NOTA DI LAVORO

12.2012

Development Finance for Universal Energy Access

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Energy: Resources and Markets Series
Editor: Giuseppe Sammarco

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Summary

The United Nations General Assembly declared 2012 the "International Year of Sustainable Energy for All", officially recognising the urgent need to put energy at the centre of the global development agenda. In parallel, a strong international policy effort is being made to achieve the goal of universal energy access to modern energy services by 2030. To support these efforts, a dramatic scaling-up of financing to the energy sector will be required through official development aid, other official flows, climate financing and various private flows. In this paper we analyse the recent evolution of development policies and finance for the energy sector using both descriptive and analytical tools. We find that, although development finance for the energy sector rose considerably during the past decade, the financial flows have not been directed towards the countries with the lowest levels of energy access.

Keywords: Development Finance, Energy Policy, Energy Access

JEL Classification: F35, Q40, O20

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Abstract: The United Nations General Assembly declared 2012 the "International Year of Sustainable Energy for All", officially recognising the urgent need to put energy at the centre of the global development agenda. In parallel, a strong international policy effort is being made to achieve the goal of universal energy access to modern energy services by 2030. To support these efforts, a dramatic scaling-up of financing to the energy sector will be required through official development aid, other official flows, climate financing and various private flows. In this paper we analyse the recent evolution of development policies and finance for the energy sector using both descriptive and analytical tools. We find that, although development finance for the energy sector rose considerably during the past decade, the financial flows have not been directed towards the countries with the lowest levels of energy access.

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1. Introduction

In the last decade the centrality of energy for the economic, environmental and social dimensions of sustainable development has been widely recognised and, accordingly, energy issues have attracted greater attention by the international community (UNCSD, 2001), (World Bank, 2001) (UN-Energy, 2005) (IEA, 2011b).

Recently, the UN Secretary-General's Advisory Group on Energy and Climate Change (AGECC) recommended that the international community adopt the two complementary goals of:

1) Ensuring universal access to modern energy services by 2030
2) Reducing energy intensity by 40 per cent by 2030 (UN-AGECC, 2010).

A third goal of supplying 30% of energy demand from renewable sources by 2030 has also been discussed in international fora for possible inclusion to the next round of Millennium Development Goals (IISD, 2011). In addition, the UN General Assembly has approved a resolution establishing 2012 as the "International Year of Sustainable Energy for All". Energy issues likely will be central to the negotiations at the United Nations Conference on Sustainable Development (Rio+20) to be held in Rio de Janeiro in 2012 (UN, 2010a; UN, 2010b).

Access to modern energy services is very limited in many developing countries. The number of people lacking access to electricity is estimated to be roughly 1.3 billion, 44% of which are in sub-Saharan Africa and 22% in India. The number of people without clean cooking facilities is more than twice as large, 2.7 billion, or 39% of the world population (IEA, 2011b).

The objective of our analysis is to understand to what extent development finance is being committed to the countries with lower access to modern energy services,

and to what purpose, framing the analysis in the historical evolution of the international assistance for the sector.

Several authors have estimated the investments and financial resources required to achieve universal energy access (Bazilian et al., 2010b), (IEA et al., 2010), (World Bank, 2006) (UN-AGECC, 2010). Some of this literature found that existing energy sector investment flows are not sufficient to provide electricity service to those who currently lack access – even if all investment was to be directed toward expanding access (which will not be the case). The financing gap is considerable, especially for Least Developed Countries (LDCs) which have the lowest access rates and the greatest difficulty securing financing (Bazilian et al., 2011).

Development finance from bilateral and multilateral donors is an important source of resources for the energy sector, especially when and where other sources of financing like domestic savings, foreign direct investment and commercial loans are limited.

Despite the importance of the energy sector for developing countries (and in donors' policies and allocations) there exist few analyses of the characheristics of development finance for the energy sector: Tirpak and Adams have compiled details of bilateral and multilateral assistance for the energy sector to 2005, with a focus on renewable energy sources (Tirpak, Adams, 2008) and the OECD produced a short pamphlet presenting some statistics on energy aid (OECD, 2010). Neither of these studies take into account energy access levels.

To address some of the gaps in the literature, we:

- review historical trends in the allocation of international assistance to the energy sector and analyse how they have changed in the light of policy developments;
- compare the distribution of development finance for the energy sector with an indicator of access to modern energy services during the last decade; and

- describe the distribution of recent energy commitments by purpose, origin and destination.

For the analysis we use the most comprehensive project-level statistics available from the AidData.org database (Tierney et al., 2011) and compare the results with those obtained using data from the Creditor Reporting System (CRS) of the OECD.

The rest of the paper is divided into four sections: in the second section we discuss the methodology, indicators and datasets used; in the third we identify three main periods in the evolution of aid policies for the energy sector and their related financial commitments; in the fourth section we provide a detailed analysis of the development finance data for energy after 2000, after which we draw conclusions.

2 Methodology and Data Sources

2.1 Methodology

A large part of the aid literature explores the determinants of aid. Typically these studies involve multivariate analysis that attempts to relate each donor's aid commitments to a series of explanatory variables (e.g. GDP, poverty, commercial ties, colonial past, governance, geographical position and others) (e.g. (Alberto, Dollar, 2000) (Collier, Dollar, 2002) (Clist, 2011) (Berthélemy & Tichit, 2004) (Knack et al., 2010) (Hoeffler, Outram, 2008) (Dollar, Levin, 2006)).

Some studies examine the allocation of aid with respect to sectoral indicators: for example Thiele and others estimate the coherence of aid commitments to the MDGs using a set of Tobin models (Thiele et al., 2007); Pitt and others explore the coherence of aid for the health sector with health indicators using linear regressions with panel data (Pitt et al., 2010); Baulch utilizes concentration curves and Suits indexes to compare different donor's allocations with respect to selected MDG indicators (Baulch, 2006).

The use of multivariate regression is a very well established methodology to understand the motivations for the level of aid, but concentration curves are a tool

that we believe is better suited to examine the distribution of aid among recipient countries, providing a clear understanding of the share of aid committed to various quantiles of the reference population and, together with their numerical counterpart, Suits Indexes[1], permit a practical comparison of donor's behaviors.

Concentration curves and Suits indexes are often used to evaluate the distribution of international aid with respect to a specific "need indicator" (Koch, 2007) (Baulch, 2006) (Koch et al., 2007) (Cogneau, Lambert, 2006) (Suwa-Eisenmann, Verdier, 2007) (Gwatkin et al., 2005) (White, McGillivray, 1995) as well as in the analysis of health variables against an economic condition (O" Donnell et al., 2008).

Given that our objective is to examine the distributional aspects of development finance rather than donor's motivations, we follow the methodology used by Baulch (2006) and we compare development finance commitments with energy access levels using concentration curves and Suits indexes. However, in contrast with Baulch, we take into consideration only the development finance allocated to one sector (energy). Annex I provides a detailed explanation of Concentration Curves and Suits indexes.

2.1.1. Measuring energy access

There is a growing literature on defining and measuring access to modern energy services (e.g., (Bazilian et al., 2010a) (Pachauri et al., 2004) (Nussbaumer et al., 2011) (Practical Action, 2010) (Mirza, Szirmai, 2010) (IEA, 2010) (IAEA et al., 2005)).

