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THE BOTTOM LINE

This note is the first report of energy-sector results indicators reflecting the World Bank's broad lending patterns during FY 2000–13. To compile it, energy projects back to FY 2000 were manually screened for results data comparable with the standardized indicators now used in the Bank's Corporate Scorecard. In the future, automation will make it easier to collect, aggregate, and analyze data on project outcomes.

Sudeshna Ghosh Banerjee is a senior energy specialist in the World Bank's Energy Practice (sgbanerjee@worldbank.org)

Ruchi Soni (rsoni@worldbank.org) is an energy analyst in the same practice.

Elisa Portale (eportale@worldbank.org) is an energy consultant, also in the Energy Practice.

Measuring the Results of World Bank Lending in the Energy Sector

Why is this issue important?

The need for accountability has made it critical for the Energy Practice to measure results

The World Bank tracks the outcomes of its projects in order to understand how well they are advancing the goals of ending poverty and promoting shared prosperity. For some years now those outcomes have been reported in a Bank-wide Corporate Scorecard based on a set of so-called core sector indicators (CSIs) that measure impact at the project level and permit aggregation of standardized data across the Bank. Each CSI is an indicator of output or outcome that is strategically relevant to a particular sector or theme, such as the energy sector.

Three CSIs are particularly central to the Bank's Energy Practice, because they reflect its engagement in every step of the energy value chain—from generation to transmission and distribution (T&D) to "last mile" customer connections. The three indicators are:

- The number of people provided with access to electricity through household connections
- T&D lines constructed or rehabilitated, measured in kilometers (km)
- Generation capacity constructed, measured in megawatts (MW).

More recently, additional indicators have been developed covering measurement of energy efficiency in heat and power (lifetime savings, captured in MWh).

What challenges were faced in the effort to measure results?

Data back to FY 2000 had to be retrieved and aligned with the new CSIs

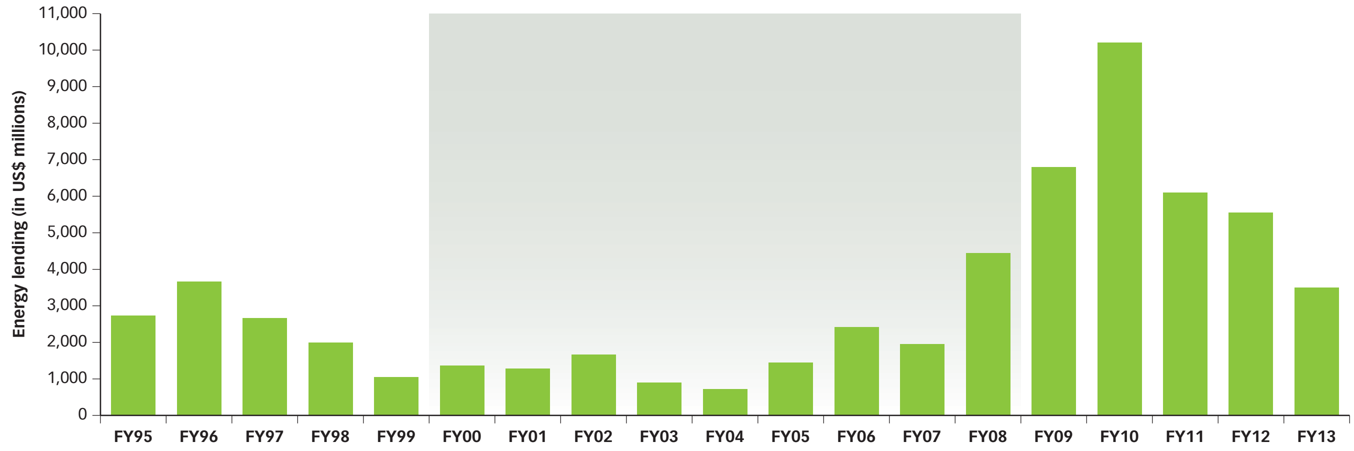
Previously, each project in the energy sector had devised its own indicators of results, which made it difficult to report the Bank's achievements in terms that were both broad and precise. With the advent of the Corporate Scorecard, however, the clear advantages of being able to demonstrate results led the Energy Practice to examine the Bank's energy projects back to FY 2000 and, to the extent possible, to retroactively harmonize or align the indicators used in those projects with those devised for the Corporate Scorecard. The results of this "archaeological" exercise are reported in this note.

