and technological barriers; acceptance of new technologies; <i>stimulation of new technologies; use of local resources</i>

Source: IPCC (2007) Table 4.1 AR4 Synthesis report

Mitigation measures are in some way easier to identify. All energy intensive sectors can play a major role in mitigating greenhouse gas emissions. Some examples of possible sectorial contribution to climate change mitigation include the energy sector through the supply of energy from renewable sources, the transport sector with the adoption of more fuel-efficient or clean vehicles, the promotion of non-motorised transport or public transport, the industry sector in general with more energy efficiency production, or waste sector with methane emissions recovery from landfill or wastewater treatments.

Climate change benefits can also arise from policies implemented for various reasons at the same time.

Acknowledging that most policies designed to address other issues, like economic development, sustainability, equity can have other, often, rationales related to objectives of climate change mitigation and adaptation means a better understanding of possible climate co-benefits.

Reporting criteria for climate related activities

The World Bank has recently developed a reference guide titled *Typology of Activities with Climate Co-Benefit by WB Sector*²⁸. The document illustrates different activities with adaptation and mitigation co-benefit under the industrial sectors such as energy and mining, industry and trade, agriculture, fishing and forestry; service related sectors such as water, sanitation and flood protection, transportation, education, information and communication, health and other social services but also finance and public administration, law and justice. According to the definition provided by the World Bank development activities provide climate change co-benefits when they contribute to climate change adaptation/mitigation even when adaptation/mitigation is not their main objectives.

²⁸ The document is available at the following link: <http://climatechange.worldbank.org/sites/default/files/Typology.pdf>

The document is part of a broader and joint initiative of Multilateral Development Banks started in 2012 aiming to improve and harmonize their systems to track the climate finance flows. The World Bank will be able to report on its lending commitments aimed at low-carbon and climate-resilient development in a consistent and transparent manner. This will cover the new projects financed by the World Bank own resources (IBRD and IDA) as well as a number of external resources, including carbon finance, the Climate Investment Funds, and the Global Environment Facility.²⁹

A Joint MDB Report on Mitigation Finance 2011 has been published on July 2012 while a *Joint MDB Report on Adaptation Finance 2011* has been presented and discussed in December 2012 at the UNFCCC Conference of the Parties in Doha (Qatar).

According to the joint MDB approach for mitigation finance reporting “an activity can be labelled as contributing to climate change mitigation if it promotes efforts to reduce or limit greenhouse gas (GHG) emissions or enhance GHG sequestration. In the absence of a commonly-agreed method for GHG analysis among MDBs, mitigation activities considered in this joint approach are assumed to lead to emission reductions, based on past experience and/or technical analysis” and “the classification is ex-ante project implementation”. According to the Joint MDB approach on adaptation finance reporting project activities should reflect at least one of four defined adaptation categories: addressing current drivers of vulnerability: building resilience to current and future climate risks; incorporating risks into investments; incorporating management of climate risk into plans, institutions and policies. Furthermore, a project activity must fulfil three design process criteria: vulnerability context, specific intent and direct link of the project activities to the vulnerability context and with direct contribution to climate resilience (AfDB et al., 2012a) (AfDB et al., 2012b).

For the fiscal year 2011 the climate mitigation finance reported by MDBs according to the joint approach equals US\$18,247 million from their own

²⁹ <http://climatechange.worldbank.org/content/tracking-finance>

resources, plus additional US\$ 1,228 from a range of external resources managed by the MDBs (trust-funded operations including dedicated climate finance facilities). The adaptation finance for the same fiscal year, represents only the 22% and equalled US\$ 4176 million.

OECD Development Assistance Committee (DAC) Secretariat since 1998 has monitored its members' aid efforts targeting the objectives of the Rio Convention 1992 using the so called "Rio markers". The Rio markers are four and they cover climate change mitigation, climate change adaptation beside biodiversity and desertification. The Rio marker on adaptation has been introduced only in 2010 and the first comprehensive data on adaptation aid flows were published for the first time on November 2011.

OECD DAC provides a definition of the climate change mitigation and adaptation markers (OECD-DAC, 2012):

- An *activity* should be classified as *climate change mitigation-related* if it contributes to the objective of stabilisation of greenhouse gas (GHG) concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system by promoting efforts to reduce or limit GHG emissions or to enhance GHG sequestration³⁰.
- An *activity* should be classified as *climate change adaptation-related* if it intends to reduce the vulnerability of human or natural systems to the impacts of climate change and climate-related risks, by maintaining or increasing adaptive capacity and resilience. This encompasses a range of activities from information and knowledge generation, to capacity development, planning and the implementation of climate change adaptation actions.

OECD-DAC makes a distinction between an activity with a climate change "principal objective" or with a climate change "significant objective". The climate change mitigation/adaptation-related activity will score the "principal objective" when it directly and explicitly aims to achieve the specific mitigation/adaptation

³⁰ The OECD-DAC definition of climate change mitigation-related activities has been adopted also by the MDB Joint Mitigation Approach

criteria for eligibility³¹. Therefore the activities with “significant” climate change objectives will lead to climate change co-benefit as discussed above.

From the efforts made by the international organisations and MDBs we acknowledge that monitoring and recording of climate related financial flows is still an issue and organisations are working in order to harmonize the available data.

Tracking the climate component of the private finance constitutes a even more challenging task: there isn't a unique comprehensive database of the private and an agreed methodology is yet to be defined. OECD-DAC (2012) in its attempt to provide reliable statistics on climate related aid states “*Methodological work is also under way to try to identify the climate-related component of private flows*”.

³¹ Beside the definitions reported in the paragraph above, OECD-DAC gives the criteria for eligibility for applying the climate change Rio markers:

Climate change mitigation marker

The activity contributes to:

- a) the mitigation of climate change by limiting anthropogenic emissions of GHGs, including gases regulated by the Montreal Protocol; *or*
- b) the protection and/or enhancement of GHG sinks and reservoirs; *or*
- c) the integration of climate change concerns with the recipient countries' development objectives through institution building, capacity development, strengthening the regulatory and policy framework, or research; *or*
- d) developing countries' efforts to meet their obligations under the Convention.

Climate change adaptation marker:

- a) the climate change adaptation objective is explicitly indicated in the activity documentation; *and*
- b) the activity contains specific measures targeting the definition above.

An analysis of existing PPPs in “climate change affected” sectors

The Private Participation in Infrastructure (PPI) Database

The aim of this section is to assess the magnitude of the overall PPPs phenomenon, more particularly to assess whether and in which sectors the PPP model has been used in order to realize projects with a climate change mitigation or adaptation co-benefit. We also attempt to offer an estimation of the phenomenon for the affected types of projects or sectors.

In order to present the current evolution of PPPs we looked at the existing PPPs databases.

The most comprehensive database that we can use is the Private Participation in Infrastructure (PPI) Database³². The PPI Database is managed by the World Bank and the Private-Public Infrastructure Advisory Facility (PPIAF). The PPI database offers a collection of more than 6000 infrastructure projects in developing countries. Its purpose is to identify and disseminate information on private participation in infrastructure projects in low- and middle-income countries, as classified by the World Bank, recording data on the contractual arrangements used to attract private investment, the sources and destination of investment flows, and information on the main investors³³.

The recorded projects are divided into the following broad sectors:

- energy
 - electricity generation, transmission, and distribution
 - natural gas transmission and distribution
- telecommunications
 - fixed or mobile local telephony
 - domestic long-distance telephony
 - international long-distance telephony

³² <http://ppi.worldbank.org/index.aspx>

³³ See PPI Database Expanded methodology available at http://ppi.worldbank.org/resources/ppi_methodology.aspx

- transport
 - airport runways and terminals
 - railways (including fixed assets, freight, intercity passenger, and local passenger)
 - toll roads, bridges, highways, and tunnels
 - port infrastructure, superstructures, terminals, and channels
- water
 - utility
 - treatment plant

The database covers infrastructure projects and excludes investments on movable assets, like busses or vehicles.

The infrastructure projects shall meet the following criteria:

- Projects are owned or managed by private companies in low- and middle-income countries.
- Private parties have at least a 25% participation in the project contract.
- Projects shall directly or indirectly serve the public³⁴.
- Projects reached financial closure after 1983.
- Total investment commitments should be at least for US\$1 million (energy generation projects should have at least a capacity of 1MW).

If a project meets all the criteria set above, the project is categorized and entered in the database with more than fifty different fields³⁵.

The projects recorded are also categorized according to the contractual nature of the agreements. Four main contract types are identified:

- Management and Lease;
- Concessions;
- Greenfield projects;

³⁴ Captive facilities (such as cogeneration power plants and private telecommunications networks) are excluded unless a significant share of output (20%) is sold to serve the public under a contract with a distribution utility.

³⁵ An extract is provided in the appendix A

- Divestitures³⁶.

For the sake of clarity, and in order to better define the sample we will use for our analysis, in the following section we outline the main characteristics of each of these categories according to the PPI database.

In management and lease contracts, a private entity takes over the management of a state-owned enterprise for a fixed period, while ownership and investment decisions remain with the State. There are two subclasses of management and lease contracts:

- *Management contract*. The government pays a private operator to manage the facility. The payments are usually made up of a fixed sum and an incentive-based fee for achieving specific results or performance targets. Most of the operational risk remains with the government. The contract often lasts for three to five years.
- *Lease contract*. The government leases the assets to a private operator for a fee. The private operator takes on the operational risk, being responsible for operating and maintaining the business. This subtype includes the *affermage*³⁷ contracts.

Lease contracts are usually more difficult to implement because the private operator bears more risks than in a management contract.

In concessions, a private entity takes over the management of a state-owned enterprise for a given period, during which it assumes significant investment risk. The public party transfer to the private not only the operational risk but also the financing and managing investment risk. The ownership of the asset usually remains to the public; the private is legally responsible for the delivery of the service and retains the final profit. The duration of a concession contract is

³⁶ Adapted from Farquharson E. et al. (2011), and PPIAF, Washington DC, and PPI database Expanded Methodology (see note 33)

³⁷ The difference between affermage and leases is technical: under a lease, the operator retains revenue collected from customers and makes a specified lease payment to the contracting authority. Under an affermage, the operator pays the contracting authority an affermage fee, which varies according to demand and customer tariffs, and retains the remaining revenue.

usually 25 to 30 years. In the previous chapter, we already discussed the concession contracts in the context of the demand risk transfer and the possible methods of recouping the investments made by the private party.

The database classifies concessions according to the following categories:

- *Rehabilitate, operate, and transfer (ROT)*. A private sponsor rehabilitates an existing facility and then operates and maintains the facility at its own risk for the contract period.
- *Rehabilitate, lease or rent, and transfer (RLT)*. A private sponsor rehabilitates an existing facility at its own risk, leases or rents the facility from the government owner, and then operates and maintains the facility at its own risk for the contract period.
- *Build, rehabilitate, operate, and transfer (BROT)*. A private developer builds an add-on to an existing facility or completes a partially built facility, rehabilitates existing assets, and then operates and maintains the facility at its own risk for the contract period.

In greenfield projects, a private entity or a public-private joint venture builds and operates a new facility. The facility may, or may not, be transferred to the public sector at the end of the contract period. The PPI database classifies greenfield projects under the following five subtypes:

- *Build, lease, and transfer (BLT)*. A private sponsor builds a new facility largely at its own risk, transfers ownership to the government, leases the facility from the government, and operates the facility at its own risk up to the expiration of the lease. The government usually provides revenue guarantees through long-term take-or-pay contracts for bulk supply facilities or minimum-traffic revenue guarantees.
- *Build, operate, and transfer (BOT)*. A private sponsor builds a new facility at its own risk, operates the facility at its own risk, and then transfers the facility to the government at the end of the contract period. The private sponsor may or may not own the assets during the contract period. The government usually provides revenue guarantees through long-term take-

or-pay contracts for bulk supply facilities or provides minimum-traffic revenue guarantees.

- *Build, own, and operate (BOO)*. A private sponsor builds a new facility at its own risk and then owns and operates the facility at its own risk. The government usually provides revenue guarantees through long-term take-or-pay contracts for bulk supply facilities or minimum-traffic revenue guarantees.
- *Merchant*. A private sponsor builds a new facility in a liberalized market in which the government provides no revenue guarantees. The private developer assumes construction, operating, and market risk for the project.
- *Rental*. Electricity utilities or governments rent mobile power plants from private sponsors for periods ranging from one to 15 years. A private sponsor places a new facility at its own risk and owns and operates the facility at its own risk during the contract period. The government usually provides revenue guarantees through short-term purchase agreements such as a power purchase agreement for bulk supply facilities.

Finally, in divestitures a private entity buys an equity stake in a state-owned enterprise through an asset sale, public offering, or mass privatization program.

The database identifies two types of divestitures:

- *Full*. The government transfers 100 percent of the equity in the state-owned company to private entities (operator, institutional investors, and the like)³⁸.
- *Partial*. The government transfers part of the equity in the state-owned company to private entities (operator, institutional investors, and the like). The private stake may or may not imply private management of the facility.

We categorized the types of contracts listed above according to how the ownership of the asset and the responsibilities for operating the facility and

³⁸ See also note 21

financing the capital and operating investment are assigned to the public and/or the private party (see table 1).

Table 2 Types of PPI contracts

Type of contract	Ownership of the assets	Capital expenditures	Operating Expenditures	Operation responsibility
Management			X	X
Lease			X	X
ROT		X	X	X
RLT		X	X	X
BROT		X	X	X
BLT		X	X	X
BOT	X	X	X	X
BOO	X	X	X	X
Merchant	X	X	X	X
Rental			X	X
Partial divestiture	X	X	X	X
Full divestiture	X	X	X	X

Analysis of main data and trends of the PPI Database

The PPI Database we used for this work is the version updated on August 15th 2012 kindly provided by the PPIAF Team³⁹. The database records 5598 infrastructure projects from 1990 to 2011 with a total investment commitments equal to around US\$ 2,260 billion.

Before entering into the specific scope of our study, we wanted to assess the overall trend of the private participation in infrastructure projects.

³⁹ The August 15th 2012 version contains further details on renewable energy projects. Those data have been gathered in a separate database made publicly available on September 2012 at <http://ppi-re.worldbank.org>

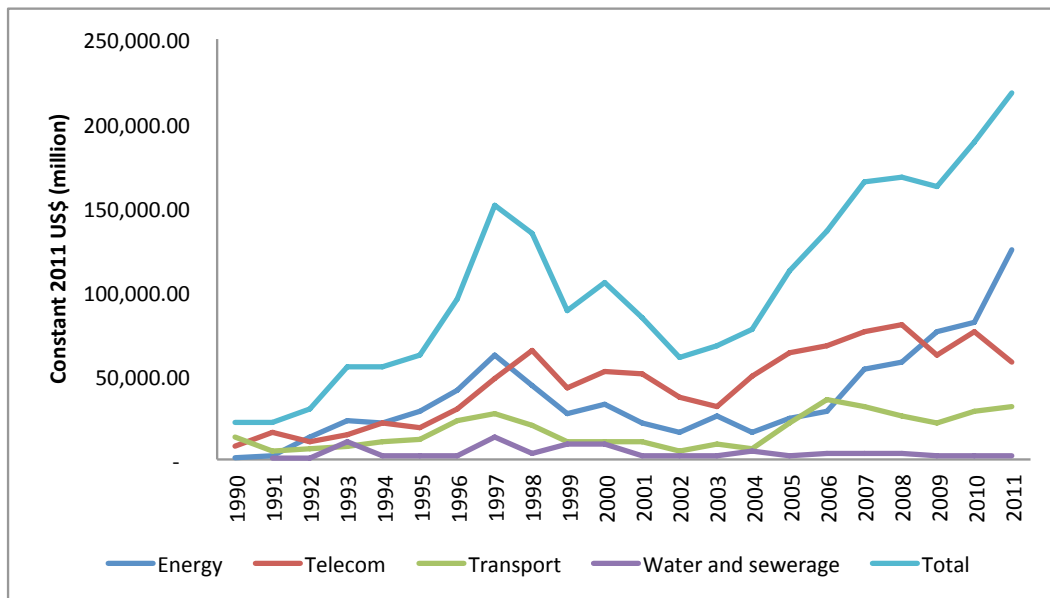
We first extracted the data of total investment commitments for the period 1990-2011.

It is noteworthy that the data show a steadily growth of investments in infrastructure in the developing countries (Figure 6).

After a small decline in 2009, probably due to the immediate impact of the financial crisis, total investments continued to grow in 2010 and 2011, and the annual investment commitments in 2011 result 44% higher compared to the peak levels seen in 1997.

Not all the PPI database sectors had registered a positive investment trend, with the energy and transport sectors appearing the most active in the last two available years.

Figure 6 Investment commitments to PPIs in developing countries by sector, 1990-2011



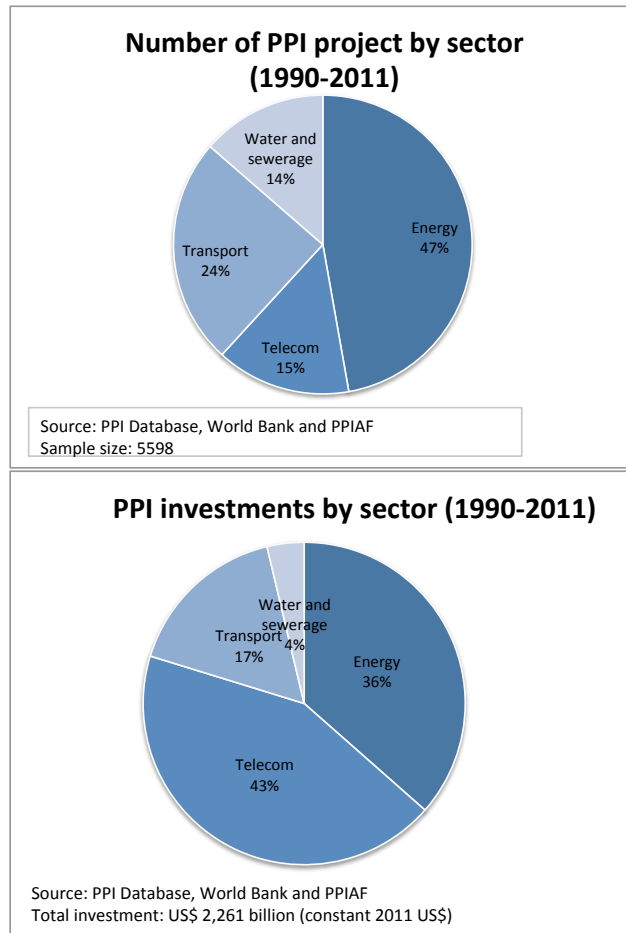
Source: PPI Database, World Bank and PPIAF

After a first assessment of the overall financial volume trend, we then extracted the relevant data in order to provide a global overview on the distribution of the private infrastructure investments by sector, by region and by contract type both in terms of number of projects and financial commitment volume.

Investments in telecommunications attracted the largest share of investments, followed by the energy sector and the transport sector, the latter with the largest

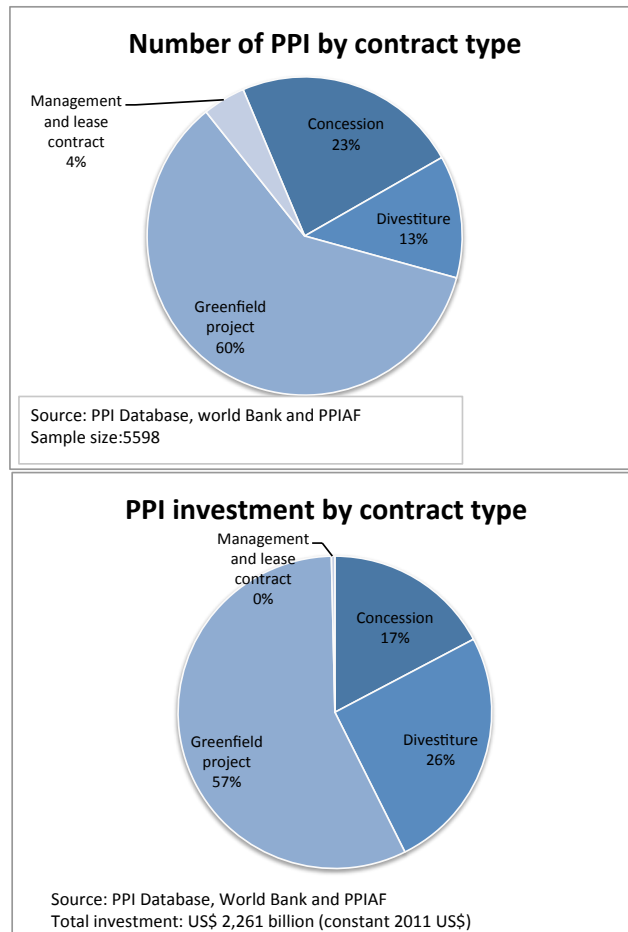
share by number of projects, while investments in water and sewage remain challenging for the private investors. (Figure 7)

Figure 7 Global Overview of infrastructure projects with private participation by sector



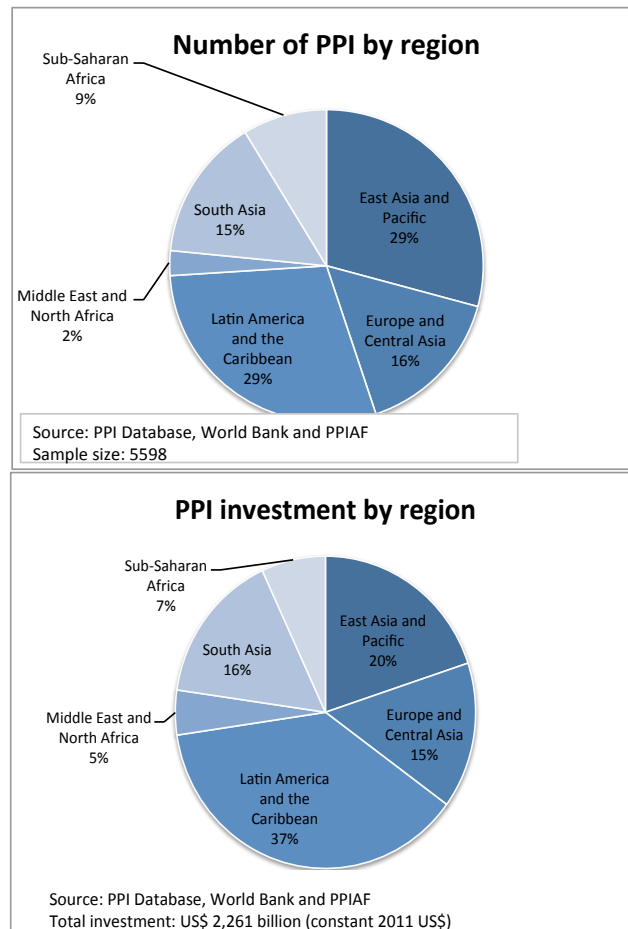
Contracts involving the development of new assets (greenfield projects) seem to be by far the preferred option for the private investors comparing to the rehabilitation of existing infrastructures, typically associated with a higher business risks, this remain valid both for number of projects and investment amount (Figure 8). Concession contracts, which mainly involve the rehabilitation and the expansion of existing public assets, are the second largest share of types of contract.