For our statistical analysis, we need an indicator that a) has data for a large number of countries and b) is a clear measure of deprivation of access to modern energy services. There exist only two energy indicators with almost universal coverage: the share of population with access to electricity (electrification share) and the installed

[1] Suits indexes are a numerical counterpart of the concentration curves and vary between -1 and +1, with a Suits index of -1 representing finance allocated entirely to the countries with lower energy access, and vice versa. See Annex I for details.

capacity per capita [2]. Both indicators can be considered proxies of the level of energy development for low and middle income countries, although neither takes into account important factors like service reliability, prices, and access to clean domestic fuels and modern appliances. The two indicators are also clearly linked (Figure 1) and we note that all countries with high or universal access to electricity have an installed capacity greater than a threshold of 100-150 MW per million inhabitants. For our analysis we utilize the electrification share indicator because it is a much clearer indicator of deprivation and it is well suited to the calculation of concentration curves.

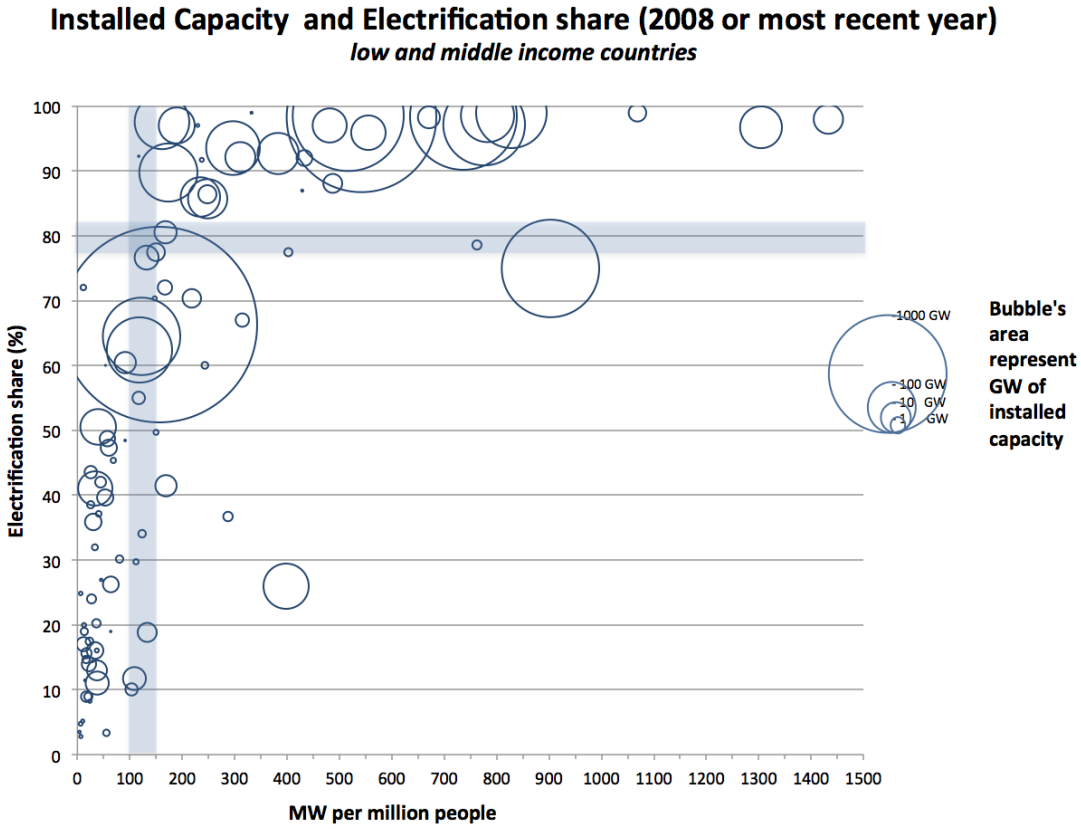

Figure 1 - Installed capacity per million people and electrification share, selected low and middle income countries. Data sources (IEA, 2011a) (World Bank, 2011)

[2] A more limited set of data is also available for the share of utilization of solid fuels and of improved cookstoves, (UNDP, 2009) but the data on aid activities for domestic fuel is very scarce.

2.2 Data sources and limitations

Development finance statistics are coded by sector and purpose[3]. We limit our analysis to the "Energy Generation and Supply"[4] sector that includes finance for the purposes of electricity production and distribution, gas and petroleum distribution, and energy policy and administrative management[5] (OECD, 2011) (OECD, 2010).

Some development finance also goes to the upstream fossil fuels and minerals mining sector [6] (2.2% compared of the total for energy generation and supply for 2000-2009). Although it is linked to the broader energy sector, it is not generally focused on expansion of energy access and thus is excluded from this analysis.

For similar reasons we have not included development finance for the "forestry for energy"[7] sector (forestry projects for the purposes of producing biomass for energy use). In addition, finance for this purpose is negligible (0.01% compared to the total financing for energy, 2000-2009).

We note that household energy use is not well represented in aid statistics. There are no codes to track aid activities with the specific purpose of raising the penetration and use of improved stoves. The "Biomass" code (0.3% of the total) includes both aid activities related to domestic fuels and biomass fuelled power plants. A search on the title and description of projects found fewer than 100 records (out of 774095) that included the word "stoves" in the title or in the long description and were related to the diffusion of improved cook stoves after 2000, including emergency aid. Adding other search keys yielded results in the same order of magnitude. Clearly further research is needed on the aid activities for household energy use.

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3 The projects are classified with a five – digit coding scheme: the first three digits indicates the sector and the remaing two the purpose.

4 CRS code 230

[5] Development Aid for the "Energy Generation and Supply" sector refers to the following CRS compatible purpose codes, 23000, 23005, 23010, 23020, 23030, 23040, 23050, 23061, 23062, 23063, 23064, 23065, 23066, 23067, 23068, 23069, 23070, 23081 and 23082 (OECD, 2008).

[6] Under the "Mineral resources and Mining" sector for the purposes of Coal (32261) and Oil and Gas (32262)

[7] CRS purpose code 31261

We use the dataset collected and distributed by AidData.org and the OECD - CRS data for comparison[8]. Appendix II presents a detailed comparison between the two datasets. If not otherwise specified, all data presented refers to (Official) Development Finance - (O)DF - that includes both Official Development Assistance – ODA - and Other Official flows - OOF - and is expressed at constant prices (2009) (OECD, 2008)[9].

The indicators for electrification rates and population without electricity access are taken from the IEA Energy Access Database and, when not available, from UNDP[10] (IEA, 2011a) (UNDP, 2009).

3. International donors' policies for the energy sector

Bilateral and multilateral donors have given assistance to the energy sector of developing countries since the 1940's[11]. Since that time, the modalities, scopes and funding committed to the sector have changed considerably, resulting from, *inter alia*, the complex interaction between the evolution of general aid policies, the transformation of the energy sector and the economic paradigm in both developing and developed countries (Barnett, 1993) (Bacon, Besant-Jones, 2002).