The results reported here for the fiscal years 2000–13 are the first such report of energy-sector indicators reflective of the broad lending patterns of the World Bank during this period.

To compile the report, all World Bank projects approved in the energy space between FY 2000 and FY 2013 (approximately 70–80 projects per year on average) were screened to extract those that had adopted indicators similar enough to those used in the Corporate Scorecard that they could be mined for comparable data.

Information was extracted from two types of project documents: the Implementation Completion and Results Report (ICR) for closed projects and the most recent Implementation Status and Results Report (ISR) for active projects. In some cases, information was referred back to project staff for confirmation or, where discrepancies had been spotted, for correction. In a few cases where indicators were not explicitly mentioned in the ICR or ISR, "World Bank-supported programs provided 42 million people with new access to electricity between 2000 and 2013—most of them in South Asia and Africa."

Figure 1. World Bank Financing for projects in the energy sector, FY 1995–FY 2013 (US$ millions)



this information was extracted from the base document (Project Appraisal Document).

In the future, of course, such laborious manual data collection and manipulation will not be necessary, since the CSIs have been standardized and programmed into operational reporting to support automated aggregation.

The results reported for the fiscal years 2000–13 correspond largely to projects approved in FY 2000–08 (shaded in figure 1), reflecting the fact that results for most projects show up only after four to five years of project implementation. The earlier half of the decade that began in FY 2000 corresponds to a period of relatively low energy sector lending, antedating the steep scale-up in the late 2000s. This relatively low volume of lending also constrains the scale of the ensuing results.

What do the results reveal?

The substantial scale of results in countries of particular operational focus

The three energy CSIs—on number of people provided with access to electricity, T&D lines, and generation capacity—provide a cumulative snapshot of results between FY 2000 and 2013 for active and closed projects. Bank support has made possible 13,500 megawatts (MW) of new generation capacity and 98,362 circuit kilometers (km) of T&D lines (table 1). Downstream, Bank-supported programs have provided some 42 million people with new access to electricity, 17.5 million with direct access and 24.4 million through inferred access (that is, access assumed to have been created through the addition of new generation capacity, as discussed below).

Indicator 1: Number of people provided with access

Direct access is defined as the number of people who benefited from new grid-based or off-grid household connections—a total of 17.5 million, roughly equivalent to the population of Cameroon. Of these, at least 5.8 million, or about one-third, gained access through Bank support for off-grid projects, a large portion of whom were added through an innovative solar home system program in Bangladesh.

During FY 2000–13, the World Bank approved 34 projects in 25 countries that reported this indicator for direct connections. A handful of countries were responsible for the bulk of the results (figure 2). In Bangladesh, sustained Bank engagement in both rural grid and off-grid solar home systems resulted in 9.7 million people gaining direct access. In Cambodia, Kenya, Mali, and Rwanda, a total of more than

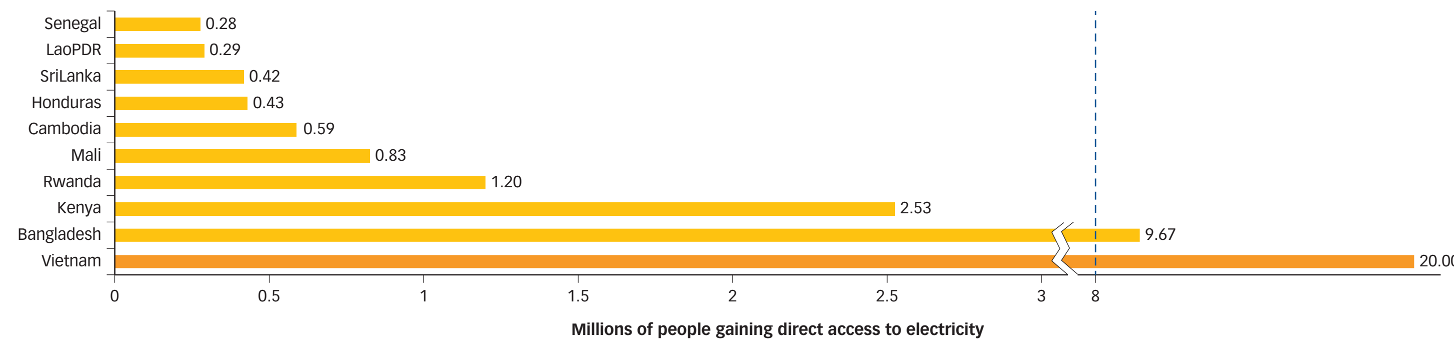
"A total of 17.5 million people received direct access from World Bank energy access projects, of which at least 5.8 million—or about one third—received off-grid access."

