



2015 Energy Sector Global PPI¹ Update

- Private participation in energy in emerging markets was US\$37.6 billion in 2015, 50 percent below the five-year average of US\$74.7 billion.
- The decline is largely due to both Brazil and India having the lowest investment in a decade; the Philippines hit an all-time high.
- Unlike previous years, renewables made up almost two-thirds of investment in energy; solar energy investment was 72 percent higher than the five-year average.

This note is a product of the Public-Private Partnership Group of the World Bank, and the Private Participation in Infrastructure Database (PPI Database), written by Jinsuk Park and edited by Jenny Chao.

1

SECTOR OVERVIEW

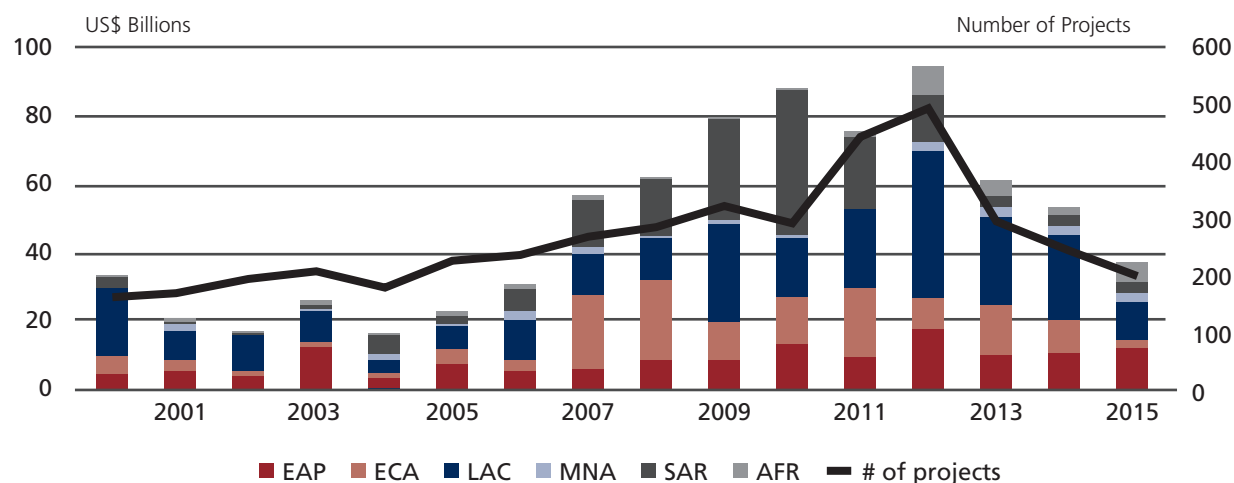
Total investment² in energy projects with private participation in 2015 in low- and middle-income countries was US\$37.6 billion, 50 percent below the five-year average of US\$74.7 billion. This trend of declining investment has continued as the total amount of energy investment has fallen in the last four years, reaching a peak of US\$94.9 billion in 2012. In addition, the number and average size of projects have also recorded a downward trend. The total number of new energy projects was 205—the fewest since 2004 when 187 closed. Of the 205 projects, most were in Latin America and the Caribbean (LAC), with 73; East Asia and Pacific (EAP), 60; South American (SAR), 33; Africa (AFR), 22; the Middle East and North Africa (MNA), 10; and Europe and Central Asia (ECA), 7. Notably, LAC dropped dramatically from 146 projects in 2014 to just 73 in 2015. The decrease in PPI activity in 2015 was mainly driven by fewer investments in Brazil and to a lesser extent, India.

On a more positive note, energy investment has largely become a story of renewables as solar and wind power continue to become more efficient against traditional forms of power generation. Renewables made up 63 percent of all energy commitments in 2015, exceeding the five- and 10-year averages of 45 percent and 39 percent, respectively. The most popular sources of renewable energy were solar followed by wind.

¹ Private Participation in Infrastructure (PPI) as defined by the Private Participation in Infrastructure Database <http://ppi.worldbank.org>

² “Investment” refers to investment commitments at the time of financial closure or in the case of brownfield concessions, at contract signing.

FIGURE 1: TOTAL INVESTMENT IN ENERGY BY REGION



Source: World Bank, PPI Project Database.