The influence of donors, and in particular the World Bank Group, has been much larger than solely financing the development of public infrastructure; it extended to

[8] We have utilized the most recent 2.0 AidData Research Release, updated in November 2011 and the full CRS dataset updated in July 2011.
[9] We refer to AidData figures as "Development Finance" rather than "Official Development Finance ODF" because AidData figures, unlike the OECD's, are not from official sources. The Difference between OECD ODF and AidData Development Finance is in large part due to additional donors / recipients in AidData, and to a different treatment of data, especially for multilateral financing. More details on the differences in Annex II.
[10] Energy Access Statistics are available only for lower- middle income countries, but development finance is allocated also to middle-higher income and transition economies. We have made the assumption that all OECD, Ex-Soviet Union, Arab States have full electricity coverage if not otherwise indicated (Albania, Armenia, Azerbaijan, Belarus, Bosnia-Herzegovina, Brunei, Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Georgia, Hungary, Israel, Kazakhstan, Korea, Kosovo, Kyrgyz Republic, Latvia, Lithuania, Macedonia FYR, Maldives, Moldova, Montenegro, Poland, Qatar, Romania, Russia, Saudi Arabia, Serbia, Singapore, Slovak Republic, Slovenia, Sts Ex-Yugo. Unspec., Tajikistan, Turkey, Turkmenistan, Ukraine, Uzbekistan).
[11] The first World Bank projects for the electricity sector in developing countries date back to the '40s http://go.worldbank.org/QEKNM08HO0. Bilateral donors declared electricity projects in developing countries since data began being collected, 1973. In 1980 the OECD set up a group of "Energy Correspondents" and initiated a dialoge on policy issues in aid for energy (Führer, 1996).

support for design of energy policies and market organization (Manibog et al., 2003). Despite the importance of the sector, bilateral and multilateral donors (and recipients) have not, until very recently, made (successful) attempts to coordinate energy sector assistance policies establishing shared objectives or modalities (Karlsson-Vinkhuyzen, 2010).

Still, we can identify an evolution of the assistance for the energy sector of developing countries. Taking into consideration the inflection points of the amounts and shares of finance committed, shown in Figure 2, we distinguish three broad periods of development assistance for the energy sector: until 1994, between 1994 and 2001, and afterwards. The underlying reasons for the changes in the aid policies of the main donors are discussed below.

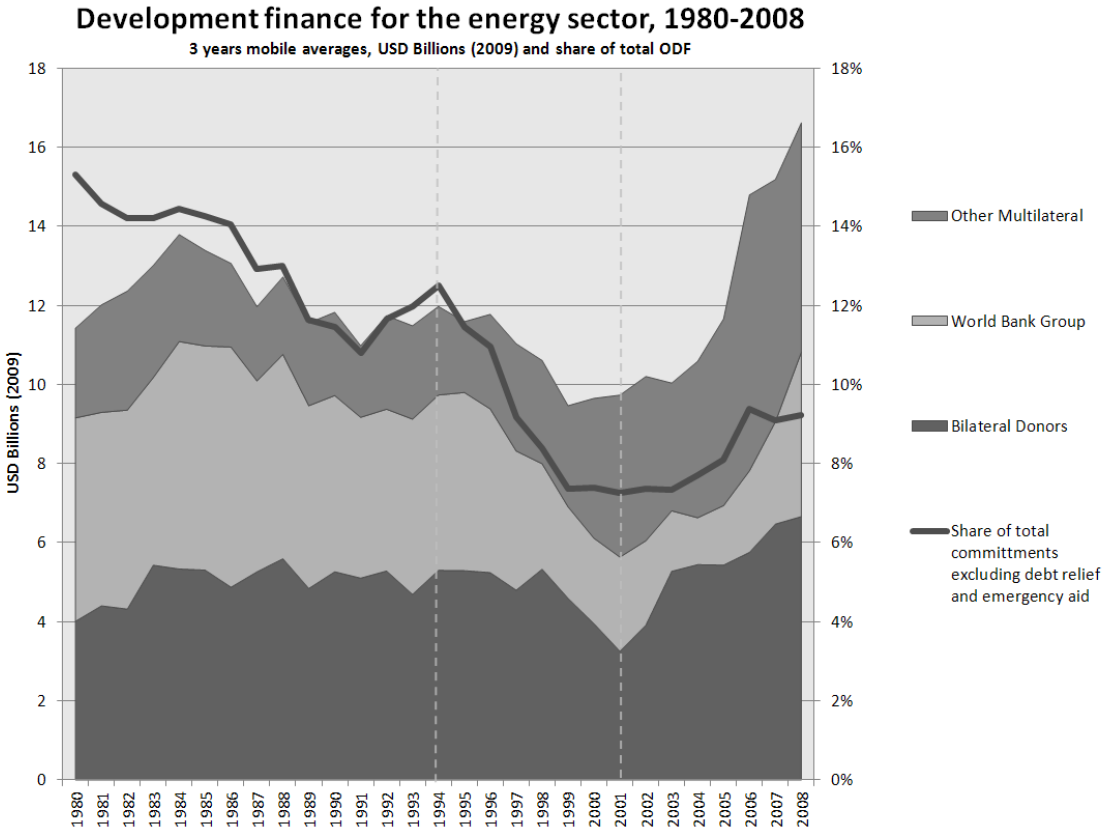

Figure 2 - Development Finance for the energy sector 1980-2008, USD (2009) billions and as a share of total development finance, 3 year moving averages.

During the first period we identify (1980-1994) the amount committed yearly to the energy sector of developing countries was relatively constant between 11 and 13 USD billion (2009$), representing between 11% and 15% of the total commitments[12]; at that time one third of the financing was provided by the World Bank Group.

The dominant model for the industry at the time was that of state-owned monopolistic utilities although - by the end of the eighties – some countries had begun to restructure their electricity sector and the World Bank started to reconsider the modalities of its energy financing (Sioshansi, 2006) (Munasinghe et al., 1988).

The second period we identify (1994-2001) is characterized by a rapid reduction in Development Finance – in particular from the WBG and bilateral donors - and by the contemporary worldwide diffusion of energy sector reforms (Helm, 2007) (Hogan, 2002).

The World Bank Group reduced its total commitments from more than 4 USD billion (2009$) in 1993 to less than 2 billion in 2000, due to the entry in force of a new lending policy that, starting from 1993, focused on creating the conditions for private investment rather than directly financing energy utilities[13] and also due to the then prevailing belief that efforts to expand energy access in rural areas were not repaying their costs (World Bank, 1995) (World Bank, 1993).

In this period the Bank concentrated up to 90% of its financing in countries that were implementing reforms[14] (Manibog et al., 2003), rapidly adopted by more than

[12] The OECD estimates that the coverage of Aid Statistics constantly improved over time, from 70% in the mid 90's to more than 90% in the '00s. The data related to the '80s therefore have to be used with caution (OECD), the same warning applies to the AidData database that is in large part based on OECD.

[13] The amount of private capital invested in developing countries rose considerably between 1990 and the Asian Financial Crisis of 1997 (albeit the private flows were concentrated in relatively few countries). After 1997 however private flows fell by 75% and never recovered, leaving many developing countries in this period with diminished investment for their energy sector, both from public and private sources (Besant-Jones, 2006).

[14] The World Bank Evaluation Department notes that the reform package evolved over time and it comprehended 7 main areas: (i) commercialization; (ii) corporatization; (iii) arm's-length regulation; (iv) unbundling; (v) private participation in production (greenfield and divestiture); (vi) private

80 developing and transition countries but not without encountering obstacles or criticisms that in some cases led to their reversal (Manibog et al., 2003) (Rosenzweig et al., 2004) (ESMAP, 2005) (Yi-chong, 2006) (Williams, Ghanadan, 2006) (Singh, 2006) (Voll et al., 2006) (Sioshansi, 2006) (Douglas, 2006) (Jamasb, 2006) (Prasad, 2008) (Gualberti et al., 2009).

The decrease of bilateral finance between 1994 and 2001 is linked both to internal developments inside Japan – the main bilateral donor[15] - and to the fact that policy changes at the World Bank have had a guidance effect on the behaviour of many bilateral donors (The Institute of Development Studies, 2003).

We identify a third period beginning in 2000-2001, when development finance again started to rise both in absolute terms and as a share compared of total (Figure 2).