Figure 8 Global Overview of infrastructure projects with private participation by contract type



Large differences also exist between regions with Middle East and North Africa totalizing only the 12% of investments in the overall period and Latin America with the largest share driven by Brazil. The remaining regions share almost equivalent investment portions, with India and China being the main actors respectively of South Asia and East Asia & Pacific region, and Russia the most active country of Europe and Central Asia (Figure 9). Country risk profiles, including political and regulatory risks certainly are the main drivers of the current global photograph of the private participation in infrastructure investments in developing economies.

Figure 9 Global Overview of infrastructure projects with private participation by region



Methodology for defining the sample

In the previous paragraph we discussed the characteristics of the projects included in the PPI database, we then wanted to define the dimension of the sample we will use for the further analysis. The aim of the study is to assess the existing PPPs activities and their role in the climate change affected sectors. More in particular the study focus on PPP projects having either a mitigation or adaptation climate change component.

First we need to define which kind of projects can be labelled as a “public-private partnership” projects according to the adopted definition, as discussed in the previous chapter.

In fact, according to the agreed main characteristics of a PPP contract (duration of the cooperation, source of funding, clear definition of partners roles and risk allocation), we identify the types of contracts included in the database that may be excluded.

The PPI database covers a broader range of private participation in infrastructure. Full divestiture contracts by their nature cannot be considered a PPP: in a full divestiture the private entity buys an equity stake in a state-owned enterprise, the contract is often part of a broader privatisation programs, by which the public sector permanently transfer to the private party an asset previously publicly owned.

In the PPI database full divestitures projects account for the 3% of total projects number and 10% of the total investment commitments.

Among the greenfield projects category, merchant and rental contracts are not strictly speaking PPPs since they respectively do not foresee revenues guarantees from the government or they foresee them only through short-term purchase agreements. The lack of liabilities and responsibilities in the public side, and the short-term horizon lead to exclude these two types of contracts from a PPPs analysis. Similarly, management contracts will not be included in our definition of PPPs for their short-term characteristic and the limited transfer of risk to the private sector.

Merchant, rental and management contracts represent in total the 15% of total projects number and the 25.6% of total investment commitments.

We therefore refined the sample by removing the full divestiture, merchant, rental and management contracts, which do not fully comply with the agreed definition of PPP. The criteria adopted in order to select the sample are consistent with the relevant literature⁴⁰.

⁴⁰ See Farquharson et al (2011), Appendix A, and World Bank PPP Infrastructure Resource Centre (PPPIRC) website

In September 2012, the PPI Database expanded its coverage to create a flag to identify PPP projects⁴¹.

For this purpose, the following definition of PPPs was adopted⁴²:

- A PPP bundles investment and service provision into a single (in most cases) long term contract
- For the duration of the contract, the concessionaire (or private partner) will build (or rehabilitate), manage, maintain, operate and control the assets in exchange for some combination of user fees and/or government transfers/payments, which are its compensation for the investment and other costs
- The corresponding government commits to make in-kind or financial contributions to the project, whether through subsidies, guarantees, shadow fees, and/or availability payments
- PPPs can create direct or contingent liabilities on the granting authority

After having identified the PPPs recorded in the PPI database, we then focus on their climate change component.

As previously discussed still there is not a common agreed reporting standard for the identification of the climate related component of private flows, and neither the PPI database classify each project entry according to a climate change criterion.

In order to define our sample, therefore we referred to the joint MDB approach for adaptation and mitigation finance reporting⁴³ and to the definition of climate related activity provided by OECD.

⁴¹ See PPI data update note 78, PPPIAF and World Bank, September 2012 available at <http://ppi.worldbank.org/features/September-2012/Government%20Support%20to%20PPPs%202011%20Highlights.pdf>

⁴² This definition does not include management contracts or divestitures but includes merchant and rental contracts

⁴³ The reference to the joint MDB approach for climate finance reporting, has been limited to the definition of mitigation and adaptation categories. Due to the lack of available data, it would not have been possible to apply the conservative part of approach, and in particular the ex-ante definition of the mitigation objectives and the three design process criteria of the adaptation activities. (See also note 13)

Out of the four sectors (energy, water, transport and telecom) of activity under which the projects are classified in the PPI Database, the telecom sector is the less affected by climate change policies.

Neither the Joint Report from MDBs nor the OECD-DAC list the telecommunication sector among sectors with climate change related activities⁴⁴. We therefore excluded from the sample the PPI database projects categorised under telecom sector, this implies to exclude 15% of the total projects number and 43% of the total investment commitments in the period 1990-2011.

Energy, water and transport have clear relations with both climate change mitigation and adaptation policies, we will explore these three sectors in the subsequent analysis.

Finally, all financial data recorded in the database are available only in current US\$. Over 20 years the inflation could become relevant: all values have been therefore computed in order to provide all financial data in constant US values in order to increase the time comparability and analytical capacity. The reference year we used is the year 2011.

⁴⁴ Telecommunications and more in general information technologies can have relevant adaptation co-benefit when related to the development of early warning and emergency response systems for extremes weather events, as it is also listed in the document "*Typology of Activities with Climate Co-Benefit by WB Sector*". Those activities are still very limited and often recorded under the primary affected sector, like water or agriculture. Furthermore the PPI database records only projects related to the development of networks for telephone service, no other telecommunications services or added-value services are included. It's worth to be mentioned also the contribution to human and economic development that the access to mobile telephone services offer to developing countries, from providing basic access to health information, to making cash payments, spurring job creation, and stimulating citizen involvement in democratic processes (http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTSDNET/0,,contentMDK:23241724~menuPK:64885113~pagePK:7278667~piPK:64911824~theSitePK:5929282,00.html?cid=ISG_E_WBWeeklyUpdate_NL).

Table 3, Table 4 and Table 5 here below illustrate the selection we performed on the PPI database according to the above-mentioned criteria and give a first outlook to the existing PPP projects in climate affected sectors.

The selected sample include 4,324 projects for total investment commitments of 1,212,935 millions of US\$.

Out of these projects, 352 projects have been classified in the pipeline since they haven't reached the financial closure yet, but are in an advanced development stage⁴⁵.

As expected, the energy sector still represents by far the largest share of the sample, followed by the transport sector, both in terms of numbers of projects (respectively 54% and 30%) and investment values (respectively 63% and 30%).

Concerning the types of contract, 60% of the projects follow under the greenfield category (55% in terms of investment value), while another 30% are concession contracts (more than 31% in terms of investment value), the remaining being lease contracts and partial divestiture.

Concerning the geographical coverage, the East Asia and Pacific region registers the largest share in terms of number of projects (almost 35%), while the Latin America and the Caribbean has the largest share in terms of investment commitment value (36%). The two African regions together with Middle East, North Africa and Middle East and Sub-Saharan Africa remain last, attracting in the area only the 0.07% of the total number of projects and investments.

We will analyse more in-depth trends and characteristics by sector in the following paragraphs.

The largest share of the number of projects is related to operational and under construction projects (respectively 63% and 20%). Another 8% of project numbers are currently under development since they haven't reached the financial closure in 2011 but they are in advanced stage of development. Only the 5% are

⁴⁵ All projects in the pipeline follow under the energy sector and they account for around 54,700 millions of US\$ (constant 2011 US\$).

related to project cancelled or distressed⁴⁶, while the 3% of the sample is related to concluded projects.

The PPI Database records projects reaching a financial closure from 1990 to 2011. The Kyoto Protocol entered into force on 16th February 2005. We will choose year 2005 in order to discuss the evolution of PPPs over time and the potential impacts of climate change policies on PPPs investments. It has to be noted that the entry into force of the Kyoto Protocol was anticipated by other relevant policy measures, like the Marrakech Accords, the set of agreements on the rules of meeting the targets set out in the Kyoto Protocol, reached in 2001 at the 7th Conference of the Parties (COP7) to the United Nations Framework Convention on Climate Change. The Accords provided the practical establishment of the so called “flexible” mechanisms (Emissions Trading, Clean Development Mechanism and Joint Implementation) which have the aim of reducing GHG emissions in a measurable, long-term and economically efficient manner. The first carbon fund, the Prototype Carbon Fund managed by the World Bank, became operational in April 2000, while at European level the EU Directive establishing a scheme for greenhouse gas emission allowance trading within the Community was published in 2003.

It seems therefore reasonable to assume that climate related activities with long-term investment profiles could have reached the financial closure not before 2005. Investment data will be analysed in the two periods pre and post the entry into force of the Kyoto Protocol.

⁴⁶ A project is categorised as distressed when the exit of the private sector has been formally requested or a major dispute is ongoing. (http://ppi.worldbank.org/resources/ppi_methodology.aspx.)

Table 3 Selected PPPs projects by contract type and sector (number of projects and total investment commitments in constant 2011 US\$ million)

PPP contract type	Energy		Transport		Water and sewerage		Total	
	N. of projects	Total Investment commitment	N. of projects	Total Investment commitment	N. of projects	Total Investment commitment	N. of projects	Total Investment commitment
Concession	202	125,406	792	204,082	295	52,943	1,289	382,431
Partial divestiture	290	116,420	57	18,909	24	11,203	371	146,532
Greenfield project	1,823	517,548	428	141,191	318	17,425	2,569	676,164
Lease contract	17	494	26	5,760	52	1,554	95	7,807
Total	2,332	759,867	1,303	369,941	689	83,126	4,324	1,212,935

Table 4 Selected PPPs projects by region and sector (number of projects and total investment commitments in constant 2011 US\$ million)

Region	Energy		Transport		Water and sewerage		Total	
	N. of projects	Total Investment commitment	N. of projects	Total Investment commitment	N. of projects	Total Investment commitment	N. of projects	Total Investment commitment
East Asia and Pacific	745	182,100	352	102,184	410	39,159	1,507	323,443
Europe and Central Asia	408	113,710	58	23,418	33	4,170	499	141,299
Latin America and the Caribbean	631	249,786	461	151,200	212	35,046	1,304	436,032
Middle East and North Africa	38	28,520	27	7,873	13	4,033	78	40,426
South Asia	377	153,755	315	68,309	7	391	699	222,455
Sub-Saharan Africa	133	31,995	90	16,958	14	327	237	49,280
Total	2,332	759,867	1,303	369,941	689	83,126	4,324	1,212,935

Table 5 Selected PPPs projects by status and sector (number of projects and total investment commitments in constant 2011 US\$ million)

Status	Energy		Transport		Water and sewerage		Total	
	N. of projects	Total Investment commitment	N. of projects	Total Investment commitment	N. of projects	Total Investment commitment	N. of projects	Total Investment commitment
Canceled	63	17,402	61	26,132	47	23,464	171	66,998
Concluded	39	6,633	46	3,712	15	705	100	11,050
Construction	447	194,694	242	82,161	169	8,756	858	285,611
Distressed	27	24,560	12	4,183	12	5,731	51	34,474
Merged	55	149	-	-	-	-	55	149
Operational	1,349	461,551	942	253,752	446	44,470	2,737	759,774
Under development	352	54,878	-	-	-	-	352	54,878
Total	2,332	759,867	1,303	369,941	689	83,126	4,324	1,212,935

Energy

PPP projects in the energy sectors are more than 2,300 and account for almost 760 billion US\$ of investments in developing countries. The renewable energy segment accounts for 190 billions US\$.

The mean annual investment commitments of PPPs in renewable energy generation is equal to 20.9 billion US\$ for the period 2005-2011 and 43.7 billion US\$ if looking at the last two available years (2010-2011).

These amounts represent a significant part of the private component of climate finance done by CPI (37-72.2 billion US\$), which focused on the renewable energy sector.

The energy sector is called as the main cause of the climate change issue.

The International Energy Agency (IEA, 2012b) informs us that the “*world is still falling to put the global energy system onto a more sustainable path*”. The global energy demand is expected to increase by one third by 2035, while the emerging economies of China, India and Middle East, will be the main drivers.

In order to meet this growing demand the IEA foresees US\$ 37 trillion of investments in the period 2012-2035, for replacing or expanding the existing energy supply capacity.

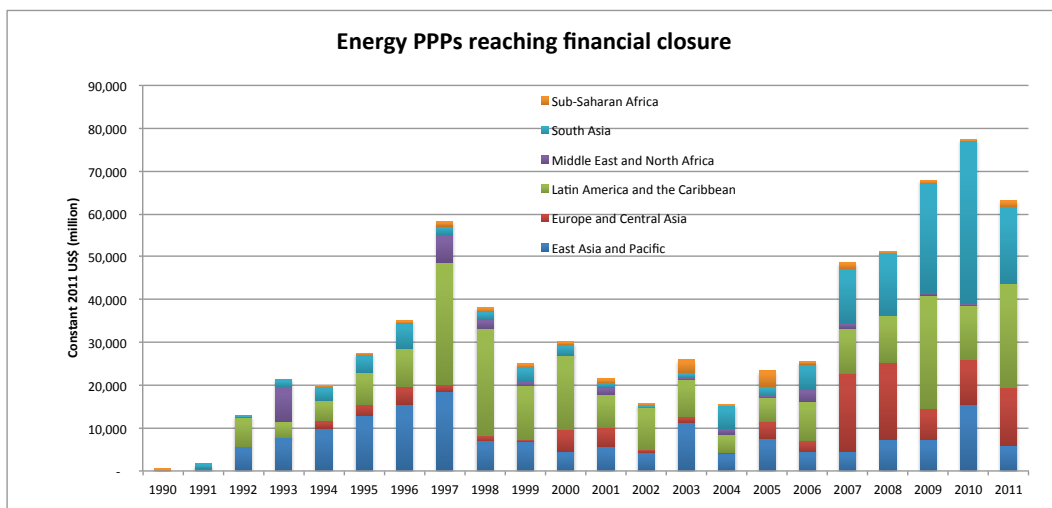
The energy sector can also be part of the climate solution. The share of renewable electricity generation is expected to reach the 31% in 2035.

According to IEA (2012a) in its last *Energy Technology Perspectives*, investments in clean energy need to double by 2020, and achieving a 2°C stabilisation scenario will require an extra investment of 130 US\$ per person every year (36 US\$ trillion), from today to 2050, respect to the required investments under a scenario without carbon emissions concerns. Those investments will have to take place both in developed and in developing countries.

The following section focuses on the analysis made on our sample and on the contribution that the private investments, through the implementation of a PPP model, provide to the developing nations in meeting their energy demand.

The graph below shows the steady growth of PPP investments in developing countries in the energy sector. Since 2007, if we exclude the peak registered in 1997, the yearly investment commitments are well above the average year amount, while in 2010, PPP investments registered an absolute peak of almost US\$ 80,000 million.

Figure 10 Trend of private investments in energy PPPs (excluding2)



The total energy sector accounts for the 54% of the projects number and the 63% of total investment commitments of the sample (Figure 11). As already stated, the sample includes 352 projects that have not reached the financial closure but are in an advanced stage of development. The investment amount for those pipeline projects represent the 7% of energy investments (Figure 12a).

The energy sector in our sample is divided in two sub-sectors: electricity and natural gas (Figure 12b).

In order to track the climate change component of the PPP projects, we focused the subsequent analysis on the electricity sub-sector, which accounts for the 88.6% of the energy investments.

The electricity sub-sector projects recorded in our sample are further divided into three segments: transmission, distribution and generation of electricity.

Even if an efficient and low-carbon energy system will require investments in infrastructure beyond the power generation facilities⁴⁷, PPPs climate change mitigation potentials are mainly related to the electricity generation segment, that, according to our analysis, confirms its great potential in terms of capacity to attract the private finance.

The electricity generation segment accounts for around the 76-79% of the electricity investments⁴⁸ (Figure 13).

When analysing what type of PPP projects have been mainly implemented in the electricity generation sector, we found that the PPP model has been mainly used to increase the generation capacity of the developing nations building around 1500 new facilities (BLT BOT BOO greenfield projects) in the period 1990-2011⁴⁹. The greenfield projects share equals the 85% of the total electricity generation investment commitments (Figure 14b) and the 90% of total number of projects (Figure 14a).

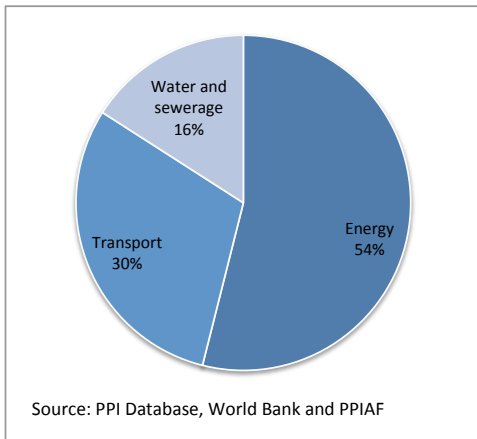
Greenfield projects are mostly shared equally among the three most active regions, namely South Asia, East Asia Pacific, Latin America and the Caribbean with investments respectively equal to 29%, 28% and 21%. Less developed region, like Sub-Saharan Africa and Middle East and North Africa, still record little investments (Figure 15), nevertheless in next pages, we provide an analysis of their potentials according to past and future trends.

⁴⁷ According to IEA (2012a) the electricity transmission capacity in China (but also in Germany) for example is already threatening to limit the future expansion of low-carbon technologies.

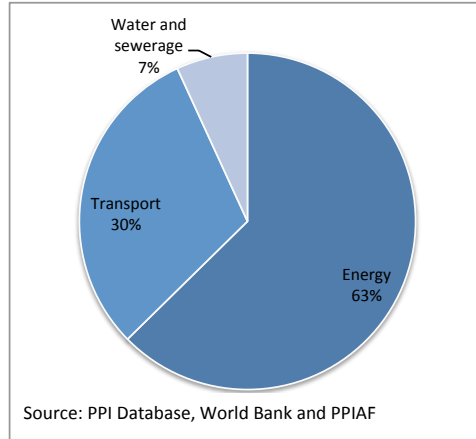
⁴⁸ The contribution of the electricity generation segment is provided according to author's best estimation based on the data recorded in the PPI database.

⁴⁹ Concessions, lease contract and partial divestiture represent only the remaining 10% of electricity generation projects.

Figure 11 Total PPPs sample by sector

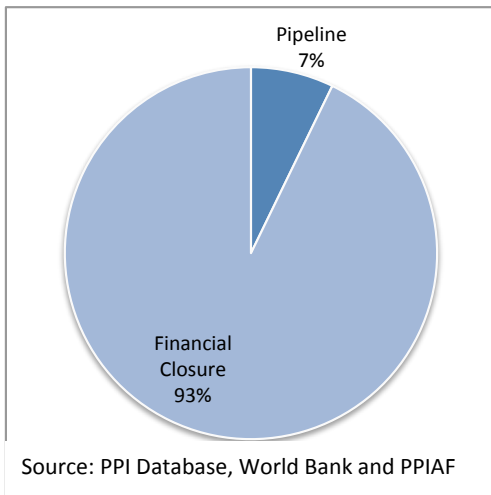


a) number of new projects

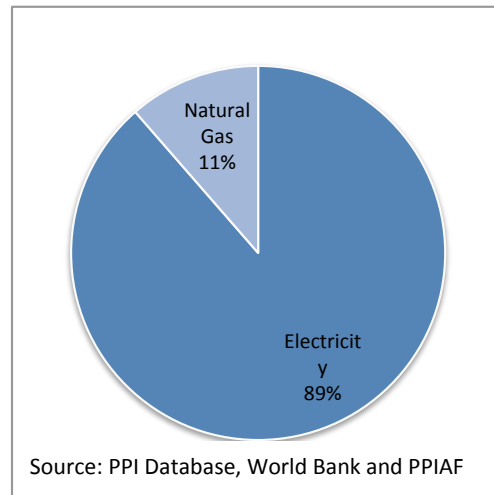


b. total investments commitments

Figure 12 Energy PPPs investment commitments



a. development status



b. sub-sectors

Figure 13 PPP investments in electricity by subsector

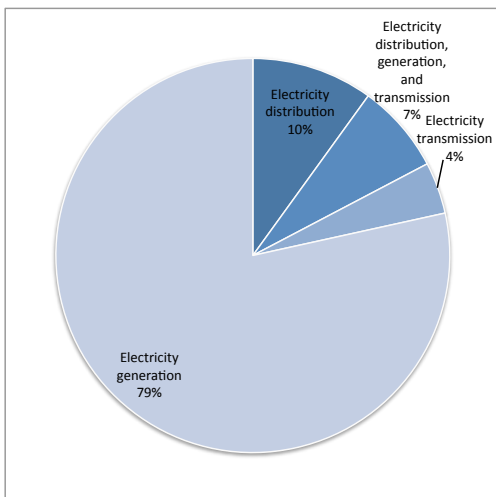
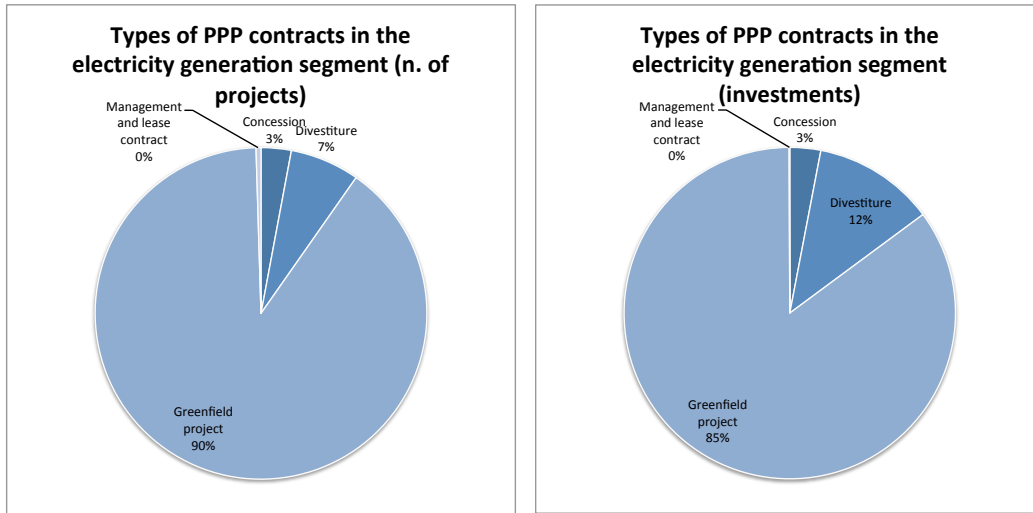


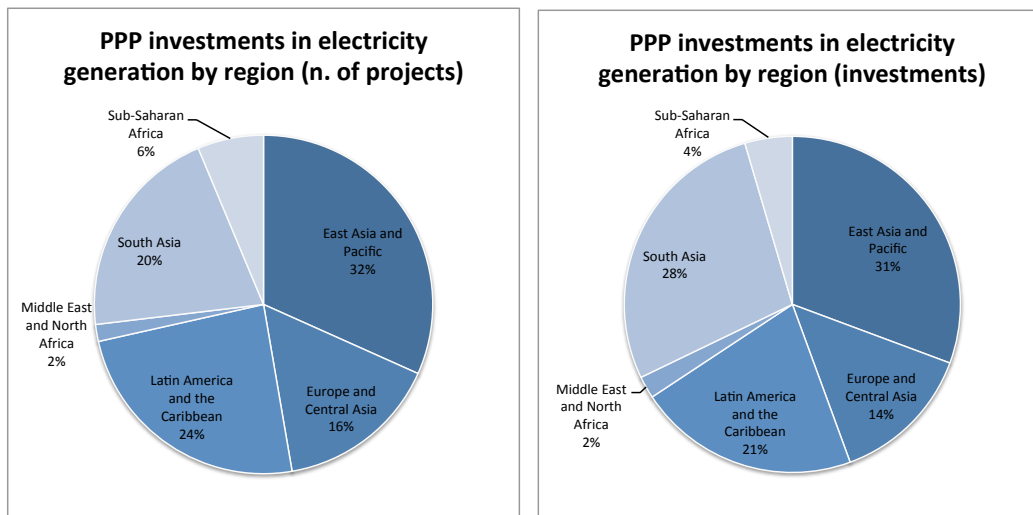
Figure 14 PPPs in electricity generation by type of contracts



a) number of new projects

b. total investments commitments

Figure 15 PPPs in electricity generation by region



a) number of new projects

b. total investments commitments

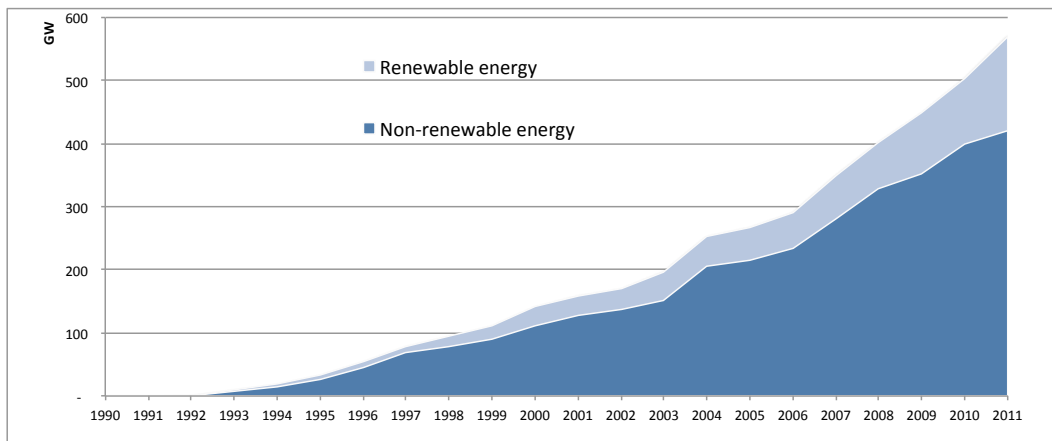
In line with the trends depicted by IEA (2012b), fossil fuels, *which remain the largest sources of energy worldwide*, cover the largest share of our sample, and in particular, PPP investments in electricity generation account for the 70% of investments related to closed projects, with coal based power plant representing around the 40% (Figure 17b).