* Adjusted by 2014 US CPI

2 SUBSECTOR OVERVIEW

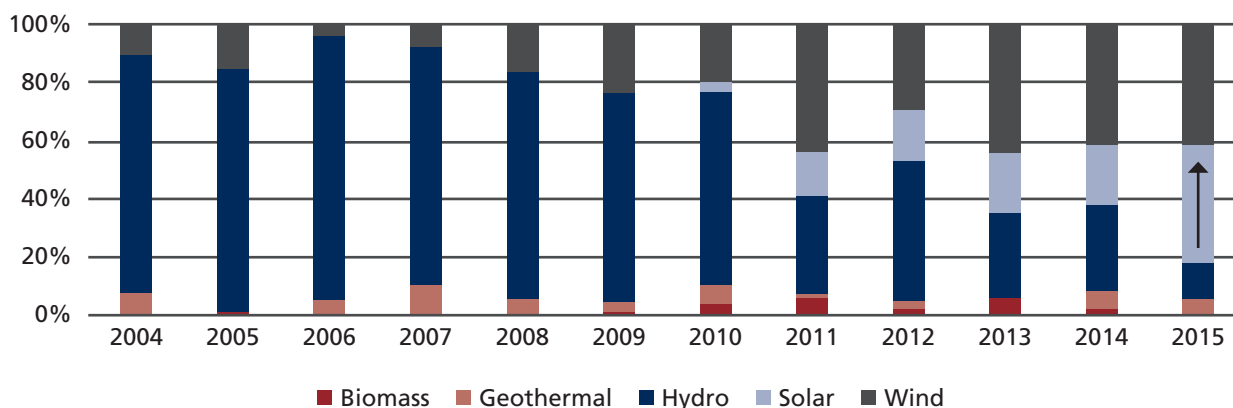
Investment in energy amounted to US\$37.6 billion in 2015: US\$35.2 billion for electricity and US\$2.4 billion for natural gas.

Natural gas. Natural gas projects downstream, all of which were in Mexico, accounted for 6.3 percent of the total energy investments in 2015. The US\$2.4 billion investment fell below both the five-year average of US\$4.1 billion and 10-year average of US\$3.7 billion. Though natural gas PPI investment in Mexico was just under the previous year's US\$2.8 billion, no other country invested in natural gas, thus leading to a slightly lower investment of US\$2.4 billion in 2015.

Electricity (general). At US\$35.2 billion for 193 new projects, the electricity subsector continued declining, with 30 percent lower investment and 14 percent fewer projects than those in 2014. Electricity investment has continuously decreased in the amount and number of projects since 2012. Generation projects absorbed US\$33.6 billion of the total, while transmission and distribution projects accounted for US\$1.4 billion and US\$250 million, respectively.

Electricity (renewables). In electricity generation, approximately US\$25.4 billion out of US\$35.2 billion was in renewables. Among the types of renewable energy, hydroelectric power is trending downward in

FIGURE 2: TREND OF SHARES OF RENEWABLES BY TECHNOLOGY



both investment and the number of projects, with only US\$2.9 billion in 2015, or 79 percent lower than the five-year average of US\$13.6 billion. In contrast, solar energy is continually attracting more investment, gaining the largest share of renewable energy investment for the first time with 41 percent of total renewables (Figure 4).

Investment commitment in solar energy in 2015 was US\$9.4 billion, 72 percent above the five-year average of US\$5.4 billion (2010-2014). The top countries with the highest investment in solar energy, respectively, were South Africa, Morocco, Chile, China, and India. Among the five countries, South Africa and Morocco showed the largest increase of 141 percent and 515 percent, respectively, above the five-year average of investment.