Although these inflection points are not caused by a single event, we note that just after the establishment of the Millennium Development Goals (MDGs) – that ignored the energy theme - the international agenda rapidly expanded to include a multitude of initiatives that stressed the central role of access to modern energy services to reach the MDGs and reduce poverty (e.g. the 9th, 14th and 15th sessions of the UN Commission on Sustainable development, The World Summit on Sustainable Development in Johannesburg, with its implementation plan (JPOI) and its Partnerships, the formation of UN-Energy, the recommendations of the AGECC and the designation of the International Year of Sustainable Energy for All[16])

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participation in transmission and distribution (greenfield and divestiture); and (vii) building competitive markets in production, transmission and distribution. It also notes that the main outcomes have been of three types: 1) introduction of Independent Power Producers (IPPs), 2) privatization of the integrated enterprise and 3) unbundling the monopolistic enterprise and privatization of its segments (Manibog et al., 2003).

15 Japan has always been the main bilateral donor for the sector. In the first half of the '90s Japan increased its commitments for the energy sector almost threefold until peaking in 1995, more than compensating a concomitant reduction in German, French and Italian aid. In the second half of the nineties Japanese aid quickly fell to the levels of the eighties, bringing down considerably the total bilateral commitments. Analysing Japanese aid for the energy sector Yamaguchi notes that on several occasions between 1989 and 1992 Japan declared its intention to expand aid in environmental areas (including energy) and that the decrease in the commitments at the end of the decade is probably to be attributed to Japanese economic crisis of those years (Yamaguchi, 2005).

16 On those occasions (and many others) a great deal of attention has also been devoted to the environmental aspects of the use of energy, its linkages with climate policies and the promotion of renewable energy sources and energy efficiency through climate and development finance (Tirpak,

(UNCSD, 2001) (WSSD, 2002) (UN-Energy, 2005) (IISD, 2007; IISD, 2006) (UN-AGECC, 2010) (Karlsson-Vinkhuyzen, 2010) (UNDESA).

During this third period the assistance policies of the Bank moved to a more integrated approach initially with the "Fuel for thought" (1999) energy strategy and the Energy Program of 2001[17] followed by a Guidance note in 2004 that reconsidered the role of public utilities. The more recent developments in the Bank's policies for the energy sector are contained in the Sustainable Infrastructure Action Plan[18] (2008) and the latest Energy Strategy Approach, that underwent public consultations in 2010-2011 (World Bank, 2001) (World Bank, 1999) (World Bank, 2004) (World Bank, 2008) (World Bank, 2009).

All these international policy activities are linked to the recovery of development finance from the slump of the previous decade. The amount committed in the first decade of the new millennium, is rising quickly and reached the record levels of more than 16 USD billion in 2009[19].

In the next section we try to answer the question of how these flows have been allocated and to what purposes.

4 - Analysis of the distribution of the financing flows for the energy sector (2000-2009)

4.1 Distribution by share of access

We analysed the distribution of Development Finance for the energy sector between 2000 and 2009 and we find that energy is not prioritised in donors'

Adams, 2008). However Michaelowa and Michaelowa tested for correlation between climate policy development and ODA for renewable energy and energy efficiency and found no positive correlation (Michaelowa, Michaelowa, 2010).

[17] The 2001 document remained an informal document, but had nevertheless an important impact inside the Bank.

[18] That included the principles of 1) economic and financial sustainability, 2) social inclusion and 3) local and global environmental sustainability

[19] For 2009 the CRS points to a record commitments of 19.6 USD billion, while AidData figures for the same year is 16.8 USD billion. See Annex I for a comparison between the two datasets.

commitments to low electrification countries. In fact, more than 65% of the total Energy Sector Development Finance is committed to countries with an electrification level higher than 75% (Table 1). Countries with low electrification share (i.e. where less than 50% of the households have access to electricity) are home to around 54% of the world population without access to electricity but less than 15% of the total financing for energy is committed to them. The energy commitments as a share of total development finance is only 5.4% for low access countries, against a share of 10.4% for high electrification countries. Thus it seems clear that the level of energy access was not a principal metric for donor decision making.

Recipient Countries by Electrification Level	Low	Mid (excluding India)	India	High	Other Countries	Regional and global flows	Total
	<50%	50-75%	75%	>75%	not available	-	
Population without electricity access	707.5	239.4	288.8	68.2	-	-	1304.0
Share of world population without access	54.3%	18.4%	22.1%	5.2%	-	-	-
Total development finance committed 2000-2009 energy sector (Billions of 2009 USD)	18.1	8.5	10.0	80.7	0.1	6.4	123.8
Share of development finance for energy committed to each country group	14.6%	6.9%	8.1%	65.2%	0.1%	5.1%	100%
Share of energy commitments over total (excluding emergency aid and debt relief)	5.8%	7.2%	15.0%	10.4%	1.0%	2.8%	8.2%

Table 1 – Distribution of Development Finance by group of countries and number of people without access to electricity. Shares and totals 2000-2009 in 2009 USD billion, based on AidData.org.

To further validate these results we compare in Figure 3[20] the concentration curves of Development Finance from both the AidData and the CRS databases and the concentration curves for ODA for Energy and ODA for All Sectors (both from the CRS)[21]. We find that the distribution of energy ODA is more favourable towards low electrification countries than general development finance, as expected.

We also note that the distribution of ODA for all sectors is more favourable to the countries with low electricity access than the distribution of ODA for the energy sector only. This indicates that the observed distribution of development finance for energy is the result of donors' sectoral priorities in their assistance to low access countries, rather than unwillingness or difficulty of committing development finance to countries with low electrification levels.

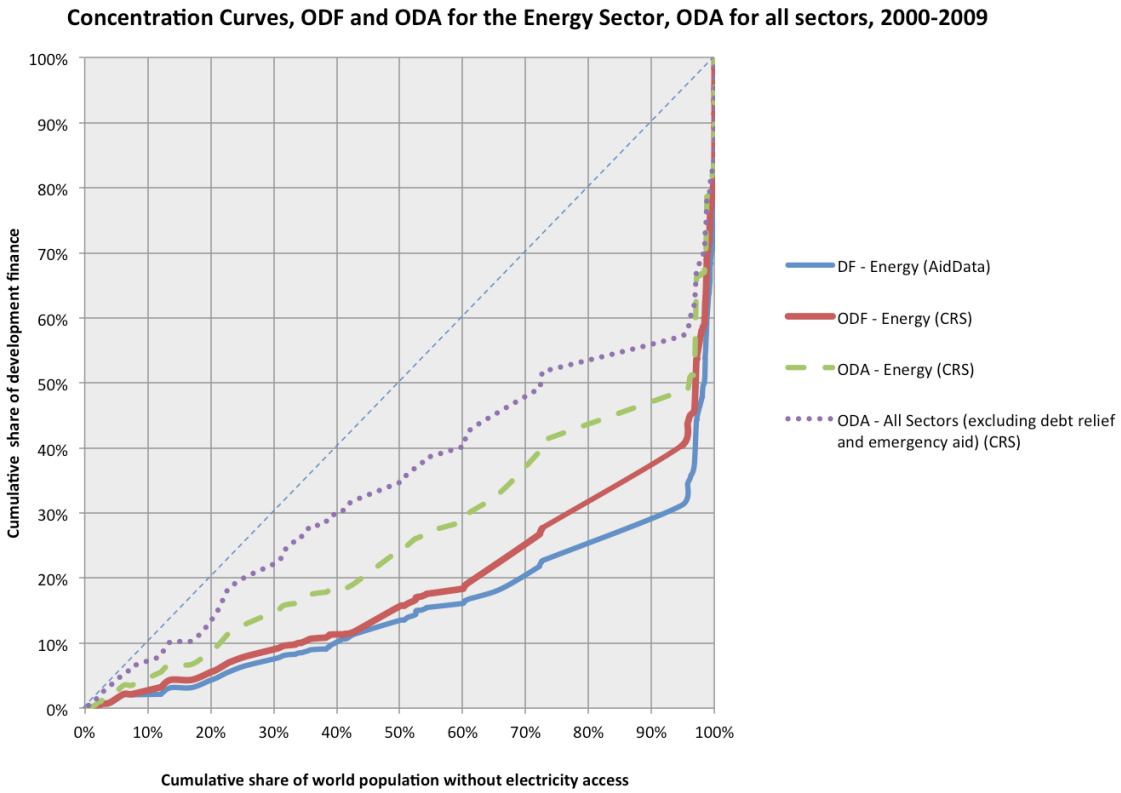

Figure 3 - Concentration curves, (O)DF and ODA for the Energy Sector, ODA for All Sectors, 2000-2009. Elaboration on AidData and CRS databases.