Looking at the energy sources, the growth of renewable energy generation, highlighted by IEA at global level, is also confirmed by the present study of PPP investments.

Total investments in renewable energy PPP projects, so far have reached the amount of 190 billion US\$ (over 135 billion US\$ when including only the projects reaching the financial closure), and all the new projects in the pipeline (totalling around 54.7 US\$ billion) are related to the renewable energy sector.

In terms of installed capacity, the renewable sector cover the 26% of the total projected⁵⁰ installed capacity (150GW over 570GW) (Figure 16).

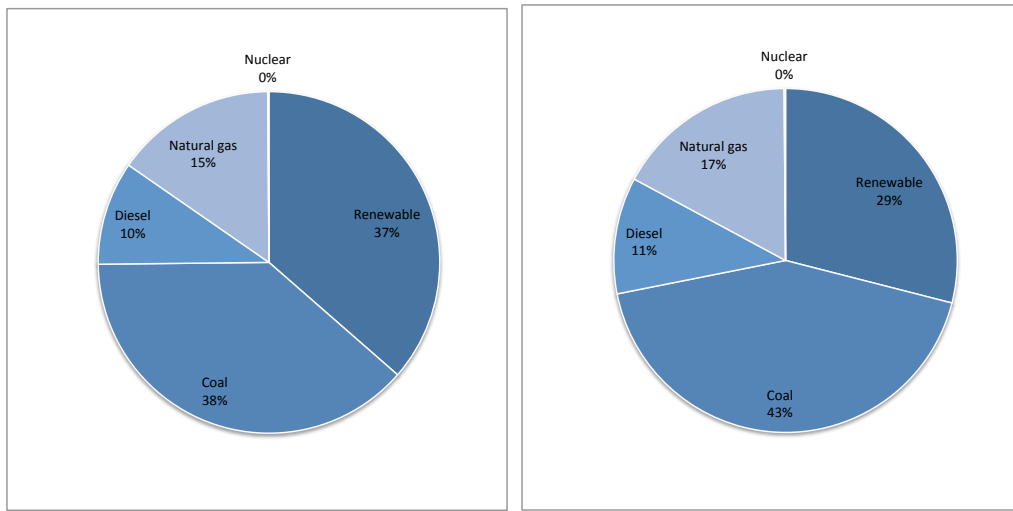
Figure 16 Installed capacity of PPP energy generation projects



The impact of the 352 pipeline projects on the renewables share, is also shown by Figure 17a. When including the latest projects still under development, the share of renewable energy increase of the 8%.

⁵⁰ We refer to projected installed capacity when including the 352 projects still in the pipeline.

Figure 17 Electricity generation investments in PPPs by energy source

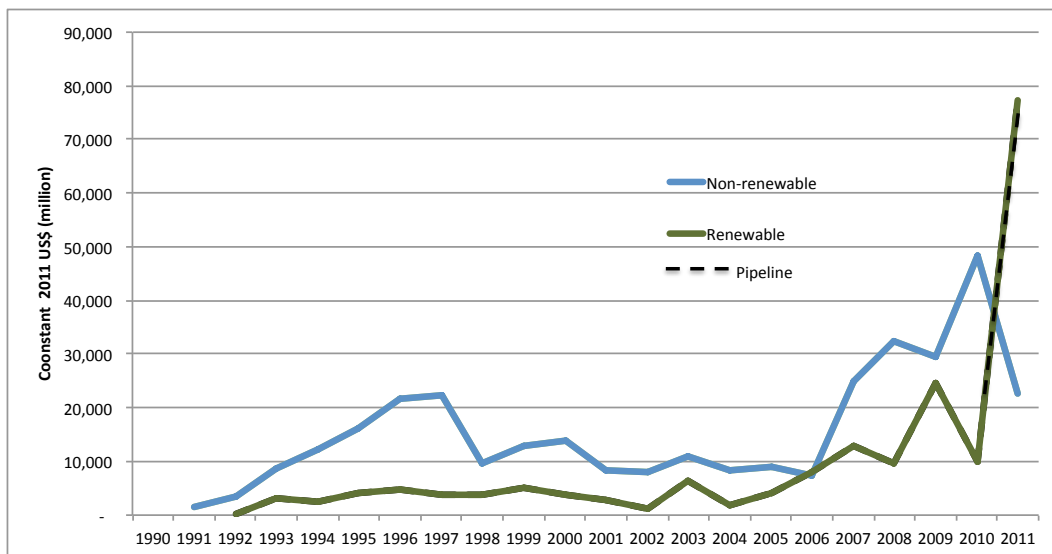


a) including pipeline projects

b) excluding pipeline projects

Figure 18 again provides a meaningful overview of the past and future energy investments trends in the electricity generation segment both in the renewable and non-renewable sector as extracted from our selected sample of projects. When including the amount of investments coming from the pipeline projects (dotted line), for the first time in the period, PPPs investments in renewable energy generation exceed those in the fossil fuels energy sectors, thus showing the evidence of a progressive switch toward low-carbon sources of energy.

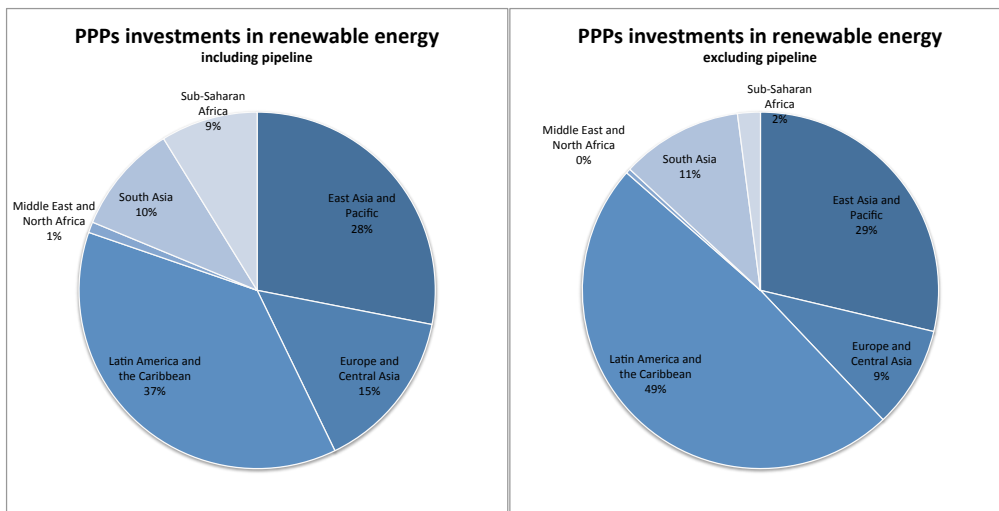
Figure 18 Renewable and non-renewable PPP energy projects in the electricity generation segment (total annual investment commitments -including pipeline)



Investment trends among regions strongly depend from their untapped potential. South Asia is attracting the largest investments in the non-renewable sector. Having reached a global peak in 2009-2010 attracting respectively the 70% and 77% of yearly investments in non-renewable energy sources, in 2011 South Asia registered a share of 67% (Figure 19 and Figure 20).

Latin America is the leading region in attracting private investments in the renewable sector: having reached a peak in 2009 of 69% of total PPPs investments, the region has totalised a global share of 37% in the period 1990-2011.

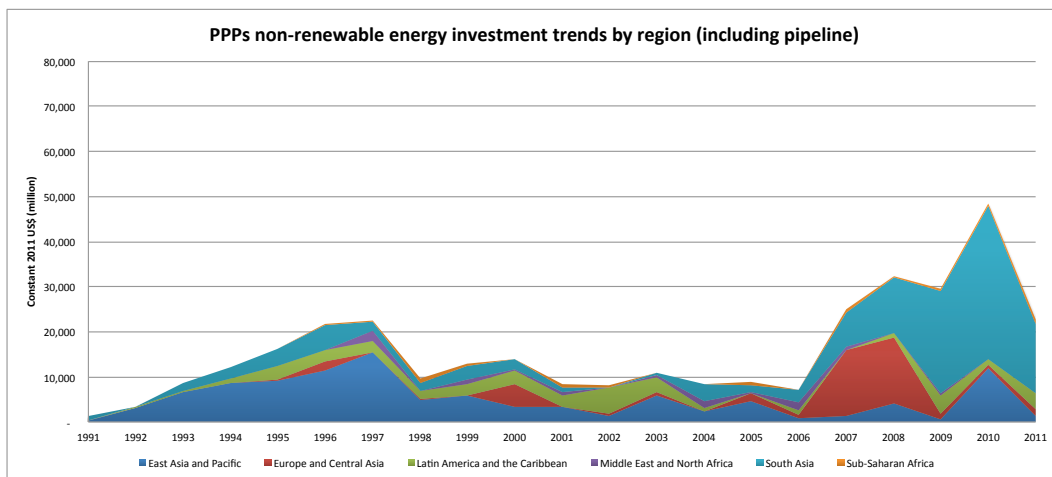
Figure 19 PPPs investments in renewable energy generation by region (1990-2011)



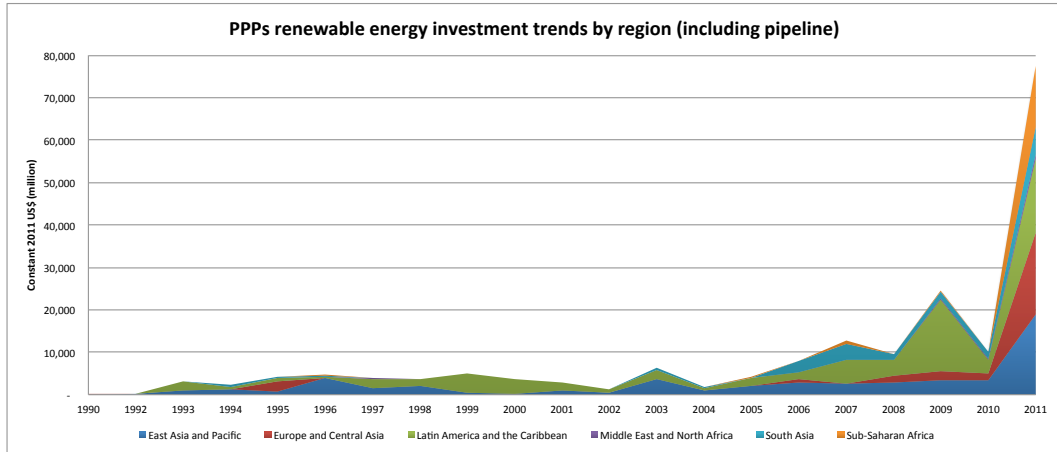
a) including pipeline projects

b) excluding pipeline projects

Figure 20 PPPs electricity generation investment trends by region



a) non-renewable energy



b renewable energy

It is mention worthy the sharp increase in renewable energy PPPs in Sub-Saharan Africa: this future trend is highlighted by the analysis on the PPP projects in the pipeline. The share of PPP project investments in the Sub-Saharan region increases of 7% when including the projects in an advanced stage of development, which have not reached the financial closure in 2011(Figure 19). Those African projects are represented by 44 new renewable energy power plants to be realized in 15 countries of the Sub-Saharan Africa region (half of those plants will be located in South Africa). Figure 21 and Figure 22 offer an overview of the private investments in the next future.

Figure 21 PPPs pipeline projects (investments and number) by region

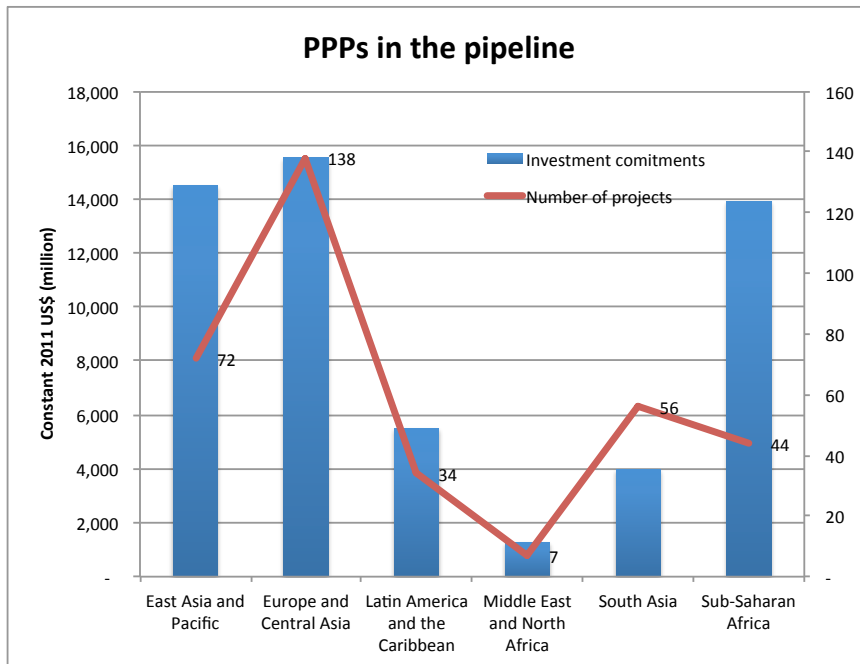
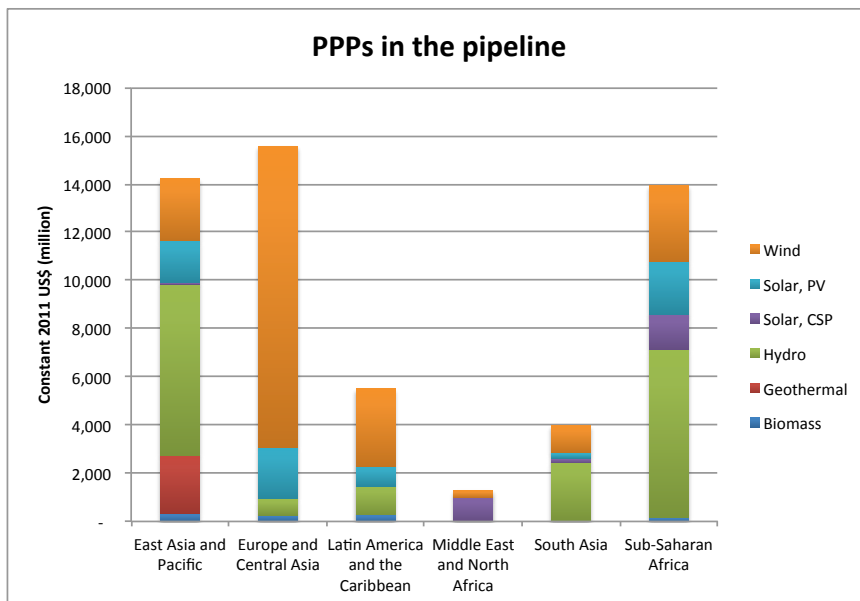


Figure 22 PPPs investments in the pipeline by renewable energy source

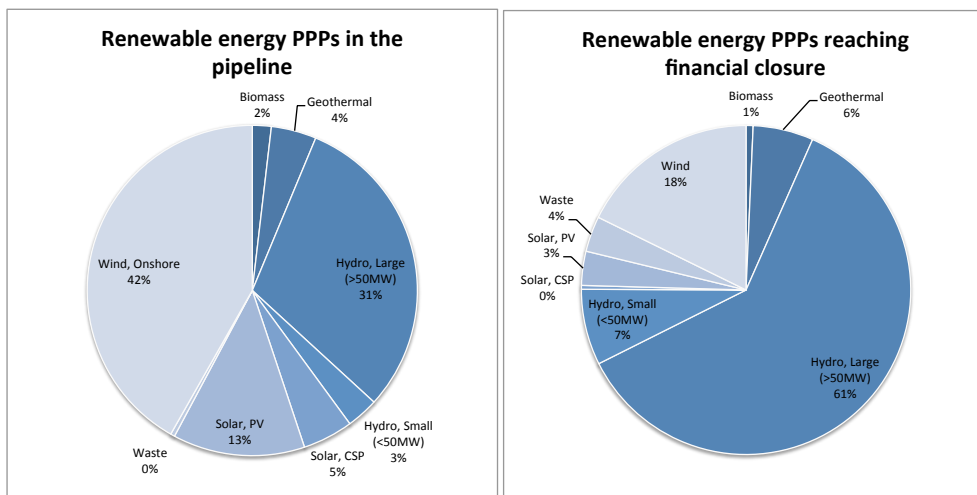


We then proceed the analysis to understand which renewable source seems having the largest potential in attracting the private investments in developing countries. According to the present study, PPPs in renewable energy have been traditionally used for the construction of large hydro projects (>50MW), which represent the 61% of total investments in the renewable energy sector, followed by on shore wind energy plants accounting for the 18% of investments (Figure 23b).

Looking at future trend (Figure 23a), private investors in pipelines projects seems to prefer to be engaged in PPPs in the wind power sector which represents the 42% of the pipeline, followed by large hydropower plants. The result is consistent with IEA (2012b), which foresees a shift from hydro to wind in the renewable sources development in non-OECD countries.

The study furthermore shows the capacity of the private sector to bring into the market its ingenuity and innovation. The new deployed technologies such as concentrated solar power (CSP) are in fact appearing already in our pipeline, with a share of 5%. We devoted one of the selected case studies to one of the world biggest CSP projects now under development in Morocco.

Figure 23 PPPs investments in renewable energy generation by energy sources



a) only pipeline projects

b) excluding pipeline projects

To better assess the PPP phenomenon in the renewable energy generation sector, we calculated the capacity installed or being installed (pipeline), thanks to the implementation of a PPP project.

As briefly pointed out before, the total capacity of renewable energy PPP projects is becoming fairly large (total 150 GW).

In the last ten years, with a total installed capacity slightly above 20GW in 1999, the amount reached a first peak in 2003, remaining quite stable until 2005 and then sharply increasing over the last years.

Figure 24 gives an overview of the cumulative capacity highlighting the contribution from projects still under construction but having reached the financial closure, and projects still in the pipeline, thus having not reached the financial closure yet.

According to the last Energy Outlook (IEA, 2012b), over the period 2012-2035 a total of 5,890 GW of capacity additions is required at global level. Renewables represent half the capacity additions, at 3,000 GW. It becomes clear the unlocked potential of energy generation PPPs in developing countries.