TABLE 1: TOTAL INVESTMENT IN SOLAR ENERGY IN 2015

	Number of Projects	Total Investment (US\$ millions)	% of Total	% Change from 5-Year Average
South Africa	8	\$2,353	25%	+141%
Morocco	2	\$1,800	19%	+515%
Chile	6	\$1,293	14%	+26%
China	18	\$1,008	11%	-4%
India	17	\$841	9%	+25%
All other countries	29	\$2,096	22%	+46%
Total	80	\$9,389	100%	+72%

Investment commitment in wind in 2015 was US\$9.4 billion, 18 percent below the five-year average of US\$11.5 billion. The top countries with the highest investment in wind energy were similar to those investing in solar energy, respectively, South Africa, Brazil, China, India, and Chile, indicating these countries have conducive environments for supporting renewable energy. Among the five countries, South Africa and Chile showed the largest increases of 158 percent and 310 percent, respectively, above their five-year investment averages. However, as commitments in Brazil and other countries decreased, the total investment of US\$9.4 billion in 2015 dropped approximately 18 percent below the five-year average of US\$11.5 billion.

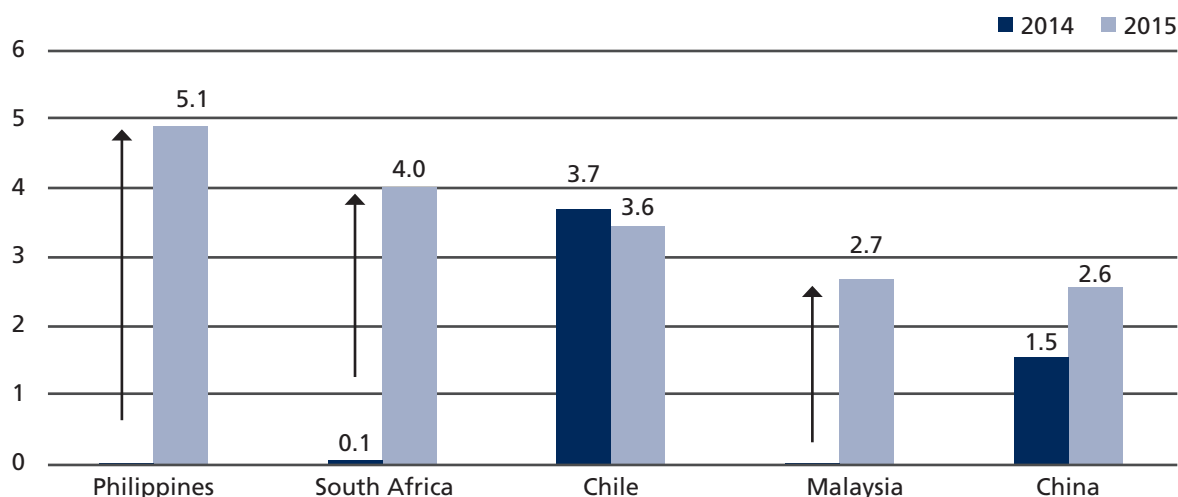
TABLE 2: TOTAL INVESTMENT IN WIND ENERGY IN 2015

	Number of Projects	Total Investment (US\$ millions)	% of Total	% Change from 5-Year Average
South Africa	7	\$1,594	17%	+158%
Brazil	13	\$1,570	17%	-54%
China	7	\$1,282	14%	+23%
India	9	\$1,148	12%	+5%
Chile	5	\$1,096	12%	+310%
All other countries	20	\$2,711	28%	-47%
Total	61	\$9,401	100%	-18%

3 TOP COUNTRIES

The top five countries with the highest energy investment in 2015, respectively, were the Philippines, South Africa, Chile, Malaysia, and China. These five countries together amassed US\$18 billion, representing 48 percent of energy investment commitments in the developing world in 2015. Remarkably, three countries newly joined the top five group (Figure 3).

FIGURE 3: TOTAL INVESTMENT IN ENERGY IN TOP 5 COUNTRIES



In 2015, the top market for energy investment was newly held by the Philippines, taking in US\$4.9 billion, or 13 percent of global energy investment. Notably, this is the first time the Philippines has secured first place in energy PPI since the inception of the database. The largest deal was also in the Philippines: the US\$1.2 billion San Buenaventura Power Plant. This greenfield facility is the country's first supercritical, highly fuel-efficient, and pulverized coal-fired power plant, with a total capacity of 455 megawatts. The plant is located in the Mauban Municipality of Quezon Province in the Philippines. Another prominent deal in the Philippines is the US\$937 million Therma Visayas Power Plant (340 megawatts), which also happens to be coal-fired as well.