[20] Concentration curves exclude the commitments to regional groups and to the following countries: Anguilla, Barbados, Bermuda, Comoros, Cook Islands, French Guaina, French Polynesia, Grenada, Montserrat, New Caledonia, Niue, Seychelles, Somalia, St. Helena, St. Lucia, Tokelau, Wallis & Futura.

[21] Energy ODA for 2000-2009 amounts to 54 billion USD, while ODF – CRS and DF – AidData amount respectively to 99 and 117 billion of USD (2009$). The distinction between ODA and OOF is incomplete in AidData, so we were not able to plot an ODA curve with AidData statistics.

Different donors naturally allocate financing differently and in Figure 4 we compare the concentration curves of the four most important donors. Among the main players, European donors (EU institutions and EU member states) and the World Bank Group's have the closest match to the distribution of population without electricity access. Japan gives a consistent part of its development finance to India and Indonesia, while the US has spent more than half of its development finance for energy in Iraq.

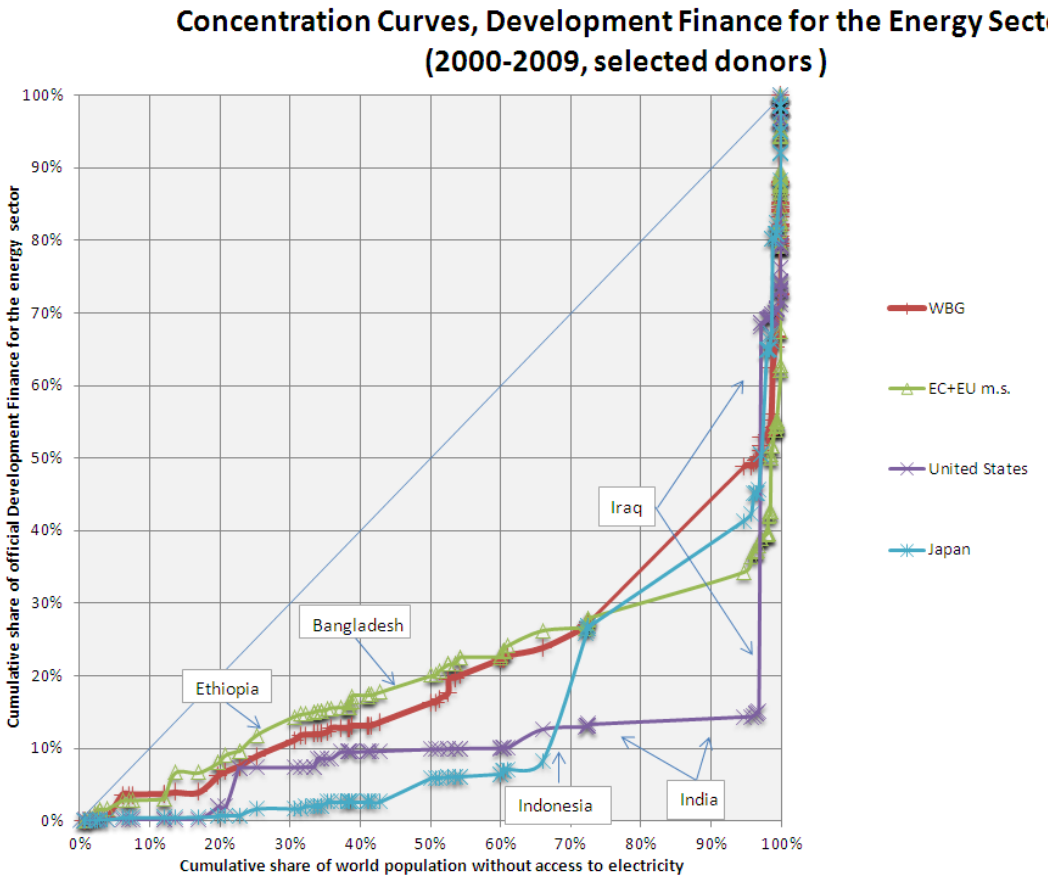

Figure 4 – Concentration curves of Development Finance for selected donors, 2000-2009.

The Suits indexes in Figure 5 summarise the distributional patterns of the donors in a unique number. We note that for many large donors (US, EC, Japan, IBRD) the index is higher than the average which means a smaller than average share of their energy aid is directed towards the countries with the lowest energy access. IDA is the largest donor with a distribution of finance that follows closely the distribution

of people without access. India also presents a distribution of finance skewed towards low access countries. The donor that allocates its energy aid in the most pro electricity–access way is Portugal (whose commitments however amounted to 0.25% of total energy aid).

In analyzing the Suits indexes and the concentration curves it must be remembered that many multilateral donors have a mandate to assist a specified group of countries. Suits indexes and concentration curves should be interpreted as a photograph of global development finance for the energy sector. They do not involve a value judgment about the donors, or the quality of their financing activities. The aid they provide and how it is allocated is obviously influenced by many factors whose analysis is outside the scope of this paper.