Figure 24 Total capacity of PPPs renewable energy projects by status of implementation

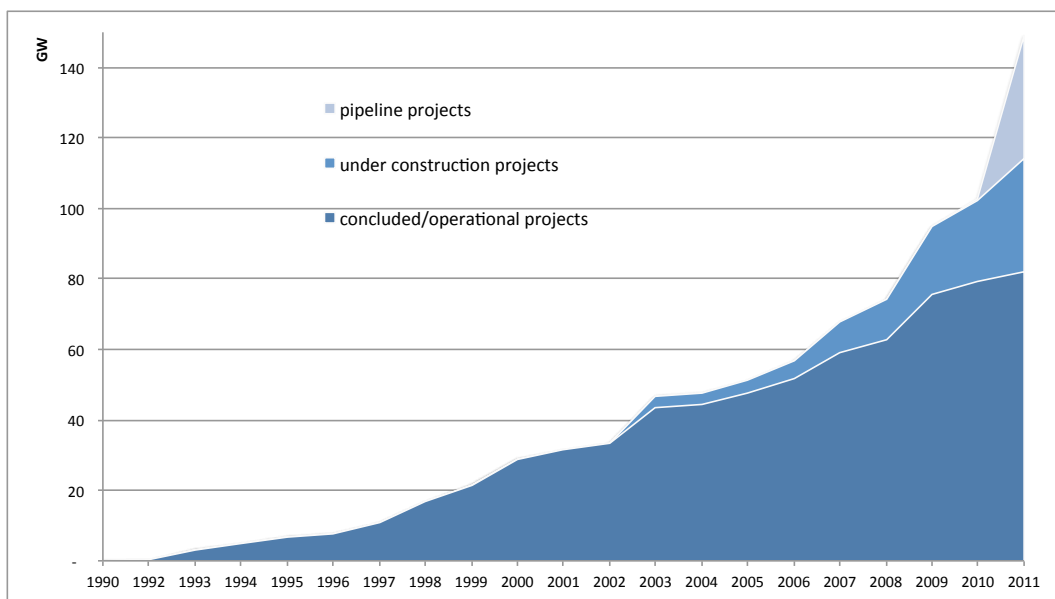
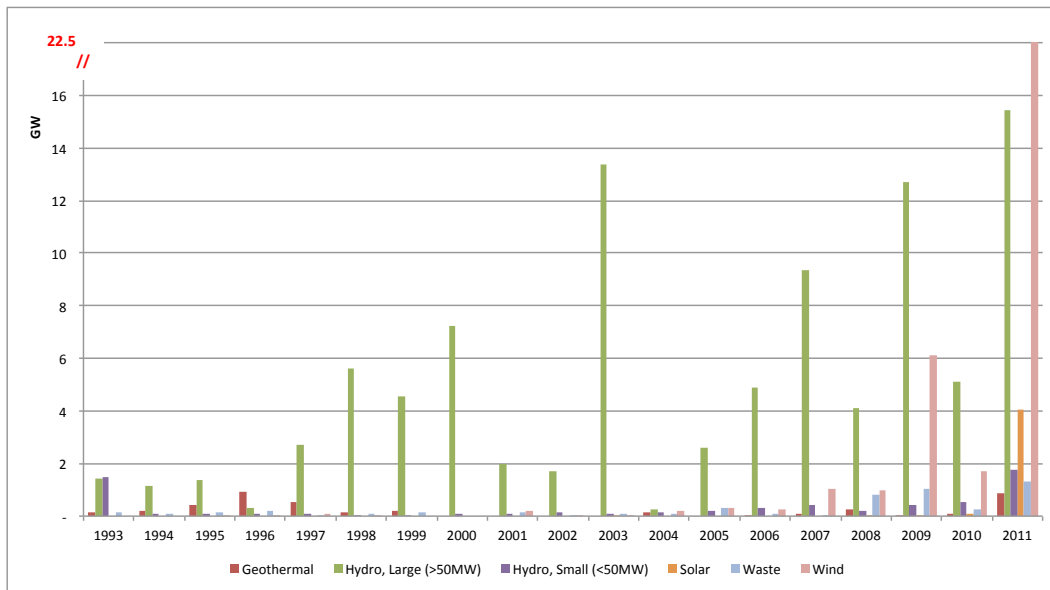


Figure 25 gives an overview of the capacity by renewable energy sources. In the past, large hydro power plants have been extensively developed under a PPP scheme in order to meet the largest amount of the energy demand increase. The figure, moreover, confirms, with the wide range of technologies used in the last three years, the capacity of this business model to be at the front line in deploying new technologies as soon as they are available.

Figure 25 Trends of installed capacity by renewable energy source



It is generally agreed that the increase in oil prices and the technological progresses made in the renewable energy decisively affected the competitiveness of renewables in the last decade (IFC, 2011b). Renewables deployment, in fact, is driven by multiple factors, like incentives, falling costs, rising fuel prices and, in some cases, by carbon pricing (IEA, 2012b).

As a partial evidence of the carbon market contribution in stimulating private investments in the renewable sector, we analysed the share of PPP projects that generate Certified Emission Reductions (CERs) bankable in the Kyoto Protocol flexible mechanisms, like the Clean Development Mechanism (CDM) market or the European Emissions Trading Scheme (EU ETS).

The analysis shows a relatively important contribution of the PPP CDM projects. The 7% of the entire cumulative capacity is represented by CDM PPP projects (Figure 26a and Figure 27), while the corresponding share of investments is equal to 14% (Figure 26b).

Figure 26 PPP and CDM projects shares

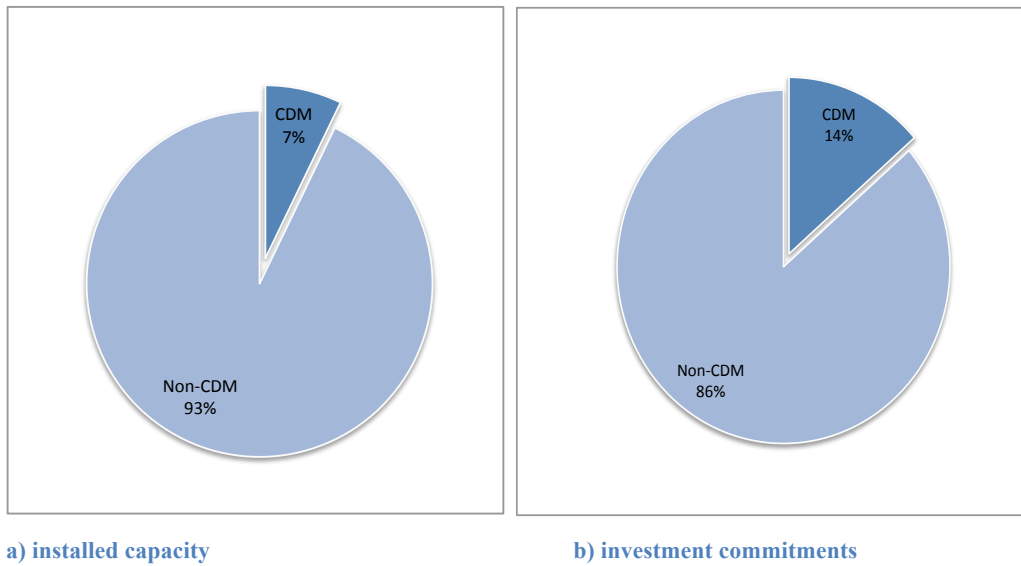
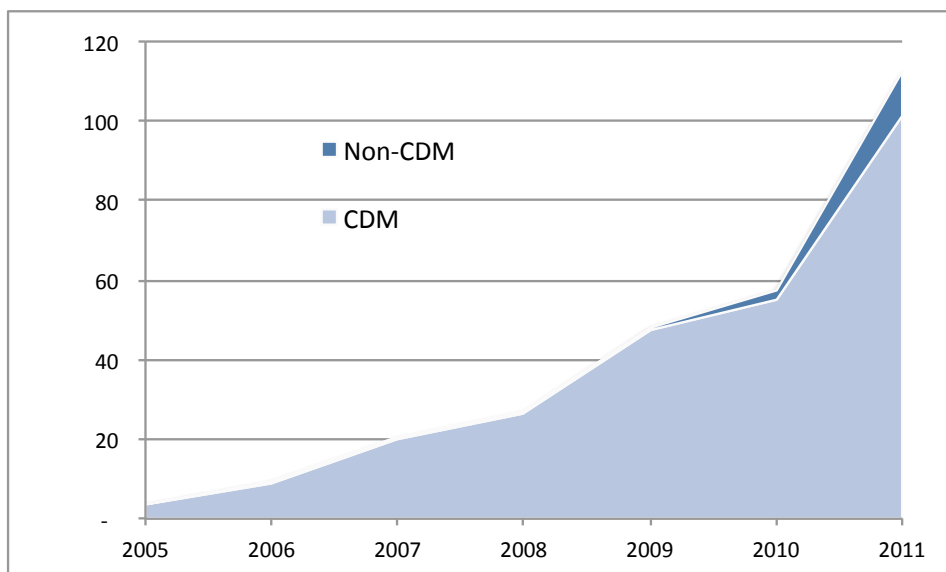


Figure 27 Installed capacity of PPP and CDM projects in renewable energy in the period 2005-2011

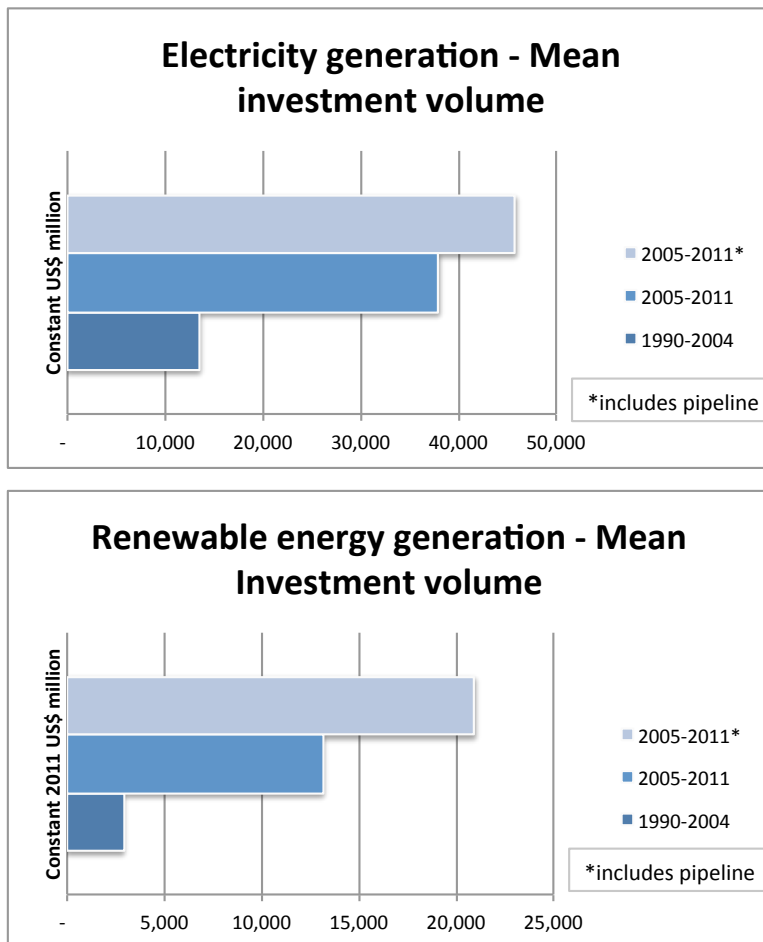


Recent literature (Vagliasindi 2012) has worked on the hypothesis that developing countries are more likely to attract more investment in renewable based generation after the entry into force of the Kyoto Protocol. We extended the analysis including the more recent data from the PPI database and using our selected sample of PPPs. We assessed the significance of differences between PPPs volume of investments in electricity generation (and in the segment renewable energy) prior and after 2005 using the statistical t-test and comparing the means of the two samples.

Differences between the means of investment volumes in generation prior 2005 and from 2005 onward resulted significant with a confidence level of 1% either when including or excluding the projects still in the pipeline (Figure 28).

This analysis therefore confirms a significant role of the Kyoto protocol in stimulating PPP investments in the energy sector.

Figure 28 Means of PPPs investments pre and post Kyoto Protocol



We can conclude that the energy sector represent an important arena for the PPP private players, those, in turn, can represent an important resource for the policy makers involved in the deployment or in the definition a developing country climate agenda. PPPs demonstrated their ability to exploit business opportunities as soon as they appear available, like in the case of the new technologies in the energy generation sector. For all developing countries, building efforts to further understand the PPP model, and to provide it with a sound investment

environment, could lead to huge benefits not only in terms of avoided climate change impacts.

Water

Private investments in water PPPs represent respectively the 16% as per number of projects and only the 7% of the total investment commitments (Figure 29). With 689 projects and less than 1/9 (83 billion US\$) of the investments attracted by the energy sector, this sector has certainly some potential to be unlocked.

Water is a scarce resource that is being affected by climate change. Climate change while affecting the hydrologic cycle will have a direct impact on the water resources availability, usage, and management.

Change in the water hydrologic cycle has a clear impact on water infrastructures investments, like hydro power plants, dikes, ports or water distribution systems. Climate change requires to incorporate the future climate projected scenarios in the design and planning of new infrastructures or when assessing the need to rehabilitate the existing assets.

Furthermore, the stress on water resources and the lack of access to water threaten the resilience of most vulnerable populations. In 2012 the world has met the Millennium Development Goal (MDG) target of halving the proportion of people without sustainable access to safe drinking water, but immense challenges remain⁵¹.

Our selected sample in the water sector is directly related with investments on water infrastructures and in particular on water utilities and treatment plants. Due to the lack of data it is not possible to assess whether climate change criteria have

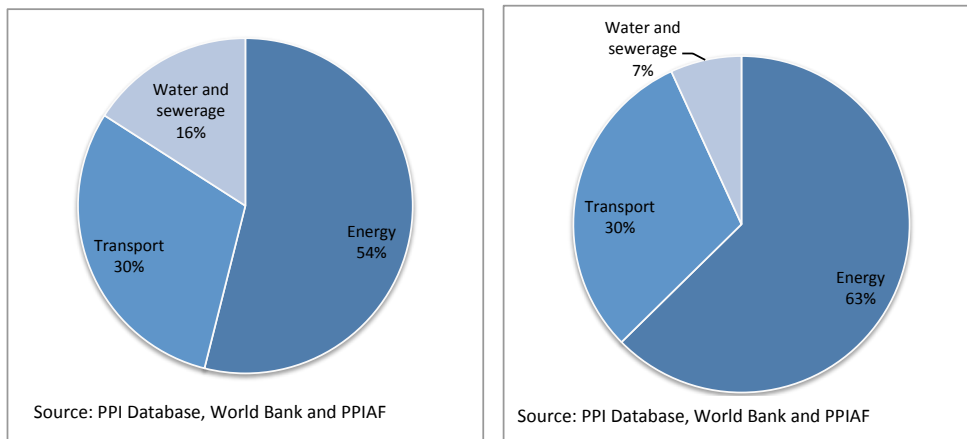
⁵¹ Only 61 per cent of the people in sub-Saharan Africa have access to improved water supply sources compared with 90 per cent or more in Latin America and the Caribbean, Northern Africa, and large parts of Asia. Over 40 per cent of all people globally who lack access to drinking water live in sub-Saharan Africa. (UNICEF & WHO, 2012)

been taken into account when designing or planning the infrastructures. Nevertheless, the analysis remains valid to understand the potential role that water PPPs investments could have in increasing the adaptive capacity of developing countries when climate change issue has been mainstreamed.

The projects recorded in our sample are divided into two sub-sector (utilities and treatment plants) and five segments (water utilities, sewerage utilities, water transfer system, potable water treatment and sewerage treatment). For the sake of clarity we performed the analysis grouping the five segments into the following: utility, treatment plant and water transfer systems.

If treatment plants represents the largest share in terms of number of projects, the investment commitments in the utility sub-sector accounts by far the largest share (Figure 30).

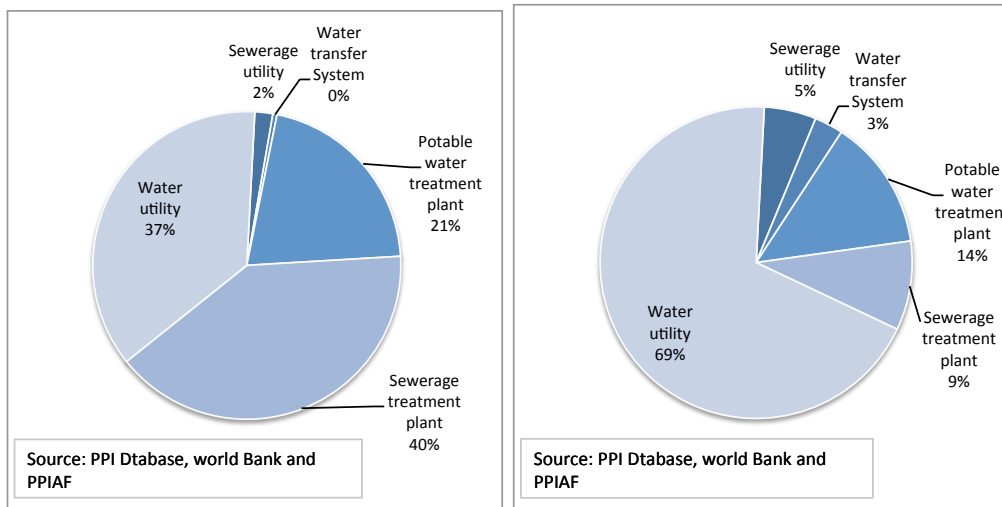
Figure 29 Total PPPs sample by sector



a) number of projects

b. total investments commitments

Figure 30 Water PPPs by segment



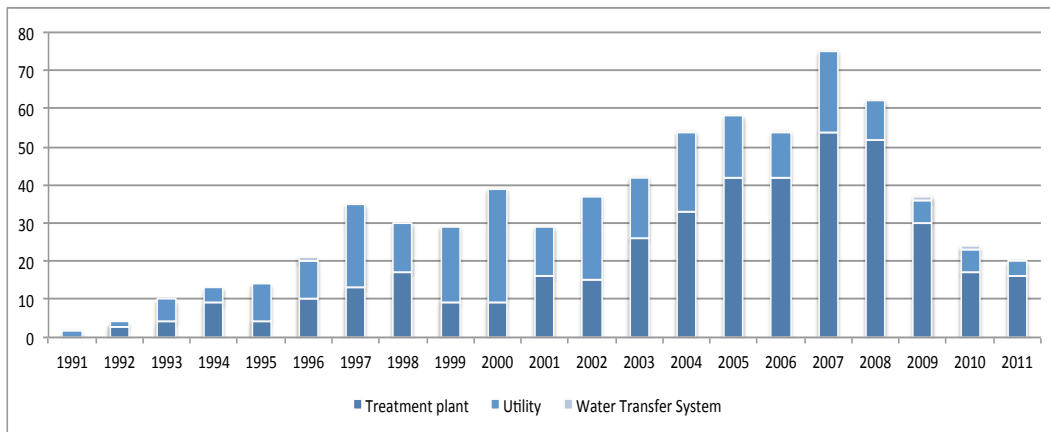
a) number of new projects

b. total investments commitments

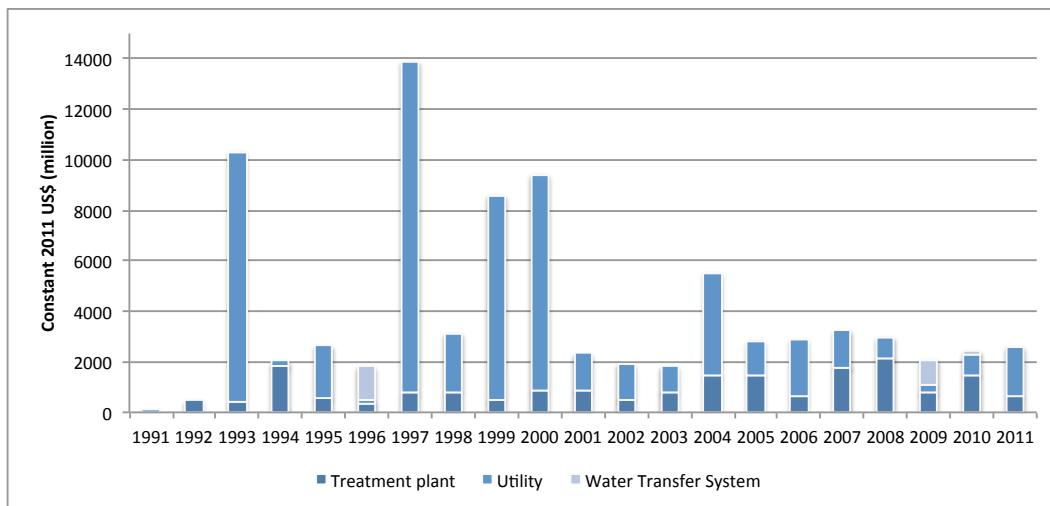
Looking at the main trend in the sector, after a steady growth in number of projects until 2007, the sector has been affected by the financial crisis in 2008 (Figure 31a.). This resulted in the concentration of private investment capitals in few very large projects, which nevertheless remains one of the main features of the private investment in the sector (Figure 31b.) and very large single investments in water utility in the past⁵² still account for a big share of total investments.

⁵² The investment peak of 1993 was related to the thirty year concession BROT project Agua Argentinas for water and sewer services of the city of Buenos Aires in Buenos Aires serving 7700 thousands persons (4 billion current US\$) and to a BROT contract amounting to 2,3 billion US\$ for the sewage collection and treatment of the Indah Region in Malaysia ensuring 180,000 connections; the global peak in 1997 is related to two 25-years concessions for water utilities and sewerage Manila metropolitan area with more than 800,000 connections– one has been cancelled in 2005- (see case study); peaks in 1999 and 2000 are respectively related to a program of partial divestitures of utilities in Chile, (3 projects amounting to more than 3,5 billion US\$, the biggest for the Greater Santiago Metropolitan Region implementing 1,130,000 connections), and to a concessions of 30 years to the Johor Water Supply project in the State of Johor in Malaysia to rehabilitate , operate and transfer the water and sewage utility with an investment of 3,4 billion US\$ and serving 2,7 million people. Last peak was registered in 2004. It is related to the Syabas Water Distribution Project in Malaysia, a concession contract of 2,5 million US\$ for rehabilitating, operate and transfer

Figure 31 Trends in water PPPs



a) number of projects



b. total investment commitments (2011 US\$ million)

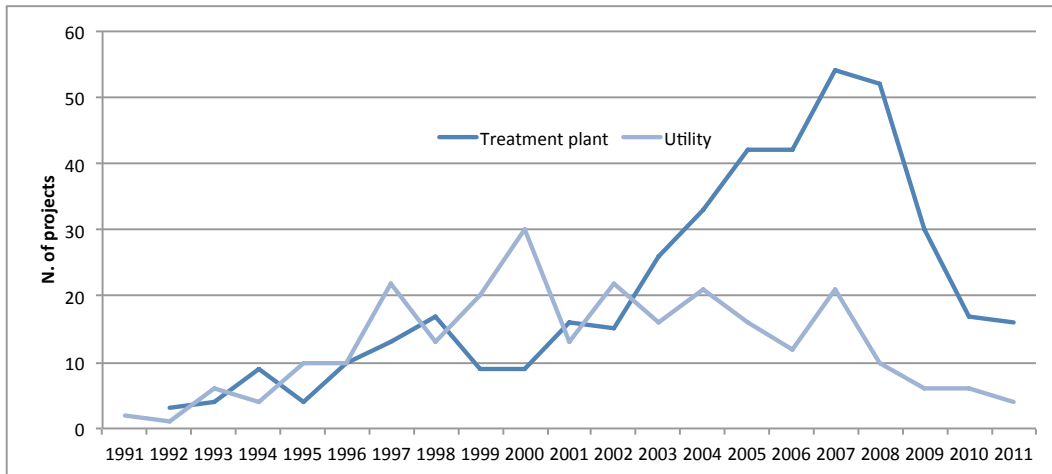
Table 6 Water PPPs investments by type of contract and segment (2011 US\$ million)

	Concession	Partial divestiture	Greenfield project	Lease contract	Total
Treatment plant	4,824	170	13,974	11	18,978
Utility	48,119	11,034	980	1,543	61,676
Water Transfer System			2,472		2,472
Total	52,943	11,203	17,425	1,554	83,126

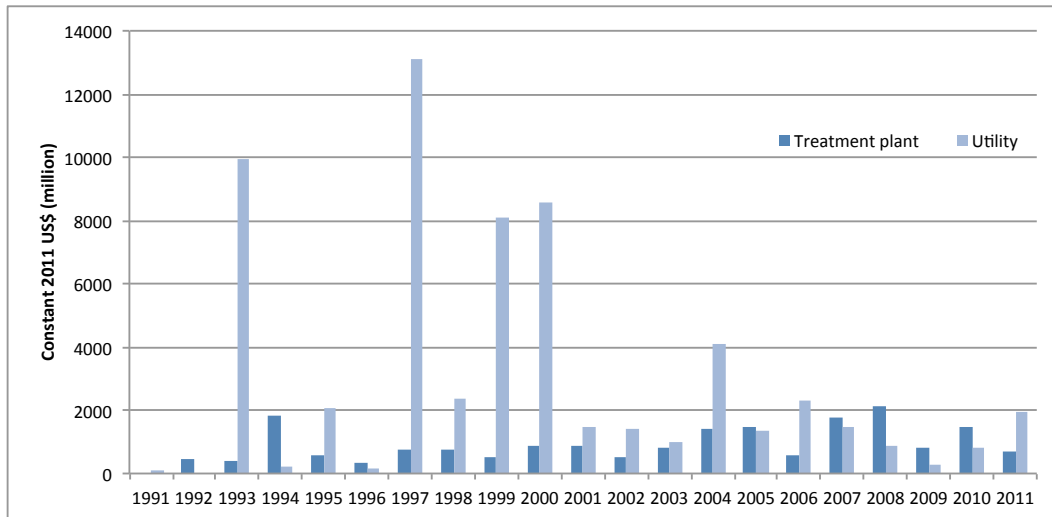
the utility – the project is now distressed and the exit from the project has been formally requested by the private party.