TABLE 3: TOTAL INVESTMENT IN ENERGY IN TOP 5 COUNTRIES

	Average Investment (US\$ millions)	Total Investment (US\$ millions)	% of Total Investment
Philippines	\$428	\$5,142	14%
South Africa	\$248	\$3,973	11%
Chile	\$225	\$3,595	10%
Malaysia	\$2,675	\$2,675	7%
China	\$83	\$2,576	7%
All other countries	\$156	\$19,662	52%
Total	\$187	\$37,623	100%

South Africa, with 16 new projects, had the second largest investment volume. The country's 15 new projects focused on renewables: solar (8) and wind (7), largely due to government support through the Renewable Energy Independent Power Producer Procurement (REIPPP) Program, which is a South African competitive auction for renewable energy projects. The program has successfully channeled substantial private sector expertise and investment into grid-connected renewable energy in South Africa at competitive prices. Specifically, 2015 witnessed two large-scale greenfield build-own-operate projects in South Africa: the US\$900 million Xina Solar One CSP and the US\$688 million Karoshoek Solar One CSP.

Chile was among the top three countries, with 18 projects totaling US\$3.6 billion. Thirteen of the 18 projects consisted of renewables: solar (6), wind (5), hydropower (1), and geothermal (1). Chile's national energy strategy "Energy for the Future" was launched in February 2012 to improve the country's energy demand matrix and supply concerns. This strategy has been reinforced by other initiatives to boost renew-

able energy production, including new geothermal concession rules introduced in early 2013. Similar to 2014, most renewable energy projects were build-own-operate greenfield contracts granted by the Chilean government in 2015. The top deal was the US\$500 million San Juan Wind Farm, located in Vallenar, the capital city of Huasco Province. This energy facility will have an overall capacity of 184 megawatts; commercial operations are expected to begin in 2016.

In **Malaysia**, one megadeal placed the country in fourth position among the top five. The megadeal was Malaysia's largest energy PPI in the last 10 years: the US\$2.7 billion 3B Jimah East Power Plant, a greenfield project to build and operate a coal-fired power plant, with a capacity of 2,000 megawatts, located in Jimah, Negeri Sembilan, Malaysia. The plant will be developed under a 25-year build-operate-transfer concession. The sponsors used Sukuk bonds (Islamic bonds) to finance the project, which closed in November 2015.

China had the fifth largest investment volume of US\$2.6 billion for 31 new energy projects. Although the average deal size in 2015 was relatively small at US\$83 million, the average project size increased by about 41 percent, compared to that in 2014. All of the 31 projects were greenfield build-operate-transfers, awarded through local governments' grant and purchase agreements. The US\$2.6 billion invested in 2015 ran parallel with the five- and 10-year averages of US\$2.4 billion and US\$2.2 billion, respectively.

4

REGIONAL OVERVIEW

With three out of the five top countries, unsurprisingly EAP was the top region by volume and one of only two regions that experienced increased investment, the other being AFR. Though these regions recorded cumulative commitments of US\$5.4 billion, this was not enough to offset declines in the other four regions. LAC fell from US\$24.7 billion in 2014 to US\$11.2 billion in 2015; ECA, from US\$9.8 billion to US\$2.5 billion; MNA, from US\$2.8 billion to US\$2.2 billion; and SAR, from US\$3.24 billion to US\$3.22 billion.

TABLE 4: TOTAL INVESTMENT IN ENERGY BY REGION IN 2015

	Number of Projects	Total Investment (US\$ billions)	% of Total	% Change from 5-Year Average
EAP	60	\$12.3	32.7%	+0.5%
LAC	73	\$11.2	29.8%	-58%
AFR	22	\$6.2	16.5%	+71%
SAR	33	\$3.2	8.5%	-81%
ECA	7	\$2.5	6.6%	-81%
MNA	10	\$2.2	5.9%	+25%
Total	205	\$37.6	100%	-50%

East Asia and Pacific. EAP regained the first position as the top market for energy PPI investment, which the region has not achieved since 2005. EAP attracted US\$12.3 billion for 60 new projects, recording a share of 33 percent of global investment. This was the second highest percentage in the last 10 years and well above the 16 percent five-year average.