Table 1. Summary of cumulative results from World Bank projects by region FY 2000–13

Region	Generation capacity (in MW)	Transmission and distribution lines constructed or rehabilitated (in kms)	People given direct access (in million)	People provided with inferred access (in million)	Total access (direct + inferred) (in millions)
Africa	1,434	6,240	5.25	9.20	14.44
East Asia and Pacific	4,475	55,187	1.57	0.02	1.59
Eastern Europe and Central Asia	2,886	2,864	n.f.	n.f.	n.f.
Latin America and the Caribbean	582	758	0.61	n.f.	0.61
Middle East and North Africa	1,192	199	n.f.	n.f.	n.f.
South Asia	2,930	33,115	10.08	15.19	25.27
Total	13,499	98,362	17.51	24.4	41.92

n.f. = none found in course of project review.
Source: World Bank CSI database, 2013.

Figure 2. Number of people in selected countries who gained direct electricity connections through World Bank funding, FY 2000–13



Note: Although approved in FY 1999, the Vietnam project was included in the analysis because it is such a notable example of an access project and came just before the start of the period under study.

5 million gained direct access to electricity through Bank-supported projects. In the remaining countries, the scale of engagement was smaller, providing electrification to a total of 2.7 million people.

By way of comparison, figure 2 also reports access results for what was probably the Bank's largest-ever engagement in energy access in Vietnam, a project approved in FY 1999, that is, just before the period currently under consideration. This project delivered first-time energy access to 20 million people, or about twice the number in Bangladesh. The government's broader rural electrification program raised access from 50.7 percent of rural households in 1996 to 90.7 percent in 2005 and 94.5 percent by the end of 2008.

The indicator also aims to capture inferred access. Inferred access is the number of people who benefited from Bank-funded generation capacity, a proportion of the output of which is assumed to be powering new household connections. (See box 1 for the methodology used in the computation of inferred access.) The number

Box 1. Methodology for calculating inferred access

The steps described below were followed to estimate the number of new *household* connections that could have been supported by capacity generated by World Bank projects.

First, the amount of generation capacity (in MW) was converted into total annual energy in kWh. For each technology, a technology-specific capacity factor was used to calculate the gross available energy. The data source for capacity factors is ESMAP (2007).

Second, the gross annual energy consumption was disaggregated between residential and nonresidential consumption based on the pattern appearing in IEA's national energy balances for the project's approval year (IEA 2013). Gross energy was converted to net energy by subtracting T&D technical losses (assumed to be 10 percent).

Third, the resulting net energy was allocated between new connections and increased consumption by existing consumers. The allocation was based on the level of access to electricity in each country and the level of residential consumption per capita (Banerjee and others 2013; IEA 2013). With an average global access rate of 83 percent in 2010 and an average global consumption per capita of 685 Kwh in the same year, countries were classified as "low" or "high" in terms of access and in terms of consumption, based on whether they were below or above the global average).

If a country's access rate was below the global average and its consumption per capita below the global average, it was assumed that 50 percent of new power generated was directed to new connections and 50 percent to existing users.