Concerning the type of contracts, the analysis of our sample shows a progressive shift of the private investments from concession contracts involving the rehabilitation of existing utilities, to investments into the design and build of new infrastructure in the treatment plant segment – even if with an exception in 2011 (see Table 6 and Figure 32).

Figure 32 Water PPPs trends by main sub-sector



a) number of projects



b. total investment commitments

Water PPPs in developing countries are concentrated in the emerging economies with Brazil and China leading the scene (see Figure 33). Due to their geographical concentration, single government measures can deeply influence the overall investment trends in the sector.

The large decline in 2009, for example, has been partly attributed to the fiscal stimulus packages introduced in China to absorb the impact of financial crisis; the fiscal package reduced the need for local governments to tap private sector financing⁵³.

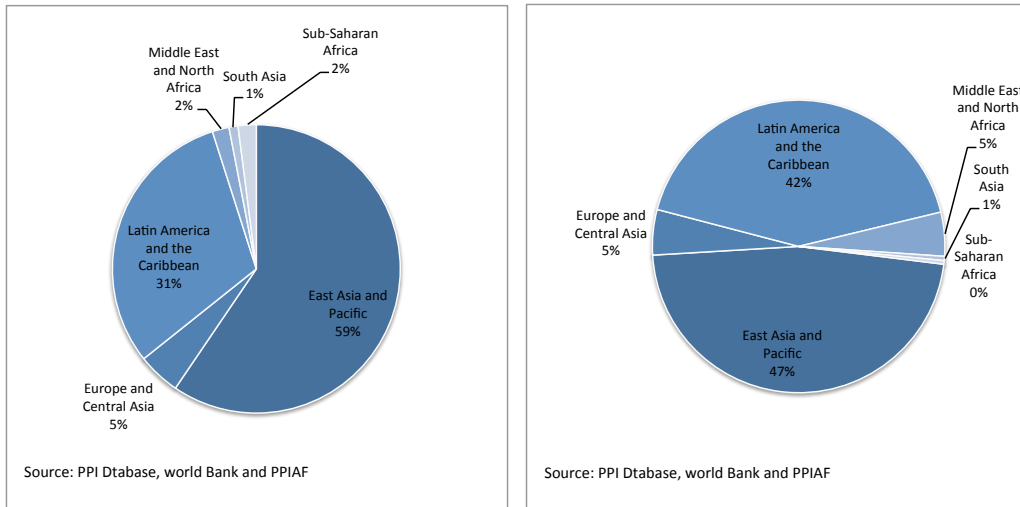
Last two years were characterised by private investments concentrated in Latin America and the Caribbean and some new activities in the Middle East and North Africa⁵⁴, while no new activities have been recorded since 2008 in Sub-Saharan Africa, Europe and Central Asia (Figure 34).

⁵³ PPIAF, PPI data update note 37, June 2010

⁵⁴ In 2009 two projects reached the financial closure in the Middle East and North Africa region: a BOT of 25 years in Algeria for the Magtaa Desalination Plant concession contract of 468 million US\$ (the plant will be built, operated and transfer by Hyflux from Singapore and will have a capacity of 500,000 cubic meters per day), and in Jordan, one of the only three projects in the water transfer segment, the Disi-Amman water conveyor project for the realisation and operation of a system composed by 55 wells, a 325 km pipeline, a new concrete reservoir east of Amman and a connection to a water reservoir northwest of Amman. The system will provide 100 million cubic meters of potable water a year for municipal and industrial users in Amman with an investment of 951 million US\$ from the Turkish Gama Holding and General Electric, USA (PPIAF, PPI data update note 37, June 2010).

In 2010 two important greenfield projects (BOT) were implemented in Egypt (the New Cairo waste water treatment plant with a production capacity of 50,000 cubic meters per day) and Tunisia (the Djerba desalination plant with a production capacity of 250,000 cubic meter per day) respectively amounting to 475 and 95 million US\$ of total investment commitments

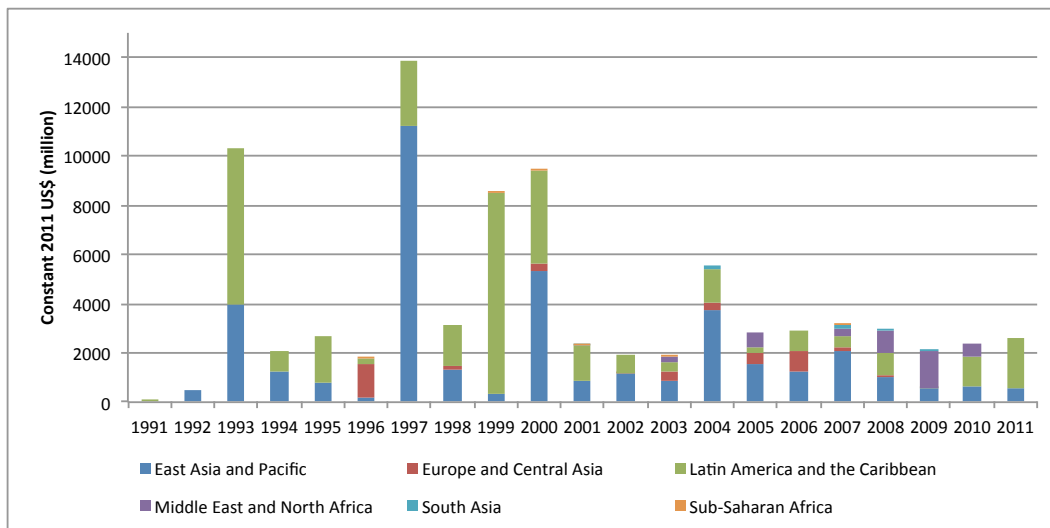
Figure 33 Water PPPs by region



a) number of projects

b. total investments commitments

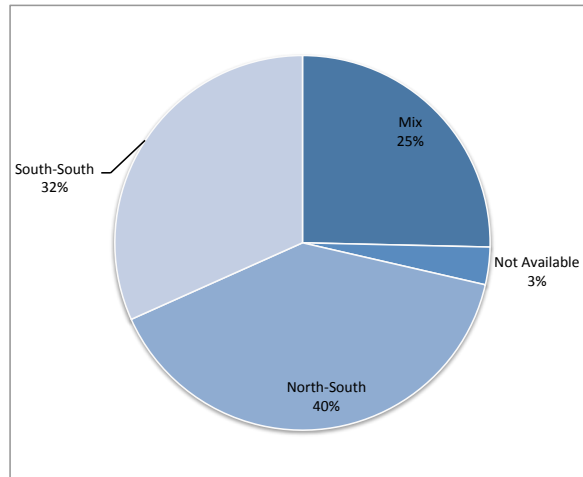
Figure 34 Investment trends in water PPPs by region



To better understand the investment flows in the sector, we analysed the origin of the investments. Data were calculated by reviewing the nationality of the main sponsors for each single project. We have been able to gather this information for the 97% of our sample. Only the 40% of the PPP project investments in the water sector have been implemented thanks to a “north-south” flow of investment. The remaining 57%, in fact had seen the contribution of at least one company from a developing nation, and for the 32% of the investments, the sponsor companies were belonging solely to developing countries. Unfortunately the database records

only the main sponsors, thus not providing a full picture of the sponsoring side. However, this should not alter the overall result, which remains reliable Figure 35.

Figure 35 Origin of PPP investments in the water sector



More interesting is looking at the sponsor origin by region. Figure 36 and Figure 37 clearly shows the capacity of the private sector in the emerging economies to directly participate in PPP projects. Countries like China in the East Asia and Pacific region and Brazil in the Latin American and the Caribbean have attracted private operators respectively in the construction of water treatment plants and in the rehabilitation and expansion of water utilities. Figure 37, in particular, better shows the vivacity of the Latin American countries in the period 2005-2011.

Figure 36 Origin of water PPP investments by region (1990-2011)

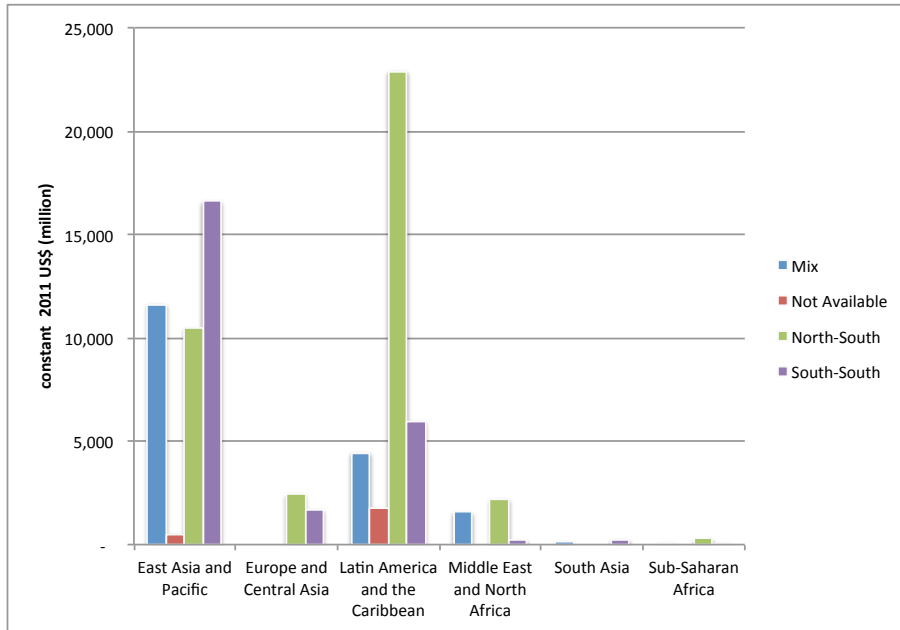
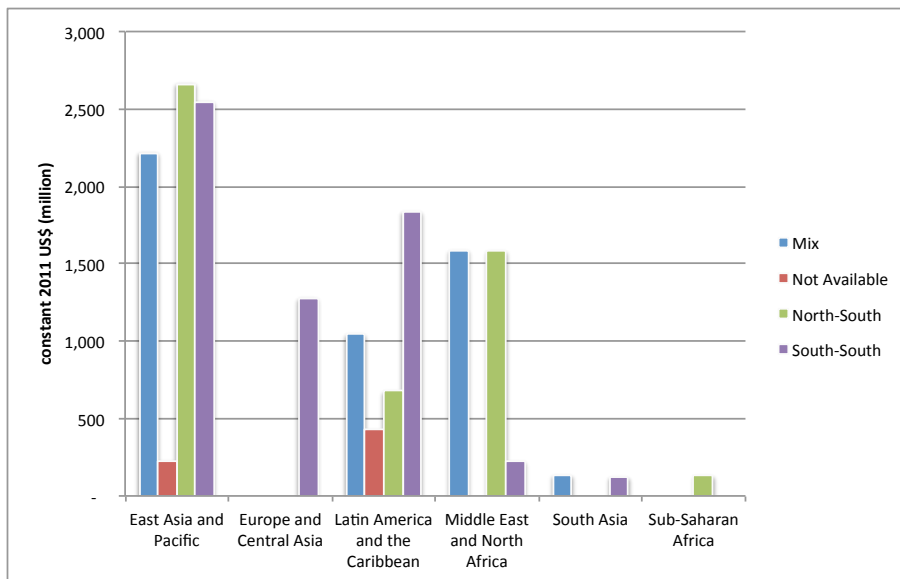


Figure 37 Origin of water PPP investments by region (2005-2011)



To study the relation of this sector with global climate change policies, we finally assessed the significance of differences between PPPs volume of investments in water sector prior and after the entry into force of the Kyoto Protocol using the statistical t-test and comparing the means of the two samples.

Differences between the means of investment volumes resulted not significant, even increasing the confidence level.

In conclusion the sector appears to be “explored” by private business following particular countries opportunities in terms of available policies in a specific period of time.

The analysis shows a good potential that nevertheless is very difficult to assess due to the lack of available data. Furthermore, it has to be noted that the available database records only larger scale projects, thus leading to an underestimation of the global phenomenon.⁵⁵

We decided therefore to devote two of our case studies to this sector, in order to better highlights characteristics, and related risks and opportunities.

Transport

PPP projects in the transport sector are around 1,300 and account for 370 billion US\$, representing almost half of the energy sector both in terms of number of projects and investments. (Table 3).

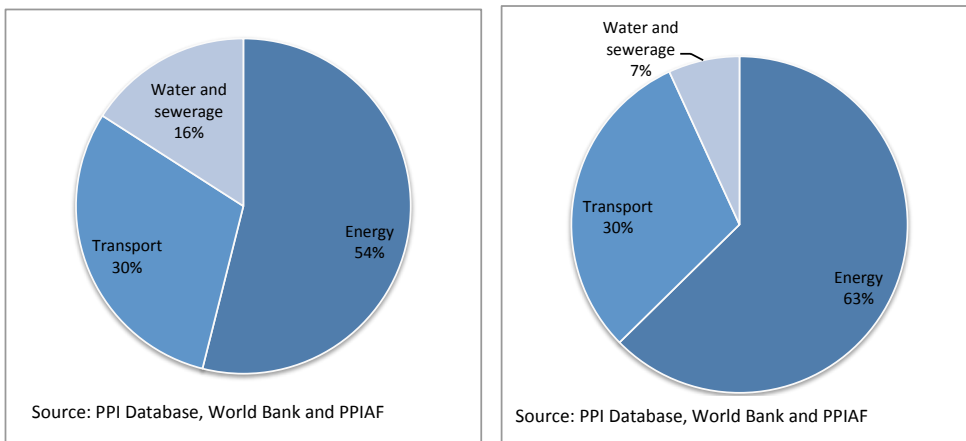
Climate change mitigation opportunities are mainly related to urban development investments and traffic management aiming to the reduction of the use of passengers’ cars and more in general to the reduction of greenhouse gasses. Furthermore, infrastructure investments leading to modal shift of transport (passengers and goods) from road to more carbon efficient systems, like rail or water transports, certainly play an important role on long term climate change mitigation.

Transport PPPs, accounts for the 30% of our selected projects sample both in terms of number of projects and investments. The 55% of the PPP project numbers are related to the land transport involving the construction of highway tunnel or bridges (Figure 39). As we already stated, the typical form of cooperation in this sector are the user-fee PPPs, where the risk associated with the demand of the asset owned by the public, is transferred to the private side. The

⁵⁵ According to IFC (2011a) the small scale service providers may exceed one million.

private will recoup its investment by collecting a fee charged to the users. The 33% of the projects are related to the construction, operation and transfer of new assets, while 61% are represented by concessions, where the private side has been involved in the rehabilitation and most probably in the expansion, and then transfer, of an existing facilities (Figure 40).

Figure 38 Total PPPs sample by sector

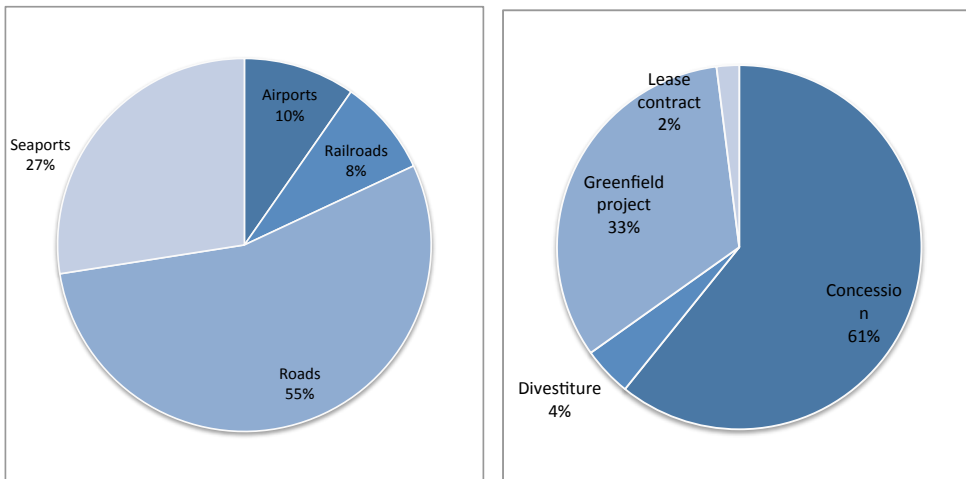


a) number of projects

b. total investments commitments

Figure 39 Transport PPP by subsector

Figure 40 Transport PPP by contract type



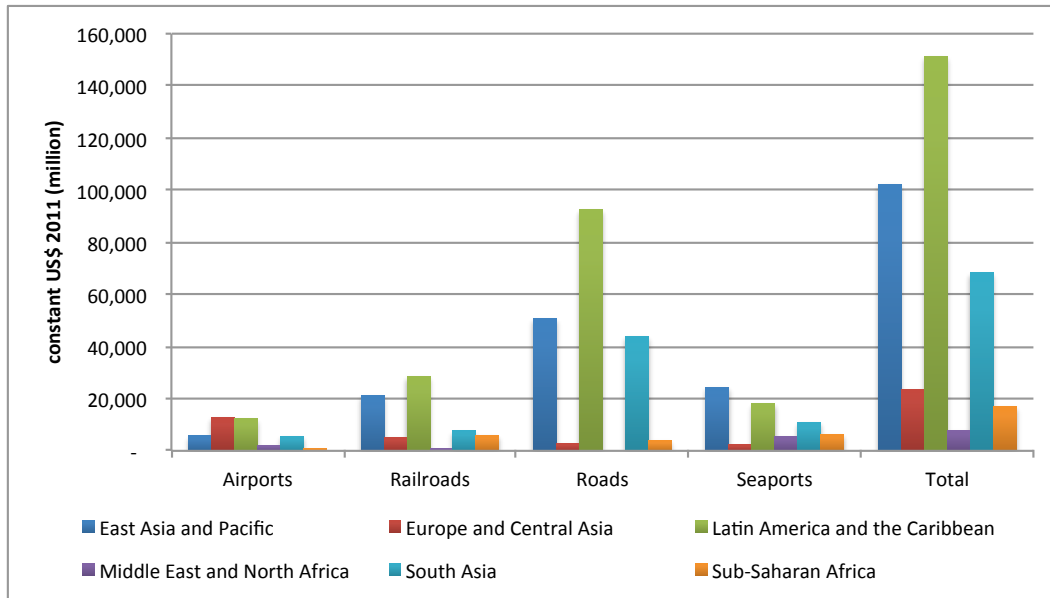
Most of the investments occurred in the emerging countries in the Latin America and the Caribbean region and East Asia and Pacific. (Figure 41)

To study the relation of this sector with global climate change policies, we assessed the significance of differences between PPPs volume of investments in

water sector prior and after the entry into force of the Kyoto Protocol using the statistical t-test and comparing the means of the two samples.

Differences between the means of investment volumes resulted not significant, even increasing the confidence level.

Figure 41 Transport PPP investment commitments by region



The PPI database excludes investments on buses and mobile vehicles; therefore analysis focused only on the investments in “fixed” infrastructures, moreover the database does not provide information on the their climate objectives.

According to IEA (2012), the demand for personal mobility and freight will steadily increase in the emerging economies. Moreover, according to a study commissioned by the European Investment Bank (EIB) (Bain, 2009), PPPs in the road sector (toll roads) will remain at the forefront in the near future. This result is particularly significant considering the fact that it comes from an analysis of completed PPP projects carried out by the EIB in its developed member countries. Transferring this result to the developing world let us understanding the prominent role that this sector can play in the future.

One of the selected case study focuses on the construction of the mixed use tunnel in Kuala Lumpur, to better understand the potential role that transport PPPs can have also in implementing adaptation measures.

An evaluation of best and worst case studies

Metro Manila Water Concessions

Figure 42 Home pages of the Manila Water Company, Inc. and of the Maynilad Water Services, Inc. websites
www.mayniladwater.com.ph and
www.manilawater.com



Projects name:

1. Manila Water Company (Manila East)
2. Maynilad Water Services (Manila West)

Type of Contract: Concession for build, rehabilitate, operate and transfer (BROT)

Sector: Water and sewage – water utility

Duration: 25 years + renewal

Year of financial closure: 1997

Climate change co-benefit: adaptation / building resilience to current and future climate risks: improvement of access to water, reduction of water losses, increase of awareness and improved cooperation at community level

Why did we choose these projects as case study?

- It refers to one of the oldest and largest water PPP signed in developing countries
- Beside having already 15 years of implementation, the two manila water PPPs are among the few projects with performance data available
- It refers to large infrastructure projects with strong and measurable impacts at micro level

- It represents a best and bad - but not worst - practice at the same time

The events

On January 23, 1997, the bid opening ceremony for the two concessions of the service area of Metropolitan Waterworks and Sewerage System (MWSS), took place in Manila at the presence of around 400 people. Ayala-International Water (Manila Water Company) won the concession for the Manila East zone, Benpres-Lyonnaise des Eaux (Maynilad Water Services) won the concession for the West zone. The combined population in the two service areas was about 11 million and the investment commitments during the life time of the two 25-years contracts were around US\$7.5 billion: it was the largest water concession in the world. The two concessions were the more visible results of Philippine's President Fidel Ramos strategy started in 1994 to solve the water crisis in the metropolitan area of Manila.

Mark Dumol, who was, at that time, Chief of Staff of Vigilar, the Secretary of the Department of Public Works and Highways and the concurrent Chairman of the MWSS, has written an emotional book reporting all the entire process from the establishment of the MWSS privatisation committee in 1994 until the concessionaires take over of the operations in 1997 (Dumol, 2000).