TABLE 5: TOP 5 DEALS IN THE EAP REGION IN 2015

Country	Project	Amount (US\$ millions)	Sponsors: % Ownership/Sponsor Country
Malaysia	3B Jimah East Power Plant (coal-fired)	\$2,675	Mitsui (30%/Japan)
Philippines	San Buenaventura Power Plant (coal-fired)	\$1,195	Manila Electric Company (51%/Philippines); EGCO Group (49%/Thailand)
Philippines	Therma Visayas Power Plant (coal-fired; 340MW)	\$937	Aboitiz Equity Ventures (80%/Philippines); Vivant Corporation (20%/Philippines)
Philippines	Masinloc II Power Plant Expansion	\$700	AES Corporation (51%/Philippines; United States); EGCO Group (41%/Thailand)
Philippines	Limay Power Plant (coal-fired)	\$648	San Miguel Corporation (100%/Philippines)

Latin America and the Caribbean. LAC attracted US\$11.2 billion in energy commitments, below the five-year average of US\$13.4 billion and well under the ten-year average of US\$20.5 billion. The driving factor behind the plunge in investment in 2015 was Brazil and Mexico. Brazil particularly experienced the lowest PPI in energy in the last 10 years at only US\$2.1 billion, approximately 15 percent of the ten-year average of US\$14.1 billion.

TABLE 6: TOP 5 DEALS IN THE LAC REGION IN 2015

Country	Project	Amount (US\$ millions)	Sponsors: % Ownership/Sponsor Country
Mexico	Los Ramones Gas Pipeline Phase II Norte	\$1,513	Sempra Energy International (25%/United States)
Mexico	El Encino-La Laguna Natural Gas Pipeline	\$826	Partners Group (87%/Switzerland); Grupo Diavaz (13%/Mexico)
Chile	San Juan Wind Farm	\$500	Latin America Power (100%/Peru)
Peru	Central Termoelectrica De Ilo-Nodo Energetico del Sur	\$432	ENGIE (formerly GDF SUEZ) (100%/United States)
Chile	Central Hidroelectrica de Pasada Nuble	\$350	Electrica Puntilla (100%/Chile)

Africa. AFR had 22 deals in six countries totaling US\$6.2 billion, which is almost three times larger than the previous year's investment. South Africa took in 64 percent of new investment, with 16 new projects for US\$4.0 billion. Following South Africa were Nigeria with US\$880 million and Zambia with US\$830 million.

TABLE 7: TOP 5 DEALS IN THE AFR REGION IN 2015

Country	Project	Amount (US\$ millions)	Sponsors: % Ownership/Sponsor Country
South Africa	Xina Solar One CSP	\$900	Abengoa (40%/Spain); Public Investment Corporation (20%/South Africa)
Nigeria	Azura-Edo Gas-Fired Power Plant Phase 1	\$880	Old Mutual (15%/South Africa); Macquarie Infrastructure Group (15%/Australia); Aldwych International Ltd. (14%/United Kingdom); Asset & Resource Management Company Ltd. (6%/Nigeria); Amaya Capital Partners (25%/Mauritius); American Capital Energy & Infrastructure (25%/United States)
Zambia	Maamba Coal-Fired Power Plant- Phase-I	\$830	Nava Bharat Ventures Ltd. (65%/India); ZCCM Investment Holdings (35%/Zambia)
South Africa	Karoshhoek Solar One CSP	\$688	ACS Group (20%/Spain); Investec (15%/South Africa)
Rwanda	Akanyaru Valley Peat-Fired Power Project	\$320	Hakan Mining and Electricity Generation Inc. (51%/Turkey)

South Asia. In SAR, 33 projects for US\$3.2 billion reached financial closure, akin to 2014, which recorded 32 projects for US\$3.3 billion. Yet the new projects only represent 9 percent of the global energy sector PPI in 2015.