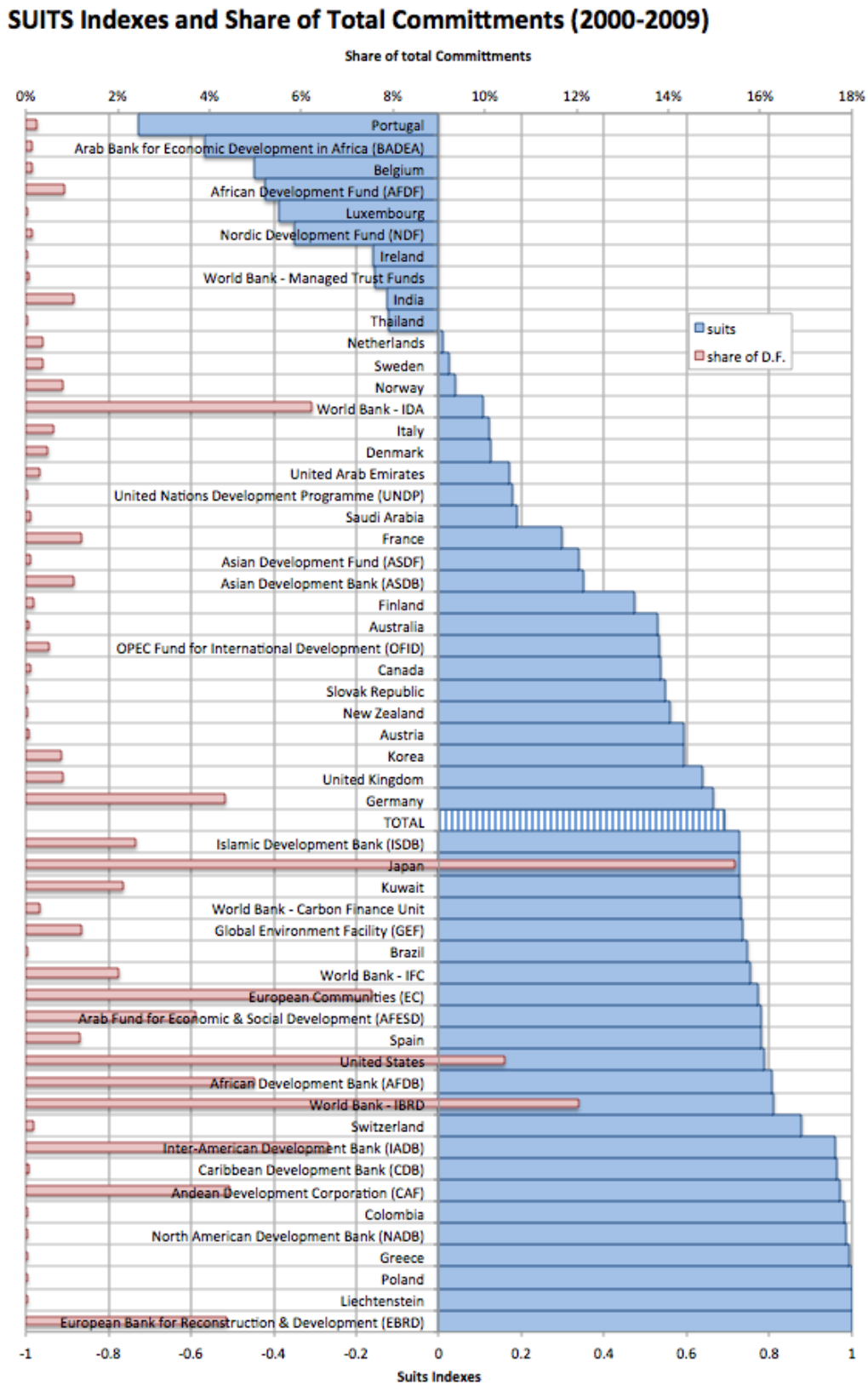

Figure 5 - Suits Indexes for energy related Development Finance committed between 2000 and 2009 and share of commitments of total energy Development Finance.

4.2. Distribution by purpose, donor and type

Commitments for the energy sector are composed of funding for a variety of purposes, and although there is not a specific category to identify actions to expand electricity access, it is worth noting that the funding for electricity transmission and production is around the 60% of the total, to which must be added a portion of the funding for projects with multiple purposes (mainly from the WBG) that amount to more than 20% of the total for low electricity access countries (Table 2).

	All countries	Low Electricity Access Countries (<50%)
Electrical transmission and distribution	24.4%	26.7%
Energy Policy and administrative management	20.5%	17.5%
Power Generation - non renewable energy sources	19.2%	15.0%
Power Generation - renewable energy sources	12.3%	10.9%
Hydro and geothermal Energy	4.5%	6.1%
Gas and Petroleum distribution and storage	3.8%	0.1%
Nuclear Power & Nuclear Safety	2.5%	0.7%
Energy Education and Research	0.3%	0.2%
Biomass and Biofuels	0.3%	0.6%
Multiple purposes or unspecified	12.2%	22.4%

Table 2 - Development Finance for the Energy Sector by Purpose and Group of recipient countries, 2000-2009. Shares of total energy funding.

The major donors have remarkably different distributions of the purpose of their financing for the energy sector (Figure 6). For example Japan – the largest bilateral donor – directs a large share of its funding to non-renewable energy sources (but

also a high share in Hydro and Geothermal), while EU Member States (of which Germany represents roughly half the total) tends to finance other types of renewable energy sources (solar and wind, above all). The EU Institutions have a very large share of aid for energy policy and administrative management, while the US delivers a large part of their aid to electricity transmission projects, in addition to being the most important donor in the nuclear energy sector. The World Bank Group also invests significant resources in electricity transmission and renewable energy sources but, due to its tendency to finance large projects with many different components, it has a high share of financing for which it has been impossible to assign a unique purpose.

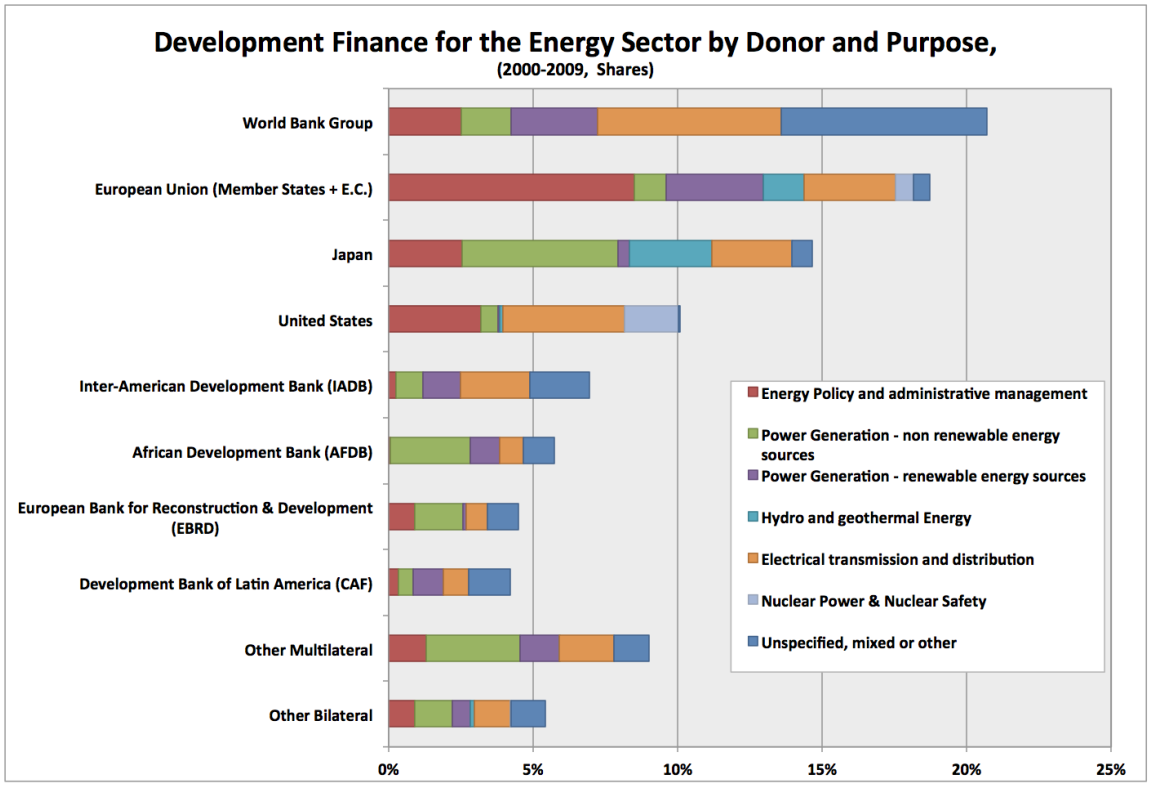

Figure 6 - Development Finance by donor and purpose, shares of total 2000-2009 in 2009 USD .

5. Conclusions

Our study analysed the distribution of donor countries financial commitments for the energy sector with the objective of understanding their characteristics in comparison with levels of access to electricity service in developing countries.