The two concessions were awarded with competitive biddings based on the lowest tariff. Four bids were received, and thanks to Dumol's "story telling" book we can feel today the tremendous tension of that "big day" with restless people and hum of noise when the four financial bids were opened and put on the projectors screens. IFC was the lead advisor of the PPP operation.

On August 1st 1997 the two concessionaires took over the operations after another big ceremony where President Ramos could announce the tariff reductions. The two concessionaires in fact won thanks to the considerable reduction they made to the pre-bids tariffs: the new tariffs were only the 26.4% of the pre-bid level of the East zone, and the 56.6% of the pre-bid level of the West zone.

Furthermore, according to the contract both concessionaires were required to achieve pre-determined service targets, reported in Table 7, which implied the definition of strategy to extend the water service also to slums⁵⁶.

Table 7 Service targets specified in the MWSS Concession Agreement

	1996	2001	2006	2011	2016	2021
Water Service	67%	87%	98%	98%	98%	98%
Sanitation and sewerage	8%	46%	55%	62%	71%	83%

Source: adapted from Dumol (2000)

The two PPPs evolved with two different pathways.

Marin lists Manila Water as one of the successful PPP projects that worldwide in 2007 are providing water services to 50 million people in developing countries, while in 2005 the PPP for Manila West was cancelled due to the bankruptcy of the concessionaire.

Looking at the performance achieved, in 2006, Manila Water in the East zone reduced water losses from 52% in 1997 to 30% and almost no customers were suffering of water rationing anymore, while the West zone concessionaire did not achieve improvements on water losses and water rationing was necessary for 32% of the served population of the West zone (Marin 2009 and Maynilad press release, see also note 60).

The low bid level of the tariffs immediately turned out to constitute a major issue. The two concessions started in the middle of the Asian financial crisis and the Philippine Peso lost half of its value by the end of 1998 and despite several petitions by the concessionaires, the regulator did not allow for tariff adjustments until 2000⁵⁷.

⁵⁶(Baker, 2012)

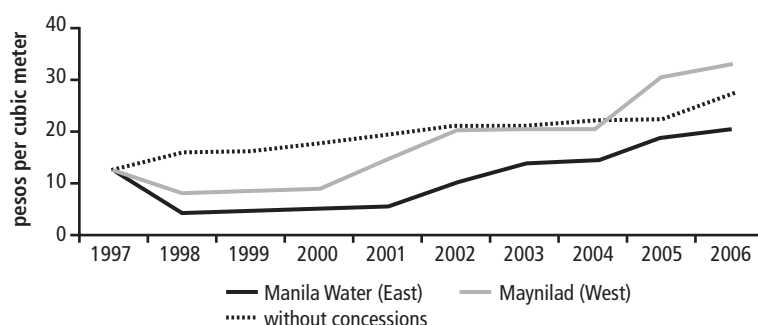
⁵⁷ (Marin, 2009)

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The table below shows the evolution of the tariffs of the two service areas. Both concessionaires adjusted in several steps their tariffs to the growing inflation. Most interesting is to compare these changes with the level that the tariffs would have reached in the absence of the PPPs (the non-PPP tariff estimation was carried out by the regulator): the tariffs of the better performing Manila Water in Manila East stayed at the lowest level while tariff in Manila West increased even more than the estimated level of tariffs made by an entire publicly owned utility.

Table 8 Water tariff changes in the Manila water PPPs

(b) Evolution of average water tariff



Source: Navarro (2007) and Manila regulator, Metropolitan Waterworks and Sewerage Systems (MWSS).

Source: Marin P. (2009)

The failed water service concession for the west area of Manila was re-assigned in December 2006 through another competitive bidding to the joint venture of the Philippine DM Consunji Inc. (42%), the Hong Kong Chinese First Pacific (42%) and the French SUEZ (16%). The bidding was based on the highest new investments. The projected investments of the new 30-years concession were of some US\$ 450 million from the private party and 50 millions from the government.

The concession for the East zone has been extended to the group led by Ayala on October 2009 for a 15-years period until 2037 with a further investment commitment of P260 billion.⁵⁸

Today the two water concessions are well operating but media attention on the two concessionaires is still very high. News on the on-going concessions still appears in the headlines of the most widely read and circulated national newspapers⁵⁹ and the two concessionaires pay lot of attention on informing customers and media on their achieved performances.⁶⁰

According to Maynilad⁶¹, since the launch of its Non-Revenue Water Reduction Program in 2008, the company water recovery per day is equal to 569 millions liters as of August 2012.

Climate change co-benefit on water are strictly linked to sustainable development. Nevertheless measurable climate change adaptation impacts and results are related to the achieved reduction of water losses. In addition, the concessionaires can use the water savings to supply drink safe water in the still-unserved area. The increasing of the access to safe and reliable water will ultimately lead to the improvement of climate resilience of the affected communities.

One could argue that mitigation results could be also attributed to the rehabilitation programs undertaken under the concessions investment plans involving the construction of new and more efficient facilities.

⁵⁸ "Gouvernement extends Manila Water Concession", articles appeared on The Philippine Star, October 23rd 2009, cache copy accessed on October 6th 2012 [*insert the website ...omissis*]

⁵⁹ "53% of Maynilad water is lost; Manila Water only 13%", article appeared on Philippine Daily Inquirer, July 22nd 2010, cache copy accessed on October 6th 2012 [*insert the website ...omissis*]

⁶⁰ According to Maynilad internet available press release of January 26th and January 29th 2012 in five years since the concessions was re-awarded, the Company implemented about P30 billion of capital expenditures and achieved significant services improvements. The access to high quality water increased from 6.1 million at the end of 2006 to 7.9 million of people in December 2011 enjoying safe and potable water. Water connections increased by 48% in five years. Availability of 24-hour water supply increased from 32% in 2006 to 84% in 2011, similarly water pressure of 7psi is now available for the 96% of its customers comparing with 45% in 2006.

⁶¹ Maynilad, internet press release published on September 11th 2012.

Recently, in 2011, the two water concessionaires in Manila initiated a new partnership with US public territorial authorities and research institutions⁶² in order to integrate climate change adaptation analysis, and climate related risk factors, into the water resource investment planning. The final interaction between the mitigation and adaptation co-benefits is difficult to assess. However, since the primary objective of the concessions is the increase of the water services availability and therefore of the overall capacity of the facilities, it could be easier to expect at least a partial conflict among the two.

Conclusions

Water sufficiency is the second strategic priority listed in the National Climate Change Action Plan (NCCAP) (Climate Change Commission, 2011) which set the country's strategic directions on mitigation and adaptation for the period 2011-2028, following the adoption of the National Framework Strategy on Climate Change (NFSCC) in 2010. To ensure the sustainability of water supply and access to safe and affordable water ensured is one of the expected primary outcomes of this priority, which is part of the Government concerns since more than 2 decades, as this PPP project also demonstrates⁶³. Other efforts are required in order to meet the full access water goal while coping with climate change and the NCCAP clearly refers to the PPP model as a viable mean to increase investments in the development of climate-smart technologies, products, and services.

In conclusion,

- The final outcome of a PPP depends heavily on the development of a solid collaboration between the public and private partners.

⁶² Manila Water Company and Maynilad Water Services signed a Memorandum of Understanding in June 2011 with Palm Beach County and the U.S. National Center for Atmospheric Research (NCAR) in order to prepare a joint work programme for assessing climate change impacts on future investment plans. (Waterlinks - News and Events, 2011)

⁶³ In 1995 the President's Priority Program on Water (P3W) was implemented in order to provide water supply infrastructure to 432 waterless municipalities outside Metro Manila.

- The public party should implement a behavioural change when implementing a PPP: clear contractual rules shall help in defining this new role.
- Strong commitment on clear contractual target is key determinant for the final success of a PPP program, even if this can lead to cancellation and rewarding of long-term contracts.
- The biggest result of a successful PPP shall be the increase of operational efficiency and service quality.
- PPPs involving large infrastructure investments can represent a success model to achieve adaptation co-benefit at local and community level.

Ouarzazate Concentrated Solar Power Station

Figure 43 Signature of the PPA between MASEN and ACWA Power on November 20, 2012 (source Middle East Online)



Project name:

Ouarzazate Concentrated Solar Power Station

Type of Contract: Concession for build, own, operate and transfer (BOOT)

Sector: Renewable energy - Solar

Duration: 25 years

Year of financial closure: 2012

Climate change co-benefit: mitigation / avoidance of 240,000 tCO₂ emissions per year

Why did we choose this project as case study?

- It's one of the latest PPP project reaching the financial closure but it can be defined as a pioneer project
- Being related to the construction of one of the largest planned CSP plants in the world, it demonstrates the capacity of the public-private partnership model to attract private capital and concessional financing in a new and still high-cost technology
- It's definitely a climate change PPP: the PPP project has been labelled as climate change project by the involved MDBs since its appraisal phase and it represents one of the first projects financed by the Climate Investment Fund through its Clean Technology Fund
- Tested as a new business model by MDBs, it provides a good example of complex risk sharing and risk transfer structure

The events

On November 20, 2012 under the Patronage of His Majesty King Mohammed IV, the Moroccan Agency for Solar Energy (MASEN) and the Saudi Arabian Acwa Power, signed the Power Purchase Agreement for the sale of the net electricity output of the 160 MW Ouarzazate Solar Power project.

This is the beginning of the implementation phase of the Moroccan Solar Plan, launched by the King Mohammed IV on November 2, 2009 during a ceremony that took place in the city of Ouarzazate and in the presence of the US State Secretary H. Clinton. The Moroccan Solar Plan envisages the instalment of 2000MW by 2020, for an estimated total investment of 9 US\$ billion in five identified sites: Ouarzazate, Ain Bni Mathar, Fom Al Oued, Boujdour and Sebkhatah. The Ouarzazate site thanks to four subsequent phases will host a 500 MW solar complex by 2015 in a surface area of 2500 ha.

The Moroccan Solar Plan is the cornerstone of the renewable energy and climate change mitigation strategy of the Country and it falls under part of the wider new energy strategy adopted by the Government of Morocco (GoM) in 2009 with the overarching aims to promote sustainable development, to reach the universal electrification rate and improve the energy security of the country while meeting an energy demand growing at an average rate of 6% per year. The objectives set by new energy strategy include the increase of the renewable energy share within the national energy mix from 33% in 2009 to 42% in 2020, the reduction of the oil share in the energy mix by 40% before 2030, and the integration of Morocco in the regional energy market by fostering the cooperation with other North African countries and the EU.

This PPA signature is the final step of the PPP procurement process that started on 30 March 2010 with a “market sounding” exercise through the request of expressions of interests, followed by a pre-qualification stage and a request for final proposal. The Figure below details the main steps undertaken during the procurement process and the degree of selection made among the applicants.

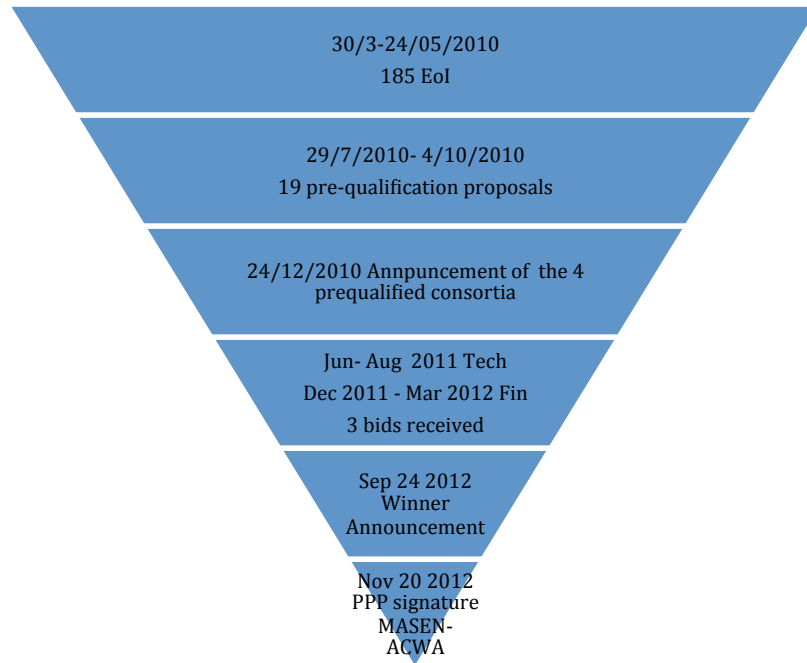


Figure 44 Outline of the procurement process

The project has benefitted from the strong commitment of the GoM who has been aware, since the beginning, of the importance to develop a well-structured PPP model in order to reach an optimal allocation of project risks between the public and private parties. Due to the high cost of the adopted technology, which is still non commercial viable, a high amount of concessional financing has been sought since the early stage, bringing on board 7 lenders (see Table 9) for a total amount of 513 € million from EU Institutions (of which 30 million as a EU grant) and the African Development Bank (AfDB) and 397 US\$ million from the World Bank and the Clean Technology Fund.

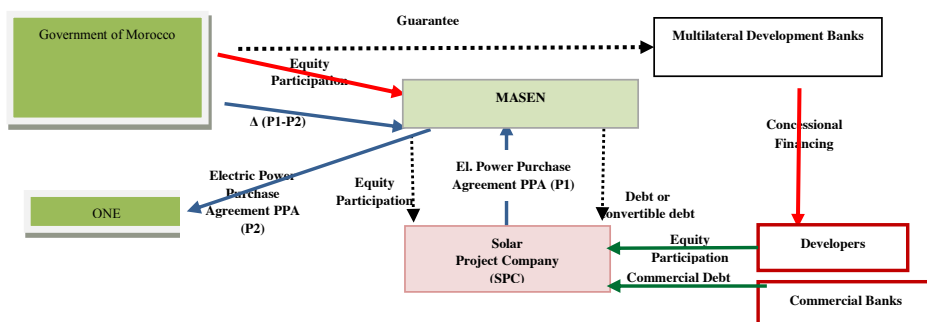


Figure 45 PPP structure and institutional arrangements (AfDB, 2012)

According to the initial project description, the winning consortium led by ACWA Power will establish and own the 75% of Solar Power Company (SPC) that will build, finance, operate and own the plant for 25 years. MASEN will invest, through MASEN Capital, in the SPC and own 25% of its equity. The SPC should be financed under a 70/30 debt/equity ratio and, in addition to its equity share, MASEN intends to provide 100% of the debt, in the form of funds borrowed from MDBs including the Clean Technology Fund and on-lent to the SPC, while no commercial banks have been involved at this stage.

Table 9 Ouarzazate concessional financing sources

Lender/Donor	Amount	Date of approval /commitment
CTF	100 US\$ - AfDB Loan 97 US\$ - WB Loan	June 22, 2011
WB	200 US\$ million – Loan for Solar Incremental Cost Support	November 17, 2011
AfDB	168 € million - Loan	May 16 2012
EIB	100 € million - Loan	November 19, 2012
AFD (Development Agency for France)	100 € million - Loan	November 19, 2012
KfW Entwicklungsbank (German Development Agency)	115 € million- Loan	November 19, 2012
EU/Neighbourhood Investment Facility	30 € million - Grant	December 2011

MASEN therefore represent the *fulcrum* of the operation: it will coordinate all the concessional financing sources, is an equity investor of the SPC company and enters into contract with SPC and ONE (Office Nationale de l'Electricité) signing two PPAs. The PPA signed on November 20 between ACWA Power⁶⁴ and MASEN (PPA1) sets the selling price of the net electricity production of the solar plant to MASEN, which in turn will sell the entire amount of kilowatt-hours produced to the national grid according to the PPA signed with ONE (PPA2), the national electricity company.

The difference between the price at which MASEN will buy the electricity generated by the plant (which will be higher due to the adopted technology) and the price at which MASEN will sell such electricity to ONE is partially covered by the World bank through the so called Solar Incremental Cost Support (SICS) and partially covered by the GoM⁶⁵.

The price offered by the winning consortium is equal to MAD 1.597944⁶⁶, the 28.8% lower of the one offered by the second bidder, is much higher than MAD 1.152721, the highest electricity cost in Morocco as published by the Moroccan Investment and Development Agency⁶⁷. We could expect that the PPA between MASEN and ONE will be in line with those current electricity prices in the

⁶⁴ According to several on-line news websites the PPA has been signed between MASEN and ACWA Power and not between MASEN and the SPC, at the time of writing no information are available on the future establishment of the SPC.

⁶⁵ GoM has in principle committed, through the MASEN law and the MASEN-GoM conventions, to cover this difference from the State budget. At the request of MASEN, WB is offering a loan to cover the additional generation cost of CSP when the GoM decides to resort to this financing, instead of State financing, when economic and fiscal conditions warrant it (World Bank, 2011).

⁶⁶ Abeinsa ICI, Abengoa Solar and Mitsui bid 2.0575 dirhams/kWh (\$0.2389/kWh), and Abu Dhabi National Energy Co. Enel, ACS SCE bid 2.0572 dirhams/kWh (\$0.2388/kWh)

(http://www.pv-magazine.com/news/details/beitrag/morocco--acwa-selected-for-ouarzazate-_100008640/#ixzz2Ea6X7800)

⁶⁷ We used a conservative approach, and we considered the kWh peak hour price in Casablanca, which are higher than the price in Rabat and Tanger (free zone).

Available at <http://www.invest.gov.ma/?lang=en&Id=32>

Country, this will lead to an estimated subsidy equal to MAD 0.445222/KWh sent to the national grid. Assuming a production of about 370 GWh per year for 25 year of operation, the yearly amount of subsidy that GoM need to provide would be equal to around MAD 164.7 million per year (€14,6 million).

The institutional and financial agreements put in place seem to assure the financial and operating viability of this first phase of the Ouarzazate Solar Complex. All major project risks have been carefully allocated among the project stakeholders through a series of contractual arrangements and through the establishment of ad hoc agency like MASEN, created in January 2010, and entrusted to develop the Moroccan Solar plan, develop the solar industry in the Country, define the CSP PPP model and coordinate the entire PPP project phase from the project preparation process, to the procurement phase till the management and conclusion of the contract in 25 years.

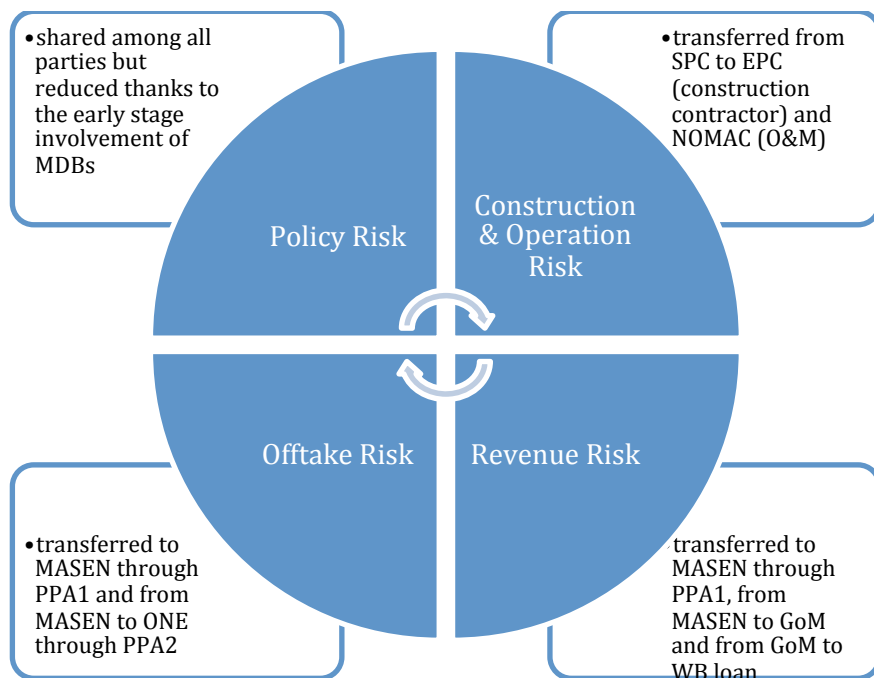


Figure 46 Risk sharing mechanisms at Ouarzazate CSP

Conclusions

It would be highly premature to state that the Ouarzazate PPP is a successful PPP. However we can state that at least the PPP procurement process coordinated by

the GoM represents a best practice in the early design of a PPP model able to catalyse the private financial flow and climate international public finance.

The PPP procurement process has been carefully carried out under the supervision of the World Bank. The transparency of the competitive tender has certainly contributed to the creation of an environment conducive to the participation of private investors.

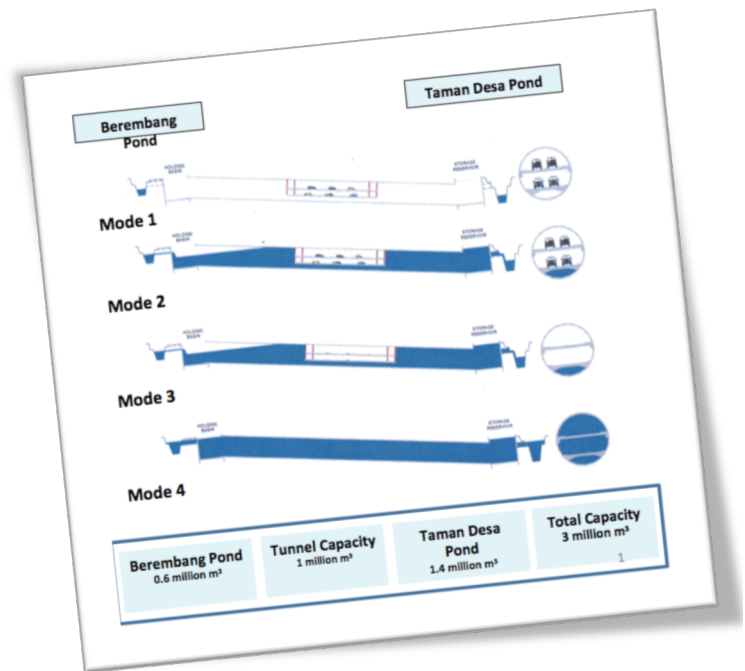
Ouarzazate is the first stage of a vaster solar complex in the same site and of the wider Moroccan Solar plan. The development of this first phase will contribute to descend the learning cost curve of the CSP technology both for the industrial operators and for the Moroccan authorities, however we could expect that the same amount of concessional funding will not be available for the subsequent phase, thus making much more challenging the role of this PPP model.

The number of lenders successfully coordinated by MASEN has certainly reduced the perceived risk of the industrial operators, which responded well to the bid procedure in terms of number of EoI and proposal received. However, having all lenders their own terms and conditions, their coordination and the future loans management implies high transaction costs and a high level of complexity and efforts to be borne by MASEN. More coordinated and harmonized efforts from international lenders would certainly help further application of the model, especially if we consider that MASEN intend to replicate this experience.

The subsidy amount covered by the GoM would be reduced in case the produced energy would be sold abroad. Being the green platform for Europe among the strategic objectives of Morocco, the PPP model applied in a developing country would become strategic for the European climate mitigation agenda.