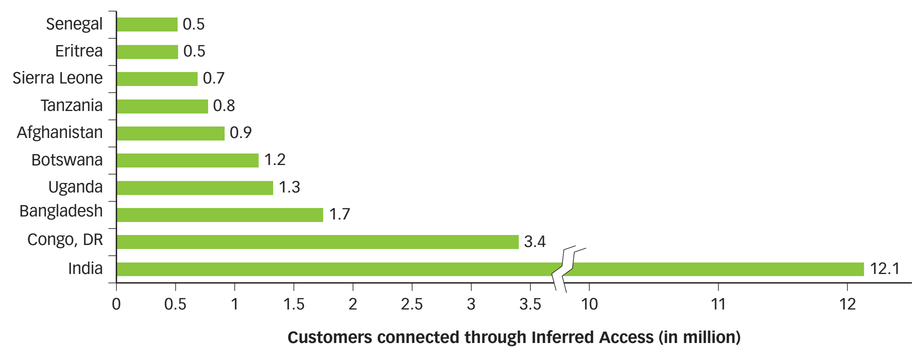
If a country's access rate was below the global average but its consumption per capita above the global average, it was assumed that all new power generated was directed to new connections.

If a country's access rate was above the global average but its consumption per capita below the global average, it was assumed that all new power generated was used to increase consumption of existing users.

Note: KWh = MW x 1000 x capacity factor x total hours per year.

"The World Bank supported the construction or rehabilitation of more than 98,000 km of transmission and distribution lines, enough to circle the earth twice."

Figure 3. Top ten countries in terms of customers connected to electricity through inferred access made possible by World Bank support, FY 2000–13



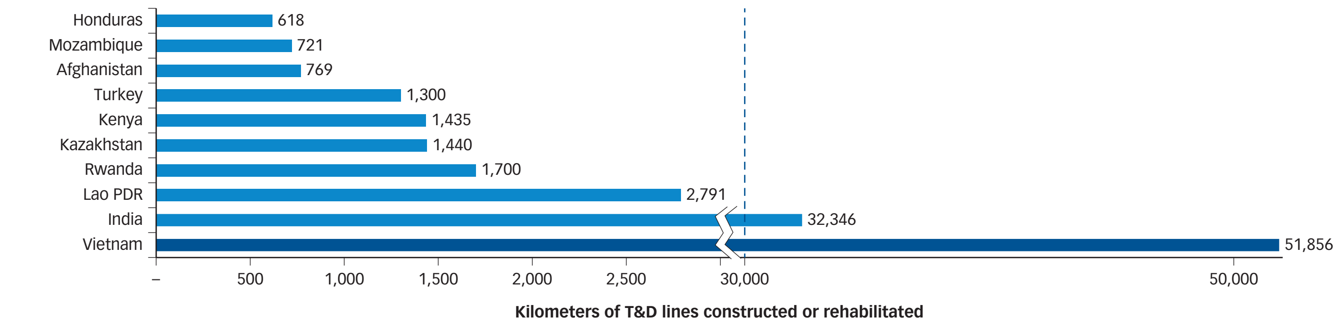
of people assumed to have gained access through national and regional programs supported by the Bank is 24 million, equivalent to the population of Ghana. Inferred access is a conservative estimate of the new connections that could have been supplied as a result of power generation projects supported by the World Bank.

The inferred access was provided in 26 projects spanning 19 countries with low rates of access to electricity—mostly in South Asia and Sub-Saharan Africa (see table 1). In South Asia, Bank-supported generating capacity was estimated to have opened access to electricity for approximately 12.1 million people in India. In Sub-Saharan Africa, the Democratic Republic of Congo and Uganda led the way, with new generating capacity inferred to have offered connections to 3.4 million and 1.3 million people, respectively (figure 3).

Estimating the Bank's contribution to inferred access is important because, in many countries governments finance the last-mile connections themselves or through consumer contributions rather than by borrowing. The Bank's efforts have most often involved upstream investments to ensure that capacity is available for access expansion.