We framed the analysis in the historical development of donor policies for the energy sector, identifying three broad periods. We compared the distribution of development finance of all donors against an indicator of access to electricity in recipient countries using concentration curves and Suits Indexes. There are some limitations to our analysis: the first is that not all development finance is devoted to expanding access even in countries with low access levels, the second is that although the electrification share can be considered a good proxy of energy development of a country, there are many electricity related factors that are equally important like, *inter alia*, reliability of service, prices, state of infrastructure, institutional setting, environmental and social concerns, energy security and economic sustainability. The use of an electricity indicator, while justified by the fact that great part of energy-related development finance is related to the electricity sector, excludes from the analysis the important issue of access to modern domestic fuels and appliances, for which further research is clearly needed. Finally, recent progress in both aid statistics and energy indicators is extremely important but further refinement is still required for more insightful analysis.

Our main finding is that energy access is not a priority among the many concerns for donor funding. Low-electrification countries (i.e., the countries where less than 50% of households have access to electricity) comprise 54% of the 1.3 billion people without access, but receive less than 15% of the total energy-related development finance for the sector.

There are of course many factors that influence each donor's allocation of development assistance. Nevertheless, the current pattern seems to indicate that less development finance is channelled into the energy sectors of the countries with the lowest levels of energy access. If international efforts to improve energy access are to be successful, this pattern will need to change or supplemental and hypothecated funds will be required.

Acknowledgments:

The authors would like to thank Andrew Barnett (The Policy Practice), Katharina Michaelowa (University of Zurich), Maria Yetano Roche (Wupperthal Institute), Patrick Nussbaumer (UNIDO), Luke Murray (Primal Renewable Energies) and Robert Mosolgo (AidData) for their valuable suggestions and kind support. All remaining errors are responsibility of the authors.

Disclaimer:

List of Acronyms:

AFDB - African Development Bank
AFDF - African Development Fund
AFESD - Arab Fund for Economic and Social Development
ASDB - Asian Development Bank
ASDF - Asian Development Fund

BADEA - Arab Bank for Economic Development in Africa

CAF - Comunidad Andina de Fomento – Development Bank of Latin America

CDB - Caribbean Development Bank

CRS – Creditor Reporting System of the OECD

EBRD - European Bank for Reconstruction and Development

EC - European Communities

GEF - Global Environment Fund

IADB - Inter American Development Bank

IBRD - International Bank for Reconstruction and Development

IDA - International Development Agency

IFC - International Finance Corporation

ISDB - Islamic Development Bank

LDCs – Least Developed Countries (UN Latest Official Definition)

NADB - North American Development Bank

NDF - Nordic Development Fund

OECD – Organization for Economic Co-Operation and Development

OPEC - Organization of Petroleum Exporting Countries

SSA – Sub Saharan Africa Countries

UNDP - United Nations Development Program

WBG – World Bank Group

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Appendix I – Concentration curves and Suits Indexes

Concentration Curves

A concentration curve is conceptually similar to a Lorenz curve, although it involves the addition of another ranking variable (Yitzhaki, Olkin, 1991; Kakwani, 1977). To understand if the financing for the energy sector is allocated to the countries that "need it most" we plot the cumulative share of development finance committed to the energy sector (vertical axis) against the cumulative share of population without access to modern energy over the world total (horizontal axis). To build the graph we order the countries in terms of a ranking variable (i.e. the electrification share) starting from the country with the lowest share. The graph is divided diagonally by a 45° line that represents the hypothetical distribution of aid that is allocated in direct proportion to the share of the world's people without access to electricity.

Thus, if the curve is above the 45° line, it shows that the aid is allocated to the countries that have less access to modern energy. In the opposite case, a curve below the 45° line shows that the financing flows tend to be directed more towards countries with higher levels of energy development. Relative distributions of different donors can be easily compared graphically. As an example, Figure 2 presents a comparison of the concentration curves of the International Development Agency (IDA) and of the International Bank for Reconstruction and Development (IBRD), the two branches of the World Bank Group dedicated to finance respectively lower and middle-income countries.

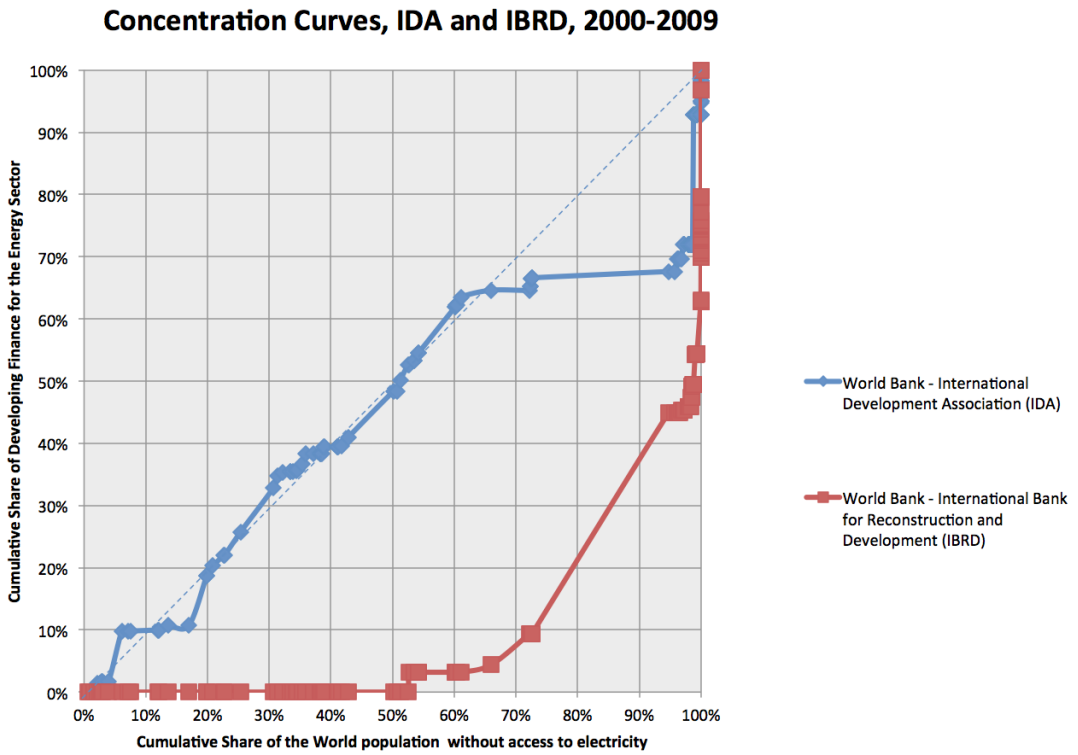

Figure 7- Comparison of the IDA and IBRD concentration curves, 2000-2009. IDA is dedicated to financing the poorest countries and its concentration curve indicates - as expected - that its financing is directed more to the countries with low levels of energy access than IBRD, whose activities are directed to middle income countries that have higher levels of energy access.

Suits Indexes

Concentration curves have a numerical counterpart, Suits indexes

A Suits index is an analogue of the Gini coefficient but varies between -1 and +1 (Suits, 1977). A Suits index of -1 represents aid allocated entirely to the poorest country (in our case to the country with the lowest electrification rate), while a Suits index of +1 represents a distribution of aid exclusively to the country with the highest (universal) electricity access. A Suits index of 0 represents a distribution along the 45° line. Suits indexes are a practical tool to compare the aid distribution

of different donors, or to compare the evolution of the distribution patterns over time.

However the Suits index, like the Gini coefficient, can produce ambiguous results when two concentration curves (or Lorenz curves) cross. The Suits index is able to summarize an important part of information in one unique number but should not be used as the only criterion to analyse the equality of a distribution.