SMART tunnel in Kuala Lumpur

Figure 47 The four operation modes of the SMART tunnel



Project name:

Stormwater Management and Road Tunnel (SMART)

Type of Contract: Concession for build, operate and transfer (BOT)

Sector: Transport - Toll road

Duration: 40 years

Year of financial closure: 2003

Climate change co-benefit: adaptation and disaster risk reduction / incorporating climate risks into investments: avoidance or reduction of urban floods.

Why did we choose this project as case study?

- It represents an innovative solution of disaster-risk reduction in order to cope and adapt to climate change
- It demonstrates the capacity of the public-private partnership model to attract national private capital and made possible a high-technology investment at urban level
- Based on the long-lasting experience of the public-private partnership model applied to toll-road, the project has been entirely financed without the involvement of MDBs, furthermore is an example of south-south investment.

The events

At the beginning the aim was simply to solve the well know problem of flash floods in the city centre of Kuala Lumpur, the project ended up to become the

longest tunnel in Malaysia receiving the British Construction Industry Awards in 2008 with the motivation “the real achievement was to make the project work” and the UN Habitat Scroll of Honour Award in 2011 “for its innovative and unique management of storm water and peak hour traffic”

Kuala Lumpur as many other metropolitan areas in the developing world has faced a significant economic growth accompanied with a rapid population increase. Being affected by the seasonal monsoon, with abundant rainfall, averaging 2,000mm to 4,000mm per year at country level, and with three rivers (Sungai Klang, Sungai Ampang and Sungai Gombak) merging in the centre of the city, flash floods occur almost annually in Kuala Lumpur. Due to its peculiar geographical and climatic conditions, the management of storm water has been an integrated part of the administration activities of the city⁶⁸ since the early ‘70s. However, the rapid urbanisation with the increase of paved surfaces, led to a significant reduction of the natural drainage capacity of the land and accelerated the runoff, thus causing human induced floods with a deeper overall impact. The annual damage in the Kuala Lumpur State has been estimated equal to 99 RM million in 2002⁶⁹ with the annual flooding of the Sungai Klang increased around the 300% since 1985⁷⁰.

Furthermore, many climate change impacts in Malaysia are expected to be related to water. According to the Second National Communication to UNFCCC, the observed rainfall intensity increased by 17% for 1 hour duration and 29% for 3 hour duration (2000-2007 compared to 1971-1980), and extreme events are expected to increase in frequency by 2050 (Ministry of Natural Resources and Environment Malaysia, 2011). The Federal Government has already begun to implement “No- regrets” options like the introduction of the National Integrated

⁶⁸ The first urban drainage manual, ‘Planning and Design Procedures No. 1: Urban Drainage Design Standards and Procedures for Peninsular Malaysia’ was published by the Department of Irrigation and Drainage (DID) Malaysia in 1975. The new Urban Storm Water Management has been released in January 2013 in order to reflect the technological development and new common practices in water management (<http://www.water.gov.my/>).

⁶⁹ Data retrieved from the DID website <http://www.water.gov.my/>

⁷⁰ (UNSSC and NCPMP, 2008)

Water Resources Management (IWRM) System and it acknowledges the importance to review the design specifications for infrastructures devoted to water management.

The Stormwater Management and Road Tunnel (SMART) of Kuala Lumpur has been reported as an early effort of the Malaysian Government to tackle the climate change issue.

Conceived as Federal Government's project, its origination wasn't straightforward but was the result of an iterative process among the public and private parties involved.

In 2001 the Government sought proposals to mitigate the impacts of the seasonal flash floods typically lasting from 3 to 6 hours, avoiding disruptions to the city centre. The construction of a tunnel to divert the storm-water flow, and of ponds to storage the water was the first solution in the mind of the grantor.

Being forced, by liability reasons, to locate the tunnel beneath the Government roads crossing the city, the ingenuity of the private operators conceived a dual use tunnel.

The idea of a dual use tunnel led to the final setup of the concession: the tunnel would have hosted a toll motorway and the revenues coming from the fees would have recovered the capital investments and the operating costs borne by the private companies. This arrangement would have reduced the overall costs of the project for the Government.

At that time a national PPP policy was not in place, even if the since early '80 the prime Minister introduced the concept of "Malaysia incorporated", calling for a stronger cooperation between the private and public sector and only in 2006, under the 9th Malaysian Plan, the Government announced the implementation of public projects under the PPP mechanism⁷¹.

⁷¹ A national PPP Unit was established later in 2009. The 10th Malaysian Plan (2011-2015) aims to catalyse and accelerate strategic private investments directly or through PPPs. The key themes of PPP initiatives under the Plan are the improvement of basic infrastructure and the upgrading of public transportation in Greater Kuala Lumpur, like the 156-kilometre length Mass

A 50/50 Joint Venture (JV) formed by two Malaysian engineering and construction companies, MMC Corp Berhad and Gamuda Berhad, established a Special Purpose Vehicle company (SPV), the Syarikat Mengurus Air Banjir & Terowong Sdn Bhd (or SMART Sdn Bhd), that signed the 40-years concession to operate and maintain the tunnel. The executing agencies of the Federal Government were the Department of Irrigation and Drainage Malaysia and LLM (Lembaga Lebuhraya Malaysia), the Malaysian highway authority. The ownership of the tunnel remained to the government.

The MMC-Gamuda JV, being the turn-key EPC contractor (Engineering, Procurement, Constructor), engaged, for engineering support, a large local consultant Sepakat Setia Perunding (Sdn) Bhd (SSP), in association with Mott MacDonald UK.

The construction works commenced in 2003, the operations remained on schedule, and on May 15th 2007, the tunnel opened its motorways to road traffic. SMART is a 12.7 kilometre tunnel, with an internal diameter of 11.8 metres. The central 3 kilometre section of the tunnel accommodates two 2-lane road decks, in parallel with a notorious traffic bottleneck in the city centre. Furthermore, the overall system provides storage for about 3 million cubic metres of water and allows water to be transferred through the tunnel whilst utilizing the upper and lower road decks for traffic at the same time⁷².

More in particular, the tunnel has four operational modes (see Figure 47):

Mode 1: is activated in case of little or no rain, the traffic is normally allowed in the tunnel

Mode 2: is activated in case of moderate rainfalls, the excess floodwater is diverted into the bypass tunnel in the lower channel of the road decks. Road tunnel is still opened to traffic

Rapid Transit System, which also represents one of the core measures to reduce the carbon footprint of Malaysian cities. (Economic Planning Unit, 2010)

⁷² (Gusztáv Klados, 2007)

Mode 3: is activated if major storm event occurs, the traffic will be evacuated from the road tunnel. This normally takes about one hour. If heavy rainstorm stops early, then the traffic tunnel will not be flooded and the road decks will be re-opened to traffic within 2-8 hours after closure

Mode 4: is activated if heavy rainstorm prolongs, usually 1-2 hours after Mode 3 is declared. The road decks are closed to cars and open to water flow. The tunnel will be re-opened to traffic within 4 days of closure⁷³.

A real time flood warning system feeds information to a Stormwater Control Centre allowing the SMART project to decide in which operating mode the tunnel has to operate.

The overall cost of the project was around US\$ 514 million, one third provided by the private side, and the remaining provided by the public side of the PPP.

The 40-years concession accompanied by the toll fee⁷⁴ of 2 Malaysian Ringgits (US\$ 0.64) charged to some 30,000 cars that use the tunnel every day, will allow to recover the original investments made by the JV and the maintenance costs of the SPV.

Finally, a number of unique features, like air quality monitoring, safety and surveillance measures, emergency and medical equipment, are incorporated in the project leading to a facility which is a first of its kind and needed a new level of engineering.

Conclusions

PPP has been traditionally and extensively used in the transport sector all over the world. Transport infrastructures represent one of the main development factors of a nation and, as discussed earlier, a natural playground for PPPs.

⁷³ <http://smarttunnel.com.my/operational-modes/>

⁷⁴ The toll fee was set by the Economic Planning Unit and, at the time of writing, is still set at the same rate. The Economic Planning Unit and the Cabinet must approve all toll fee increases prior their introduction by the SPV.

More in particular the (toll) road sector has been recognised to fit very well in a PPP scheme, and to represent an active class of assets for some time in the near future, at least at EU level (Bain, 2009). However, in the developing world, two of the main issues usually linked to the development of a toll-based PPP - accuracy of traffic forecast and willingness-to-pay - shall be carefully taken into account, when deciding to promote a new project.

In the case of the SMART project, the development of a toll motorway appeared not to be an issue. Kuala Lumpur is the cultural, financial and economic centre of Malaysia, and is one of the fastest growing economic centre of South East Asia. Furthermore the project had two very clear objectives, both perceived of a great importance for the inhabitants: it contributes to prevent (or at least mitigate) the flash floods in the Kuala Lumpur city centre, and relieves the city of the traffic congestion.

The revenues coming from the toll charges, has been able, not only to reduce the overall cost of the project, but to attract the private investment and ingenuity in a long lasting partnership with the public party. The SMART PPP project has been entirely financed by local private⁷⁵ and public resources without the intervention of the Multilateral or Bilateral Development Banks, thus representing an important example of “south-south” private-public cooperation.

Infrastructure investments play an important role among the climate change adaptation options. Both developed and developing countries face, on one side, the need of adapting existing infrastructures to the long-term impacts of climate change, on the other, the challenge to design and build a new infrastructure taking into account the future scenario and/or to design and build it so that it can be readily adapted and/or to design and build new infrastructural solutions to mitigate the adverse impacts of climate change. To put this into reality, the technological innovation and ingenuity are fundamental. Furthermore, especially

⁷⁵ Mott MacDonald UK entered in association with the local consultancy company as subcontractor of the JV

in the developing world (but not only), the difference between needed and existent infrastructures is well beyond the financial capacity of the public sector.

The SMART project brings *in se* a successful business idea and a successful financing model: the public side (and the willingness to find practical solutions to solve identified problems) and the private side (and its innovative thinking and high technology capacity) met each other to originate a clever, original, and inventive project, recognized as first of its kind at international level.

The successful implementation of the SMART PPP project has contributed to the development of a PPP national framework. The existence of a clear policy, legal and regulatory framework is of utmost importance in order to promote a strong response from the private sector and in order to replicate pioneering initiatives.

Urban water concessions in Cochabamba

Figure 48 Road blocks during 2000's protests in Cochabamba, Bolivia



Project name:

Aguas del Tunari concession

Type of Contract: Concession for rehabilitate, operate and transfer (ROT)

Sector: Water and sewage – water utility

Duration: 40 years

Year of financial closure: 1999 (project cancelled in 2000)

Climate change co-benefit:

None achieved. Expected: building resilience to current and future climate risks: improvement of access to water, reduction of water losses, increase awareness and improved cooperation at community level

Why did we choose this project as case study?

- It's an interesting case study of PPP failure that gained an international echo
- The PPP arrangements have been redesigned and corrective actions have been taken to promote a innovative public-private-community partnership model

The events

The 40-years concession for rehabilitate and operate the water services of Cochabamba, Boliva survived only 7 months.

The concession contract was signed on September 3rd, 1999 and the contract cancellation was announced on April 10th, 2000. During this time length a dramatic escalation of events occurred, with a final balance of six dead, 60 injured, more than 130 people imprisoned and the restoration of the *status quo* of the water services provision.

The municipal water utility, SEMAPA, *Servicio Municipal de Agua Potable y Alcantarillado*, was created in 1967 by a Presidential decree, as a decentralised public company. Since then the performance of the public utility, remained very poor both in terms of water availability and quality.

In 1997, SEMAPA was able to guarantee the water access only to 57% of the population, for few hours once or twice a week. The system was facing severe lack of maintenance and water losses, due to pipe leakages, were estimated around 50%, and the international quality standards for drinking water adopted at national level already in 1985 were still to be met ten year later (Nickson & Vargas, 2002). The un-served population was compelled to meet their demand drilling their own wells, or buying water from private vendors, the *tanqueros*, who brought poor quality water by trucks and sold it at excessive rate per litre, from three to five times higher than the rate fixed by SEMAPA.

To solve the water availability issue, the Misicuni Multipurpose Project (MMP) was identified as one of the best solutions already in the '60 but never realised due to its high investment costs and the difficulties encountered to secure adequate financing sources⁷⁶.

⁷⁶ The original design of MMP project included the construction of a 20 kilometres tunnel, a 120-meter-tall dam and a 120 MW hydroelectric power plant. The project was aimed to deliver drinking water to the municipalities in the Valley of Cochabamba and to provide water for the irrigation of 10 thousand hectares and for the generation of the hydroelectric energy. The investment foreseen was around US\$ 300 million and deemed to be financial unfeasible according to several studies including World Bank feasibility studies. The original project was redefined and replaced by the Corani Project a US\$ 90 million option envisaging the construction of a 11 kilometre tunnel and the expansion of an existing hydroelectric power plant. (Nickson & Vargas, 2002)

The overall situation was made more complex by a number of illegal connections and by the non-payments of large consumers from the public sector, leading to an unsustainable financial deficit of SEMAPA that had accumulated more than US\$ 35 million in debt (Bechtel, 2005).

To address all those problems the government launched a first call for bids in May 1997 in order to sign a public-private partnership contract for the management of the water services in Cochabamba. The tendering process promoted by the government was cancelled due to legal and political reasons. A second attempt was made in 1998, and the tender was advertised at the beginning of 1999. In the mean time, the national legislator passed the *Ley del Servicios de Agua Potable y Alcantarillado Sanitario*, the New Water Services Law, in order to create the institutional framework for PPPs in the water services sector and that significantly altered the institutional framework for water regulation.

With this new competitive bidding process, the government intended to meet short and long term objectives: to increase in the short term the overall financial and operating efficiency of the water services and to ensure the water availability in the long term including in the tender scope the construction of the MMP project.

Although ten companies had expressed their interest, only one consortium submitted a bid in April 1999, proposing some amendments to the terms of reference. According to the Bolivian law, a minimum number of three bids were necessary to assign the contract, and the bid was therefore declared null and void. Nevertheless a specific Supreme Decree made possible for the government to enter into direct negotiation with the only bidder.

The negotiations with the central government successfully ended in June and the PPP contract was signed on September 3rd 1999 between the following parties:

- Public side: the new established *Superintendencia Sectorial de Saneamiento Básico* (SSSB), the water regulator agency of Bolivia, created by the New Water Services Law⁷⁷.
- Private side: the *Aguas del Tunari* (AdT), a consortium led by the UK-based company International Water Ltd⁷⁸. (IWL) (55%) and having as partners the Spanish *Abengoa Servicios Urbanos* (25 %) and four Bolivian companies (5% each)⁷⁹.

Beside the expansion and service coverage targets defined in Table 10, the contract established the following conditions:

- The construction of the Misicuni dam, redesigned to reach the lower cost of US\$ 214 million⁸⁰, to be completed by the second year of contract.
- The SEMAPA accumulated debt to be repaid by AdT.
- The construction of a new treatment plant, judged too costly and unnecessary by the consortium.
- The renting of the fixed assets from SEMAPA and the acquisition of all the moveable assets of the municipal water utility.

⁷⁷ SSSB was empowered to grant, revoke, modify concessions and licenses, to approve tariff structures and price increases, to monitor water services performance, to intervene and sanction water companies, to promote competition and efficiency in the delivery of water services, and to act as a court of appeal in deciding consumer complaints. (Nickson & Vargas, 2002)

⁷⁸ At that time, IWL was owned by the US company Bechtel (50%) and the UK company United Utilities (50%). In November 1999, Bechtel announced an agreement with Edison, to take over the participation stake of United Utilities.

⁷⁹ *Constructora Petricevic* (COPESA), *Sociedad Boliviana de Cemento* (SOBOCE), *Compania Boliviana de Ingenieria* and *ICE Agua y Energia S.A*, a major local contractor.

⁸⁰ The original 120-metre-tall dam was reduced to 90 metre, and the electricity generation reduced from 120 to 40 MW.

Table 10 AdT targets, 2000-2039

	2000	2001	2002	2004	2009	2014	2019	2024	2029	2034	2039
New water connections	3850	11800	33600	57600							
Water supply (%)	-	-	-	90%	91%	93%	95%	97%	99%	100%	100%

Source: adapted from (Nickson & Vargas, 2002)

All the above-mentioned conditions were forcing AdT to reflect a considerable amount of new costs in its tariff package.

Eventually, in order to guarantee the financial viability of the contract, the central government, agreed on the following conditions, which soon became the immediate causes of the conflict:

- To approve a redefinition of the current SEMAPA's tariff structure, which was nevertheless affected by strong pricing inequities.

The new approved tariff structure, called Increasing Tariff Block (IBT), was published in September 1999 and effective from January 1st 2000. The agreed increase of the tariffs was equal to 35%, and it was calculated in order to guarantee a regulated rate of return of 16%⁸¹ on the capital investments established by the contract, in particular the investments related to the MMP.

- To grant AdT the exclusive rights of water resources and water provisions in Cochabamba.

The consortium finally began the operations at the beginning of November 1999 when the contract entered into force, after the passage of the New Water Services Law.

In the first two months of operations, thanks to immediate technical enhancements and leakages repair, AdT increased the water supply by 30%, and introduced

⁸¹ According to the bidder, a 16% rate of return was common for utility contracts in developing and high-risk countries and was in line with the requirements applied by the International Financial Institutions. (Bechtel, 2005).

education program on water conservation engaging the community, but, in mid-January 2000, the first protests against the contract emerged.

Two main groups were acting as consumers advocate: the *Comité Cívico* and the *Coordinadora del Agua y de la Vida*. The first was a local long-established association representing the business interests and asking for a revision of the contract; the latter was a new-established more radical group which embraced other interest groups, like the *tanqueros*, and the large-scale growers, the *regantes*, calling for the cancellation of the contract.

Although the agreed increase was equal to 35% the introduction of the IBT led to highly differentiated increases along the four categories. According to the IBT, the residential customers, that covered the 80% of total consumers⁸², were classified in four categories, each category with progressive rates applied to the fixed and flexible charges (see Table 11). As shown in Table 11, small consumers experienced a maximum increase of around 14% according to their consumption, while the highest hikes were reserved to high-income customers and large consumers. The new tariff structure was, at the end, socially progressive.

Nevertheless, the improved water availability that was immediately achieved by AdT induced in many cases higher water consumption; hence the increase in the water invoices was the result not only of the tariff increase but also of the higher consumptions.

Furthermore as shown in Table 12, the IBT was strongly threatening the interest of the *tanqueros* market, much more expensive especially for the poorest part of the population.

⁸² Commercial and industrial users made up the remaining 20% of all customers.

Table 11 AdT Increasing Block Tariff (IBT)

Consumer categories	Monthly consumption (cubic meters)	Monthly invoice BEFORE	Monthly invoice AFTER	Difference
Residential 1 (empty lots, houses under litigation)	1-12	10.5	10.8	2.9%
	13-15	11-12	11.8-13.6	7.3%-13.3%
Residential 2 (Poor housing – 2 rooms)	1-12	18.5	18.2	(1.6%)
	13-16	19.5-22	19.9-25.1	2.1%-14.1%
Residential 3 (Economy)	1-12	32.5	29.1	(10.5%)
	13-25	33.5-46	31.5-59.8	(6%)-30%
Residential 4 (Luxury)	1-12	52.5	51.9	(1.1%)
	13-25	54-69	55-92.3	1.9%-33.8%
	26-50	71.5-104	95.7-175.8	33.8%-69%

Source: (Bechtel, 2005)

Note: Prices in Bolivianos (1 Bolivianos to 1 US\$); negative differences in brackets

Table 12 Comparison of water prices applied by AdT and the *tanqueros*

Consumer categories	Typical monthly consumption (cubic meters)	Aguas del Tunari average price per cubic metre	Price of trucked water for 1 cubic metre or more	Price of trucked water for 1 200-liter drum
Residential 1 (4% of all customers)	Less than 12	0.9		
Residential 2 (29.6% of all customers)	14	1.6		
Residential 3 (30.3% of all customers)	17	2.4	10 per cubic metre	18 per cubic metre
Residential 4 (16.5% of all customers)	25	3.7		

Source: (Bechtel, 2005)

Note: Prices in Bolivianos (1 Bolivianos to 1 US\$)

The intensification of the protest induced the central government to sign, on February 3rd, an agreement with the *Comité Cívico* to reduce the tariff increase to 20%, nevertheless the protest continued, and, with the Resolution of February 10th, the central government rolled back the tariff increase. In April the *Coordinadora del Agua y de la Vida* called the population for the “final battle” against the contract; the martial law was declared for 13 days; Aguas del Tunari refunded the already paid bills and the personnel abandoned their office. On April 10th the SSSB announced the cancellation of the contract.

During the concession period AdT invested US\$ 10 million and paid around US\$ 1 million debt accumulated by SEMAPA.

The dispute arisen between the Government of Bolivia and AdT was finally settled in December 2005, with the following statement:

“The concession was terminated only because of the civil unrest and the state of emergency in Cochabamba and not because of any act done or not done by the international shareholders of Aguas del Tunari.” (Bechtel, 2005)

Today, the water services in Cochabamba are managed by a new PPP. In December 2004, SEMAPA formed a new partnership, the *Agua para Todos*. This partnership can be seen as a strategic alliance between the local public water utility, SEMAPA, a private consortium (*Agua Tuya/Plastiforte*), the local communities and CIDRE and Pro-Habitat, two non-profit micro-credit foundations, with the support of UNDP.

The private consortium works in a strictly coordinated manner with the local communities to identify the water demand and the design of secondary water systems providing water access to the area unserved by the principal water system of the municipal utility. After having designed the project the partnerships work with Municipality of Cochabamba in order to identify the financial sources for the project. The secondary systems are developed under the technical supervision of SEMAPA, which will then ensure the connection with the primary system. The communities are not only involved in the planning and design phase but they also contribute directly with their labour or with micro-credit loans.

After 5 years of implementation of the partnership 25,000 people had access to modern water services.

Agua para Todos won the 2005 SEED⁸³ award with the following reason:

The municipal water company, a private consortium, the local community and a non-profit foundation form an entrepreneurial partnership to greatly extend access to affordable water in peri-urban areas of Cochabamba, Bolivia.

Conclusions

The *Aguas del Tunari* concession has been labelled as “ill-fated PPP” (UNSSC and NCPMP, 2008) or, as stated by Menahem Libhaber, the Principal Water and Sanitary Engineer for the World Bank, as a “forecasted failure” (Bonnardeaux, 2009).

Without any doubt the AdT project has been unsuccessful in achieving any goal, nevertheless it can teach us very important lessons.

Inadequate institutional capacity in managing the entire PPP process, lack of communication with all stakeholder parties, and too ambitious objectives were the main components of this failure.

All of them were later successfully addressed by the new partnership, *Agua para Todos*.