TABLE 8: TOP 5 DEALS IN THE SAR REGION IN 2015

Country	Project	Amount (US\$ millions)	Sponsors: % Ownership/Sponsor Country
Pakistan	Gulpur Hydropower Project	\$367	Korea Electric Power Corporation (76%/Korea, Rep.); Lotte (6%/Korea, Rep.); Daelim (18%/Korea, Rep.)
Bangladesh	Bibiyana Power Project	\$300	Summit Industrial and Mercantile Corp. (80%/Bangladesh); General Electric (20%/United States)
India	Green Infra Wind Portfolio (218.4 MW)	\$220	Green Infra Wind Energy Limited (100%/India)
India	Ratlam Windfarm Development (170 MW)	\$200	Continuum Wind Energy (100%/Singapore)
Pakistan	Gul Ahmed Wind Power Plant	\$135	Gul Ahmed Group (41%/Pakistan); InfraCo Asia (39%/Singapore); International Finance Corporation (20%/United States)

Europe and Central Asia. ECA had seven projects totaling US\$2.5 billion, 81 percent below the five-year average of US\$13.6 billion. The ECA's share of the global total has continuously decreased from 24 percent in 2010 to 7 percent in 2015. Turkey had three new projects out of the seven, capturing 62 percent of the total regional investment. Following Turkey were Georgia, Armenia, Lithuania, and Montenegro, each with one project. Interestingly, until 2015, none of these four countries had recorded a project since 2012.

TABLE 9: TOP 5 DEALS IN THE ECA REGION IN 2015

Country	Project	Amount (US\$ millions)	Sponsors: % Ownership/Sponsor Country
Turkey	Efeler Geothermal Project	\$940	Guris Group (100%/Turkey)
Turkey	Hamitabat Combined Cycle Power Plant	\$595	Limak Holding (75%/Turkey); InfraMed (25%/France; Morocco)
Georgia	Shuakhevi Hydropower Plant	\$417	Tata Enterprises (40%/India); International Finance Corporation (20%/NA); Clean Energy Group (40%/Norway)
Armenia	Vorotan Hydropower Plant	\$250	ContourGlobal (80/United States); International Finance Corporation (20%/NA)
Montenegro	Krnovo Wind Farm	\$155	Akuo Energy (50%/Japan); Ivicom Holding GmbH (50%/Austria)

Middle East and North Africa. Although in the last position among the six regions, MNA still attained US\$2.2 billion in energy commitments, representing 6 percent of the global investment commitments in energy. The largest two deals were in Morocco—the US\$1.0 billion and US\$800 million solar power complex projects. These two projects are sponsored by ACWA Power and have payment guarantees from the Moroccan government.

TABLE 10: TOP 5 DEALS IN THE MNA REGION IN 2015

Country	Project	Amount (US\$ millions)	Sponsors: % Ownership/Sponsor Country
Morocco	NOORo II Parabolic CSP	\$1,00	ACWA Power (70%/Saudi Arabia)
Morocco	NOORo III Tower CSP	\$800	ACWA Power (70%/Saudi Arabia)
Jordan	Shams Ma'an PV Solar Power Plant	\$168	Mitsubishi (35% /Japan); Qatar Electricity & Water Company (35%/Qatar)
Jordan	Jordan Solar One PV Power Plant	\$70	AMP Solar Group (67%/Canada); Evolution Solar Group (17%/ United States); RAI Energy International (13%/United States)
Jordan	Falcon Ma'an Solar PV Plant	\$50	Catalyst Private Equity Fund (50%/Jordan), Desert Technologies (25%/Saudi Arabia); Gruppo Maccaferri (25%/Italy)

About the Private Participation in Infrastructure Projects Database:

The Private Participation in Infrastructure Database is a product of the World Bank's Public-Private Partnerships Group. Its purpose is to identify and disseminate information on private participation in infrastructure projects in low- and middle-income countries. The database highlights the contractual arrangements used to attract private investment, the sources and destination of investment flows, and information on the main investors. The site currently provides information on more than 8,000 infrastructure projects dating from 1984 to 2015. It contains over 50 fields per project record, including country, financial closure year, infrastructure services provided, type of private participation, technology, capacity, project location, contract duration, private sponsors, debt providers, and development bank support. This project represents the best efforts of a research team to compile publicly available information on those projects, and should not be seen as a fully comprehensive resource. Some projects—particularly those involving local and small-scale operators—tend to be omitted because they are usually not reported by major news sources, databases, government websites, and other sources used by the PPI Projects database staff. For more information, please visit: <http://ppi.worldbank.org/>.

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