The Suits index for a discrete distribution is calculated with $Sd = 1 - \Sigma\ pi\ (CA\ i + CA\ i - 1)$ where: Sd is the Suits index for the donor d; pi is the share of the world population without access to electricity belonging to country i; CA i is the share of cumulative development finance allocated to the country i and all the countries with lower electrification levels. The Suits Index values corresponding to the concentration curves in Figure 7 are 0.1 for the IDA and 0.8 for the IDRB. These values indicate that IDA (close to zero) funding is distributed approximately in accordance with the level of electricity access while the IDRB value (close to 1) indicates that its funds are distributed to countries that have high levels of electricity access.

Appendix II – Comparison between AidData and the CRS databases.

The Creditor Reporting System (CRS) of the Development Assistance Committee (DAC) of the OECD is the main source of project level aid data from the OECD countries and dates back to 1973. The 22 member countries of the DAC are committed to report their aid activities through precise reporting directives and definitions[22]. In addition, some multilateral organizations and other bilateral donors (non-members of the DAC) submit data on a voluntary basis. The DAC also compiles a list of the countries that are eligible for the ODA[23] and updates it every three years. The DAC distinguishes Official Development Assistance and Other Official Flows, and publishes both commitments and disbursements as well as much other information related to each project.

AidData Database is a project run by the Development Gateway, Brigham Young University and the College of William and Mary. It is a merger of two previous projects aimed at ameliorating international aid statistics, called Accessible Information on Development Activities (AiDA) and Project-Level Aid (PLAID), started respectively in 2001 and 2003.

AiDA and PLAID merged in 2009: the first AidData version was made public in 2010 and in November 2011 the 2.0 research release was been published. The version 2.0 data have been used for this research. At its core is the CRS data, albeit consolidated per project instead of per year (with some exceptions). It also includes projects financed by several Multilateral Donors (taken from their websites or annual reports) and bilateral donors not part of the OECD, as well as recipients outside the DAC list, if the financing activity has a development purpose and is financed by a development agency. For certain multilateral donors AidData substitute the data reported in the CRS if a more complete data set is available in the donor's documentation.

[22] http://www.oecd.org/dataoecd/16/53/1948102.pdf
[23] www.oecd.org/dac/stats/daclist

In AidData, all the new projects are classified using an extended coding scheme, that is compatible with the CRS. The only difference between the coding schemes is the insertion of two new codes: 23000 and 23005, which represent projects with an unknown purpose or projects with mixed purposes. The OECD traditionally recommends that donors use the codes that end in "010" for projects that fall outside the other code headings (OECD, 2011). However, this led to an inflation in the number of the projects coded under the purpose of "Energy Policy and Administrative Management" (23010) in the CRS database. AidData staff is trying to re-code those projects to understand which are effectively for "Energy Policy" and which not.

Another difference is that the donors covered by AidData but not the CRS do not provide disbursement figures, and so, contrary to the CRS, the commitment and disbursement datasets are de-linked and it is not always possible to analyse disbursements and commitments on a project basis.

If we compare the commitments data of the CRS with those of AidData (Figure 8), we note that the information relating to bilateral donors from the two databases match closely, and that AidData bilateral numbers are always slightly higher than those of the CRS.

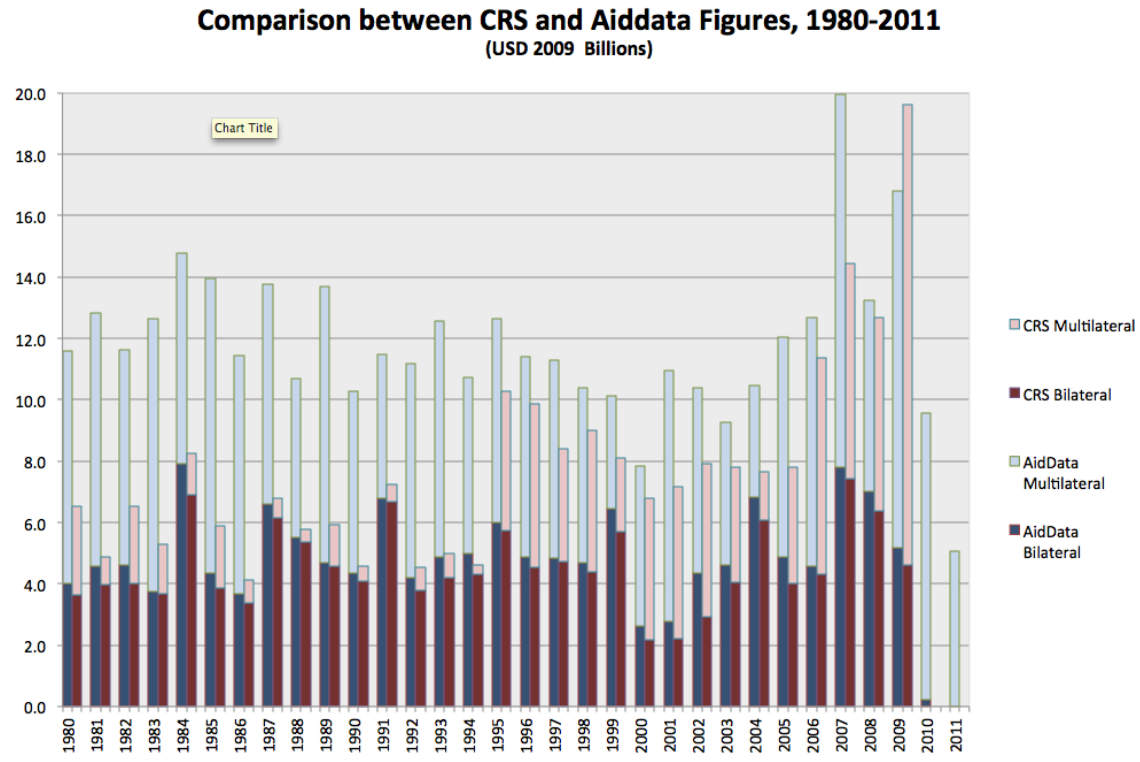

Figure 8 - Comparison of AidData and CRS databases, 1980-2009, USD 2009 billion, energy sector only.

This is due to two concomitant factors:

1) The non-DAC bilateral donors are not present in the CRS but appear in AidData: Taiwan, Thailand, Saudi Arabia, Slovak Republic, Poland, Kuwait, Liechtenstein, Iceland, India, Chile, Colombia, Brazil[24].

2) There are recipient countries that in certain cases are not considered by the CRS On-line (but that were included in the last CD-Rom edition) and that were included in AidData. For example Belarus, Bulgaria, Czech Republic, Estonia, Hungary, Korea, Latvia, Lithuania, Poland, Romania,

[24] The most notable absence from both the CRS and AidData is development aid by China. The Financial Times estimated the figures to be very high, even higher than the World Bank figures in 2009, but unfortunately no public dataset is available (Dyer, Anderlini, 2011).

Russia, Slovakia, Slovenia and Ukraine are not included in the on-line version of the CRS.

The difference between the two databases is much bigger for multilateral donors. AidData consistently reports higher values than CRS (with the exception of 2009).
In particular AidData reports projects for the following donors that are not included in the CRS: AFESD, ASDF, BADEA, CAF, CDB, ISDB, NADB, NTF, WORLD BANK CARBON FINANCE UNIT, WORLD BANK IFC.

To this higher availability of multilateral donors has to be added the fact that even for some donors that are reported in the CRS, like the GEF, AidData presents data for a much longer period.

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