The first issue that emerge from the analysis of this case study is the lack of coordination among the public authorities, and especially between the central government and the SSSB. The institutional framework introduced by the new law, was not consolidated: although the New Water Services Law had assigned clear responsibilities to the sectorial agency, the negotiations of the contract were carried out directly by a central government’s team, and the SSSB demonstrated a weak regulatory capacity owing to budget constraint and unskilled staff (UNSSC

⁸³ SEED is an initiative founded by UNEP, UNDP and IUCN. Through an annual, global awards scheme SEED finds and reveals a wealth of novel ways of doing business. An international jury of experts selects and recognises the most promising and innovative start-up social and environmental entrepreneurs working in partnership in developing countries. (<http://www.seedinit.org>)

and NCPPP, 2008). Furthermore additional uncertainty was added by the decisions over the tariff settings during the conflict, made by the central government leaving a little role to the agency.

The IBT, at the end, was a socially progressive tariff, opposite to the former tariffs applied by the municipal water utility, which envisaged high discounts to large consumers, without any form of financial aid for the most disadvantaged people. Nevertheless all parties perceived it simply as a “tariff increase”. Even though the contract had been published in the press, a communication campaign informing on the PPP arrangements and objectives had not been carried out by the government, the municipality or the SSSB. The increase of tariffs was introduced because of the investment in the Misicuni dam, aiming to solve in the long-term the water scarcity in the valley, but the final objectives of the PPP had not been disseminated neither prior nor after the contract signature. More in general, since the government, after the failure of the competitive bidding, went to a direct negotiation with AdT, the PPP contract was perceived as a “close door” negotiation, generating the suspect of pursuing very special foreign interest⁸⁴. In other words, very little attention and sensibilities, by both parties, were demonstrated in creating the most conducive environment to the introduction and implementation of the PPP.

If the existence of a sound political, legal and institution environment is crucial for the success of a PPP, another important element is of course the contract itself, and its terms and conditions. In the case of Cochabamba, the contract was non-viable from the financial point of view (see note 76). Since the beginning, the contract conditions appeared too risky for the private side that essentially did not participate to the competitive bidding. The conditions were only little reviewed during the direct negotiations, and the IBT was introduced in order to guarantee a high rate of return to AdT to counterbalance the excessive requirements made by the government.

⁸⁴ We of course must take into consideration the wider macro-economic context in which the protest erupted. It was a period of high social unrest in the country, with a growing opposition to the neo-liberal economic strategy.

But the problem arose in the origination phase of the PPP: the objectives that the government wanted to achieve through the PPP were simply too much. The PPP project selection and preparation was not accompanied by a sound need analysis, and linking the construction of the dam with the rehabilitation and expansion of the water services maybe has been the original sin of this PPP.

Conclusions and recommendations

There is a vast literature on PPP's management principles on one side, and a huge literature is merging on the climate finance needs. Nevertheless, literature on climate financing is mainly related either to assess the financing gap to achieve carbon-dioxide stabilisation scenarios, or to understand / assess the current contribution made by the public institutions. Tracking the private component remains a grey zone, and there are no common agreed standards to elaborate comprehensive figures. However, if we exclude the today mature discussion on the Kyoto Protocol market based mechanisms, only limited efforts have been made to investigate existing business models capable to attract the private party into investment activities, characterised by high public interest and higher business risk, like the climate mitigation and adaptation projects.

The PPP business model, by its nature, brings private and public parties together in a long-term formal union, where both parties cooperate during the whole life of the project. Such form of cooperation therefore represents a good framework in order to involve the private sector (usually acting with a shorter time frame) in climate related investments that require a long-term perspective.

Despite its long history and due to its complex nature, no uniform definition exists in order to demarcate a PPP from other forms of cooperation between the public and private parties. For the sake of this study, we adopted a "functional" definition, which helped us to investigate the possible forms of this cooperation and the typical relationships among its main partners. We also set boundaries for the climate mitigation and adaptation activities and investigated if common agreed standards exist to track the climate finance flow and the private climate finance flow.

We used the World Bank managed PPIAF database as our primary source of information concerning existing private participation in infrastructure investments

in developing countries. We analysed a representative sample of 4324 PPP projects, extracted in accordance with the agreed definition, and operating in sectors that are affected by climate mitigation and adaptation policies, such as the energy, water and transport sector.

- The analysis performed of the two decades panel data presented global evidence that international climate agreements are among the key drivers of PPP energy investments in developing countries.
- In particular, the energy sector represents an important arena for the PPP private players; these, in turn, can represent an important resource for the policy makers involved in the deployment or in the definition of a developing country climate agenda.
- On the contrary, PPP investments in water and transport infrastructures appeared not stimulated by the implementation of the Kyoto Protocol.
- However, the case studies in the respective sectors showed the unlocked potentials of well-managed PPP projects in terms of contributing to climate adaptation objectives.

For each sector we selected a best case study, each of them highlighting specific features leading to success. We then added a worst-case analysis in the water sector, which nevertheless turned out after few years in a learning platform for the local authorities.

The analysis of the case studies added further relevant thoughts to the data analysis and helped us to formulate following recommendations:

Mainstreaming the climate change issue

Why speaking about climate PPPs? We showed that the PPP model is already part of the adopted solution when referring to infrastructure investments. In an ideal context, climate change issues should therefore, be simply mainstreamed. Long-term investment policies such as national infrastructure investment plans or national development policies may effectively incorporate climate change

considerations within the decision-making variables – as it is already happening in some developed country, like UK. Nevertheless, especially when referring to the developing countries, the “perfect” mainstreaming could conceal the climate change objectives from the notice, thus losing the capacity to attract financial resources locked for the climate agenda.

Mainstreaming the climate change issues shall be seen as the ultimate stage of climate change awareness.

Integration of climate and PPP practices

MDBs, development finance institutions and PPP expertise centres play an important “marketing” role in implementing PPPs in developing and emerging nations. They are also at the front-line in their role of advisers, long-term finance provider and promoters of a sound investment environment for climate related activities, directly or through their participation in climate funds. Still, there is small emphasis on the contribution to climate change adaptation and mitigation policies that can be provided through the adoption of a PPP model. More integration among the climate and PPP practices already existing would be desirable.

Implementation of databases

Following the adoption of transparency principles, a number of databases are today available tracking the development finance institutions activities, highlighting either their role as private investment stimulus, or as climate investment stimulus. A better integration of databases, and the creation of a specific climate PPPs focus would help future research and dissemination of lessons learned.

Ad-hoc climate change PPPs

Policy makers shall promote the right investment for the right objective. In general focusing investment promotion on a few sectors attracts more resources. Policy makers shall work out the ultimate objectives they want to achieve bearing in mind that one cannot serve all. Ad hoc sector oriented climate change PPPs

promotion should be adopted by governments and PPPs focal points in order to take advantage of most promising sectors. Furthermore, the formal development of climate change action plans can help in identifying and prioritizing the climate objectives per sector that can be achieved through the PPP model. The development of National Adaptation Plans (NAPs) or National Appropriate Mitigation Actions (NAMAs) can be the right actions for calling the private sector's contribution to the public interest, providing them with a portfolio of possible PPP projects.

Targeting success areas

The climate action is calling developed and developing countries to change their development model, adopting new and sometimes innovative solutions. If mitigation recalls the adoption of new technologies, adaptation recalls a pure sense of ingenuity. In both cases the private party can bring in the partnership the right skills and expertise to put needs into reality.

The case studies reinforced the evidence on the PPP ability to catalyse the private investment in high technology projects. However, the sustainability of a business model largely depends on the ability to demonstrate benefits on-the-ground. When prioritizing a list of actions it is important to first target those areas that will quickly and easily demonstrate success. This will help to build the right investment environment for the future more innovative initiatives. CDMs can serve as example in the climate context.

Climate does not change PPPs governance rules

As stated at the beginning of this study, the literature on good governance of a PPP is vast. It is therefore outside the scope of this work to discuss the main success or failure factors of a PPP. However, it is noteworthy to recall that pursuing climate change objectives through the adoption of a PPP, will not alter the PPP good governance rules. Setting an effective PPP framework made of a sound, legal, regulatory and institutional environment remain essential. The private party is traditionally able to pick the business opportunities, as soon as they appear available, nevertheless building the right perception is crucial: the

proposed climate PPP project shall be perceived as part of a formal, transparent and predictable selection, evaluation, implementation and monitoring process.

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⁸⁵ The world's six largest multilateral development banks issued a statement on June 19 2012, about their commitment to the Rio+20 agenda for sustainable development and inclusive green growth.

⁸⁶ The Framework is based on six action areas, each addressing both adaptation and mitigation:

- (1) Support climate actions in country-led development processes;
- (2) Mobilize additional concessional and innovative finance;
- (3) Facilitate the development of market-based financing mechanisms;
- (4) Leverage private sector resources;
- (5) Support accelerated development and deployment of new technologies; and
- (6) Step-up policy research, knowledge and capacity building.

The DCCSF Technical report Annex 5 includes Regional profiles with key issues, impacts, emission sources and lending profiles by regions.

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Case studies reviewed

PPIAF Mitigation PPPs

2012 PPIAF Support to Private Sector Participation in the Gas Distribution Sector in Bulgaria (Impact Story)

2011 PPIAF Promotes the Development of Modern Off-Grid Lighting Enterprises in Africa (Impact Story)

2011 Options Assessment for Structuring and Financing new Hydropower in Papua New Guinea PPIAF-funded reports

2008 Taking a Holistic Approach to Planning and Developing Hydropower: Lessons From Two River Basin Case Studies in India (Case Study)

2006 Feed-in Tariffs for Small Hydro Power Plants in Macedonia PPIAF-funded reports

Case studies from PPIAF Norwegian Agency for Development Cooperation (NORAD)-funded climate change non-core trust fund in Sub-Saharan Africa.

- 2011 *Armenia Development of Financing Mix and Financing Plan for the Loriberd Hydropower Project (Pioneering transaction)*
- 2011 *Tajikistan PPA Strengthening to Support Private Hydro Power Plant Investments (Pioneering transaction)*
- 2011 Lessons Learned from PPIAF Activities: Public-Private Partnerships and Nationally Appropriate Mitigation Actions in Jordan

PPIAF Adaptation & DRR PPPs

2012 PPIAF Support to Private Sector Participation in the Irrigation Sector in Ethiopia (Impact Story)

2010 Making Transport Climate Resilient in Ethiopia (Case Study)

2010 Making Transport Climate Resilient in Ghana (Case Study)

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2001 An Action Plan to Promote Private Sector Participation in the Provision of Disaster-resilient Infrastructure in Bangladesh PPIAF-funded reports

Case studies from the Clean Technology Fund project portfolio:

200 MW Wind Farm in the Gulf of Suez (CTF/AfDB)

MOROCCO: Ouarzazate Concentrated Solar Power (AfDB/WB)

South Africa: ESKOM Renewable Support Project /Wind and CSP (AfDB/WB)

[Case studies from the Strategic Climate Fund for Low Income Countries- SREP](#)

KENYA: Menengai Geothermal development Project

[Case studies from IFC](#)

INDIA Azure Rooftop (IFC)

INDIA Chennai's Green Metro O&M PPP contract (IFC)

INDIA Khandwa Water Supply Augmentation Project (IFC)

EGYPT New Cairo Wastewater Treatment Plant (IFC)

Morocco: Guerdane Irrigation (IFC)

Zambia Chanyanya Irrigation Development and Support Project (WB/IFC)

[Case studies from the PPI Database](#)

Metro Manila Water Concessions

Aguas del Tunari concession

Appendix A - The World Bank and PPIAF Private Participation in Infrastructure Project Database

The PPI project database offers a collection of more than 6000 infrastructure projects in developing countries. Its purpose is to identify and disseminate information on private participation in infrastructure projects in low- and middle-income countries, as classified by the World bank, recording data on the contractual arrangements used to attract private investment, the sources and destination of investment flows, and information on the main investors. If a project meets all the criteria described in the Methodology paragraph, the project is categorized and entered based on more than fifty different fields. The table below provides an overview of those fields and the degree of availability of the data for each field, specifically computed for the sample we considered in this work.

The second table provides the details of the projects that are recorded in the PPI database and that we analysed as case studies.

PPI Database Fields	% of available data
Crossborder	100.00%
New or Additonal	100.00%
Project ID	100.00%
Region	100.00%
Country	100.00%
Income Group	100.00%
IDA Status	100.00%
Financial Closure Year	100.00%
Financial Closure Month	100.00%
Project Name	100.00%
Related Names	64.19%
Type Of PPI	100.00%
Subtype Of PPI	100.00%
Project Status	100.00%
Primary Sector	100.00%
Secondary Sector	100.00%
Subsector	100.00%
Segment	100.00%
Location	78.08%
Contract Period	53.44%
Termination Year	51.61%
Publicly Traded	100.00%
Stock Exchange	100.00%
Multiple Systems	100.00%
Number Of Systems	25.44%
Captive Facility	100.00%
Share Percent	0.64%
Govt Granting Contract	100.00%
Type Of Govt Support	5.38%
Investment Year	100.00%
Percent Private	91.39%
Govt Payment Commitments	81.71%
Physical Assets	91.42%
Total Investment	100.00%
Total Investment CPI	100.00%
Gov Cash Assist	8.12%
Date Status Updated	19.46%
Capacity Type	79.23%
Capacity	78.12%
Capacity Year	100.00%
Technology	100.00%

Contract History	3.79%
Related Projects	11.82%
Bid Criteria	76.43%
Award Method	34.34%
Number Of Bids	15.06%
Number Renewal Bids	7.14%
Sponsors	99.88%
Multi Lateral Support	19.55%
Revenue Source	47.82%
Renewal Bid Criteria	7.91%
Renewal Award Method	8.25%
Is Renewable Energy	100.00%
Development Stage	100.00%
Commissioning Date	5.00%
Exp Load Factor	1.92%
Exp Annual Production	1.88%
Grid Emission Factor	1.88%
Exp Annual GHG Avoided	1.88%
Carbon Credits	5.92%
Funding Year	1.80%
Private Funding	1.24%
Public Funding	0.16%
Govt Funding	0.71%
Bank Local Funding	1.22%
Donor Funding	0.80%
Debt Equity Grant Ratio	1.20%
Equity Funding Private Sources	0.99%
Is PPP Project	1.78%
PPP Type	1.60%
Related Infrastructure By Govt	0.03%
Concession Period Type	1.34%
Key Features Of Revenue Cost	0.94%
Key Features Of Guarantee	0.06%
Total Cost Of Public Project	0.01%
Is PPP Part of Public Project	1.74%
Project Banks	1.22%

The Metro Manila Water Concessions, the Ouarzazate Concentrated Solar Power Station and Cochabamba Case Studies as recorded in the PPI Database

PPI DB Fields	Aguas del Tunari	Ouarzazate CSP	Metro Manila Water Concessions						
			No	No	No	No	No	No	No
Cross border	No	No	No	No	No	No	No	No	No
New or Additional	New	New	New	Additional	Additional	New	Additional	Additional	New
Project ID	2278	6557	659	659	659	3871	3871	3871	3907
Region	Latin America and the Caribbean	Middle East and North Africa	East Asia and Pacific	East Asia and Pacific	East Asia and Pacific	East Asia and Pacific	East Asia and Pacific	East Asia and Pacific	East Asia and Pacific
Country	Bolivia	Morocco	Philippines	Philippines	Philippines	Philippines	Philippines	Philippines	Philippines
Income Group	Lower middle income	Lower middle income	Lower middle income	Lower middle income	Lower middle income	Lower middle income	Lower middle income	Lower middle income	Lower middle income
IDA Status	Blended	Non-IDA	Non-IDA	Non-IDA	Non-IDA	Non-IDA	Non-IDA	Non-IDA	Non IDA
Financial Closure Year	1999	2011	1997	1997	1997	1997	1997	1997	2006
Financial Closure Month	October	November	May	May	May	May	May	May	December
Project Name	Cochabamba Water and Sewer System	Ouarzazate Solar Phase I	Manila Water Company	Manila Water Company	Manila Water Company	Maynilad Water Services	Maynilad Water Services	Maynilad Water Services	Maynilad Water Services Inc (second concession)
Related Names	Aguas de Tunari		Manila Metropolitan Waterworks and Sewerage System (East Zone)	Manila Metropolitan Waterworks and Sewerage System (East Zone)	Manila Metropolitan Waterworks and Sewerage System (East Zone)	MWSI, Manila Metropolitan Waterworks and Sewerage System (West Zone)	MWSI, Manila Metropolitan Waterworks and Sewerage System (West Zone)	MWSI, Manila Metropolitan Waterworks and Sewerage System (West Zone)	
Type Of PPI	Concession	Greenfield project	Concession	Concession	Concession	Concession	Concession	Concession	Concession
Subtype Of PPI	Rehabilitate, operate, and transfer	Build, operate, and transfer	Build, rehabilitate, operate, and transfer	Build, rehabilitate, operate, and transfer	Build, rehabilitate, operate, and transfer	Build, rehabilitate, operate, and transfer	Build, rehabilitate, operate, and transfer	Build, rehabilitate, operate, and transfer	Build, rehabilitate, operate, and transfer
Project Status	Canceled	Under development	Operational	Operational	Operational	Canceled	Canceled	Canceled	Operational
Primary Sector	Water and sewerage	Energy	Water and sewerage	Water and sewerage	Water and sewerage	Water and sewerage	Water and sewerage	Water and sewerage	Water and sewerage
Secondary Sector	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

PPI DB Fields	Aguas del Tunari	Ouarzazate CSP	Metro Manila Water Concessions						
			Utility	Utility	Utility	Utility	Utility	Utility	Utility
Subject or Segment	Water utility with sewerage	Electricity generation	Water utility with sewerage	Water utility with sewerage	Water utility with sewerage	Water utility with sewerage	Water utility with sewerage	Water utility with sewerage	Water utility with sewerage
Location	Cochabamba	Ouarzazate	Manila (East)	Manila (East)	Manila (East)	Manila (West)	Manila (West)	Manila (West)	West part of Metro Manila
Contract Period	40	25	25	25	25	25	25	25	30
Termination Year	2000	2039	2037	2037	2037	2005	2005	2005	2037
Publicly Traded	No	No	Yes	Yes	Yes	No	No	No	No
Stock Exchange	N/A	N/A	Local	Local	Local	N/A	N/A	N/A	N/A
Multiple Systems	No	No	No	No	No	No	No	No	No
Number Of Systems						1	1	1	1
Captive Facility	No	No	No	No	No	No	No	No	No
Share Percent									
Govt Granting Contract	Local	Federal	Federal	Federal	Federal	Federal	Federal	Federal	Local
Type Of Govt Support		Payment Guarantee							
Investment Year	1999	2011	1997	2005	2007	1997	2002	2005	2006
Percent Private	100	75	100	100	100	100	100	15	100
Govt Payment Commitments	0	Not Available	222	0	0	846	0	0	56.7
Physical Assets	320	1000	2720	0	0	3690	0	0	447.2
Total Investment	320	1000	2942	0	0	4536	0	0	503.9
Total Investment CPI	432.15	1000	4122.65029	0	0	6356.336408	0	0	562.26
Gov Cash Assist		Not Available							
Date Status Updated	01/04/00					01/04/05	01/04/05	01/04/05	
Capacity Type	Population (thousands)	MW	Number of connections (thousands)	Number of connections (thousands)	Number of connections (thousands)	Number of connections (thousands)	Number of connections (thousands)		Number of connections (thousands)

PPI DB Fields	Aguas del Tunari	Ouarzazate CSP	Metro Manila Water Concessions						
Capacity	558	160	325	600	986	499	573		537
Capacity Year	1999	2011	1997	2005	2007	1997	2002	2005	2006
Technology	N/A	Solar, CSP	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Contract History			Contract renewal	Contract renewal	Contract renewal				Reawarded after cancellation
Related Projects									3871
Bid Criteria		Not Applicable	Lowest tariff	Lowest tariff	Lowest tariff	Lowest tariff	Lowest tariff	Lowest tariff	Highest new investment
Award Method	Direct negotiation	Competitive bidding	Competitive bidding	Competitive bidding	Competitive bidding	Competitive bidding	Competitive bidding	Competitive bidding	Competitive bidding
Number Of Bids		4	4	4	4	4	4	4	3
Number Renewal Bids		Not Applicable							
Sponsors	Edison International SpA (Italy) (25% / Italy), Bechtel (25% / United States)		Ayala Corp (44% / Philippines)	Ayala Corp (44% / Philippines)	Ayala Corp (44% / Philippines)	Benpres Holdings (60% / Philippines), SUEZ (31% / France)	Benpres Holdings (60% / Philippines), SUEZ (31% / France)	Benpres Holdings (60% / Philippines), SUEZ (31% / France)	DM Consunji Inc. (42% / Philippines), First Pacific (42% / Hong Kong, China), SUEZ (16% / France)
Multi Lateral Support		EIB (Loan / \$97 Million / 2011), AFDB (Loan / \$314 Million / 2011), IBRD (Loan / \$297 Million / 2011)	IFC (Loan / \$30 Million / 2003), IFC (Equity / \$15 Million / 2004), IFC (Loan / \$30 Million / 2004), IBRD (Loan / \$65 Million / 2005), IFC (Loan / \$30 Million / 2006)	IFC (Loan / \$30 Million / 2003), IFC (Equity / \$15 Million / 2004), IFC (Loan / \$30 Million / 2004), IBRD (Loan / \$65 Million / 2005), IFC (Loan / \$30 Million / 2006)	IFC (Loan / \$30 Million / 2003), IFC (Equity / \$15 Million / 2004), IFC (Loan / \$30 Million / 2004), IBRD (Loan / \$65 Million / 2005), IFC (Loan / \$30 Million / 2006)	EIB (Loan / \$55 Million / 1998), ADB (Loan / \$45 Million / 1999), ADB (Syndication / \$126 Million / 1999)	EIB (Loan / \$55 Million / 1998), ADB (Loan / \$45 Million / 1999), ADB (Syndication / \$126 Million / 1999)	EIB (Loan / \$55 Million / 1998), ADB (Loan / \$45 Million / 1999), ADB (Syndication / \$126 Million / 1999)	
Revenue		Purchase							User

PPI DB Fields	Aguas del Tunari	Ouarzazate CSP	Metro Manila Water Concessions						
Source		agreements or transmission fees with public entity(ies)							fees
Renewal Bid Criteria			Not Available	Not Available	Not Available				
Renewal Award Method			Not Available	Not Available	Not Available				
Is Renewable Energy	Not Applicable	Yes	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Development Stage	Financial Closure	Advanced development/ awarded by government	Financial Closure	Financial Closure	Financial Closure	Financial Closure	Financial Closure	Financial Closure	Financial Closure
Commissioning Date		2014							
Exp Load Factor									
Exp Annual Production									
Grid Emission Factor									
Exp Annual GHG Avoided									
Carbon Credits		No							
Funding Year		2012							
Private Funding									
Public Funding									
Govt Funding									
Bank Local Funding									
Donor Funding									
Debt Equity Grant Ratio									
Equity Funding Private Sources									
Is PPP Project									

PPI DB Fields	Aguas del Tunari	Ouarzazate CSP	Metro Manila Water Concessions						
PPP Type									
Related Infrastructure By Govt									
Concession Period Type									
Key Features Of Revenue Cost									
Key Features Of Gurantee									
Total Cost Of Public Project									
Is PPP Partof Public Project									
Project Banks	No								