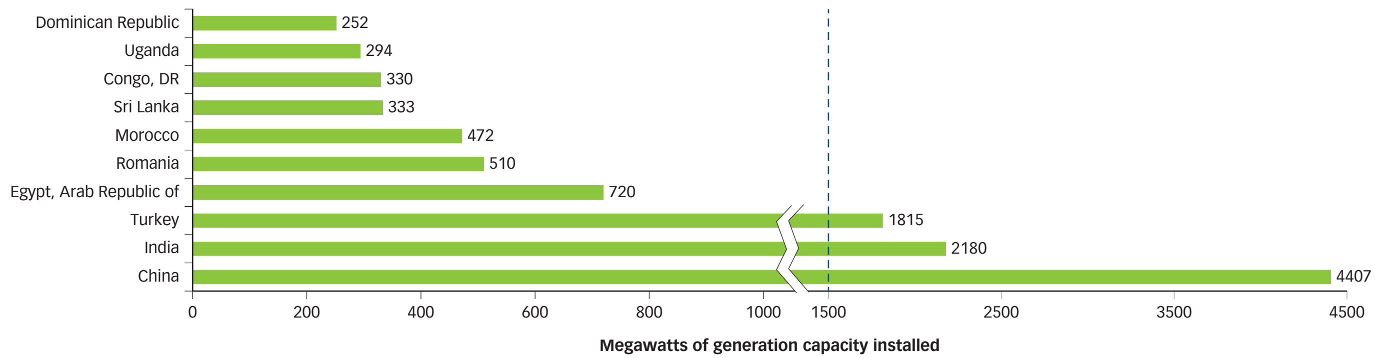
"Bank-constructed generation capacity for the period was equal to the entire installed generation capacity of Colombia."

Figure 4. Top ten countries in terms of T&D lines (in km) constructed or rehabilitated with World Bank support, FY 2000–13



Note: Although approved in FY 1999, the Vietnam project was included in the analysis because it is such a notable example of an access project and came just before the start of the period under study.

Figure 5. Top ten countries in terms of generation capacity installed (in MWs) with World Bank support, FY 2000–13



Indicator 2: Transmission and distribution lines constructed or rehabilitated

The second indicator measures the length (in km) of transmission lines and distribution lines constructed or rehabilitated under World Bank–supported projects. During FY 2000–2013, the Bank approved 65 projects that reported this indicator. A total of 98,362 kms of T&D lines were constructed or rehabilitated during this period, enough to circle the earth twice. Most of the construction occurred in East Asia (Vietnam) and South Asia (India), as shown in figure 4.

Five projects in Vietnam accounted for about 51,900 km of transmission lines, with the Rural Energy Access project contributing the majority. The spike seen in 2005 is also attributable to the Vietnam project. Around 32,300 km of lines were built in India with the Bank support, with around 19,801 km coming from the Rajasthan Power Sector Restructuring Project alone.

Indicator 3: Generation capacity

Sixty-two World Bank energy projects during the period FY 2000–13 included an indicator on generation capacity (MW). The amount of generation capacity installed was approximately 13,500 MWs, equivalent to the installed generation capacity of Colombia. East Asia and South Asia accounted for most of the new capacity during the period (figure 5). India's Renewable Energy Project alone added 2,180 MW, while three projects in China contributed 3,370 MWs.

“The usefulness and reliability of the automated system depends critically on accurate system entry of core sector indicators by task team leaders.”

What have we learned?

Automation will make it easier to collect, aggregate, and analyze data on project outcomes

The fact that indicators of results historically were defined for individual projects made it difficult to aggregate results across multiple projects for purpose of analysis. Henceforth, CSI data will be systemically captured and compiled for all ISRs. The standardization and automated compilation of indicators will greatly increase the ability of the Bank’s Energy Practice to report on results in real time.

The usefulness and reliability of the new capability depends, of course, on accurate entry of CSIs into the ICR/ISR data system by task team leaders. The hope is that as task team leaders come to see the benefits of comparable and aggregatable data for their work, they will be motivated not only to see that accurate data from their projects is fed into the system but also that data from that system are used in the design of their future projects.

The CSIs will be fine-tuned as Bank operations evolve in response to clients’ new priorities. The suite of indicators has already been expanded to include measures of energy efficiency in heat and power and the possibility of breaking down new generation capacity resulting from renewable vs. conventional sources of energy.

In the meantime, the historical data compiled for this report reflect the significant impact of World Bank investments in the energy sector, particularly countries where there was a sustained engagement in the energy sector.

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The peer reviewers for this note were Dana Rysankova (senior energy specialist) and Avjeet Singh (senior operations officer), both in the World Bank’s Energy Practice.

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