



REPORT

POWER SHIFT:

SHIFTING G20 INTERNATIONAL PUBLIC FINANCE FROM COAL TO RENEWABLES

AUTHORS

Han Chen, Jake Schmidt, *Natural Resources Defense Council*

DATA COMPILED BY

Han Chen, Noah Lerner, Erin Wong, Sarah Lyn Chirichigno, and Carley Reynolds

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Executive Summary

Renewable energy is taking the globe by storm, becoming competitive with and sometimes even cheaper than coal power. According to a 2016 report by the International Renewable Energy Agency, prices for solar PV modules and wind turbines have fallen roughly 80 percent and 30 to 40 percent respectively since 2009, thanks to technology improvements and economies of scale by the countries that have invested heavily and installed large amounts of solar and wind capacity, such as China, Germany and the U.S. Given the climate challenge the planet is facing, this shift is a crucial step in reducing global emissions and providing countries with access to clean energy. Many G20 countries are leading this transition. China invested \$366 billion in renewable energy domestically from 2013 to 2016, 30 percent of the global total, followed by the United States (18 percent), Japan (12 percent), the UK (7 percent) and Germany (6 percent.)

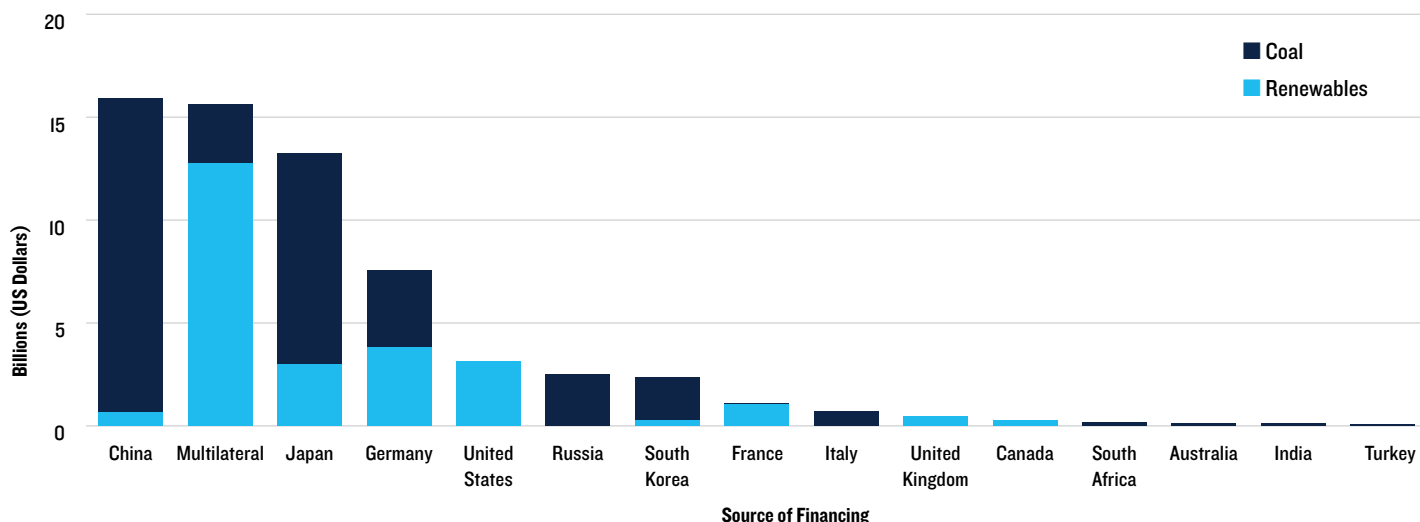
In addition to G20 countries' domestic actions to expand renewable energy, it is also important to evaluate how they are using their public funds abroad. This report examines the public financing provided by G20 countries to developing countries, and whether their international actions to support clean energy are in line with their domestic actions. The report finds that G20 countries' financing for renewable energy projects abroad has indeed grown, but more effort is needed to shift investments away from coal to renewables.

Coal power plants represent the single largest source of global carbon emissions from combustion. These emissions jeopardize our chances of realizing the Paris Agreement's goal of limiting global temperature rise to 2 degrees Celsius above preindustrial levels, and making best efforts to keep it below 1.5 degrees Celsius. Coal power plants also emit a range of harmful air pollutants (e.g., sulfur dioxide, nitrogen oxides, particulate matter, and mercury) that negatively impact the environment and public health. Nevertheless, G20 nations have invested billions—and counting—in coal power projects beyond their borders, and are just starting to ramp up financing for renewable energy to reach comparable levels.

Countries Financing Coal Projects: This report shows that G20 members provided at least \$38 billion USD in public financing for overseas coal projects from 2013 to 2016. During that period, the five biggest G20 coal financers were China (\$15 billion USD), Japan (\$10 billion USD), Germany (\$4 billion USD), Russia (\$3 billion USD), and South Korea (\$2 billion USD). These five countries supplied 89 percent of G20 coal financing. Multilateral institutions in which G20 countries play a prominent role provided another \$3 billion USD, representing 8 percent of total financing.

Countries Financing Renewables Projects: During the same period, G20 countries invested only \$25 billion USD in solar, wind and geothermal energy abroad. The top five renewable energy financers were Germany (\$4 billion USD), United States (\$3 billion USD), Japan (\$3 billion USD), France (\$1 billion USD), and China (\$0.6 billion USD). These five countries supplied 46 percent of G20 renewables financing. Multilateral banks provided \$13 billion USD, 50 percent of the financing for renewables projects.

FIGURE ESI: FINANCING BY G20 COUNTRIES FOR COAL AND RENEWABLE ENERGY PROJECTS ABROAD (2013–2016)



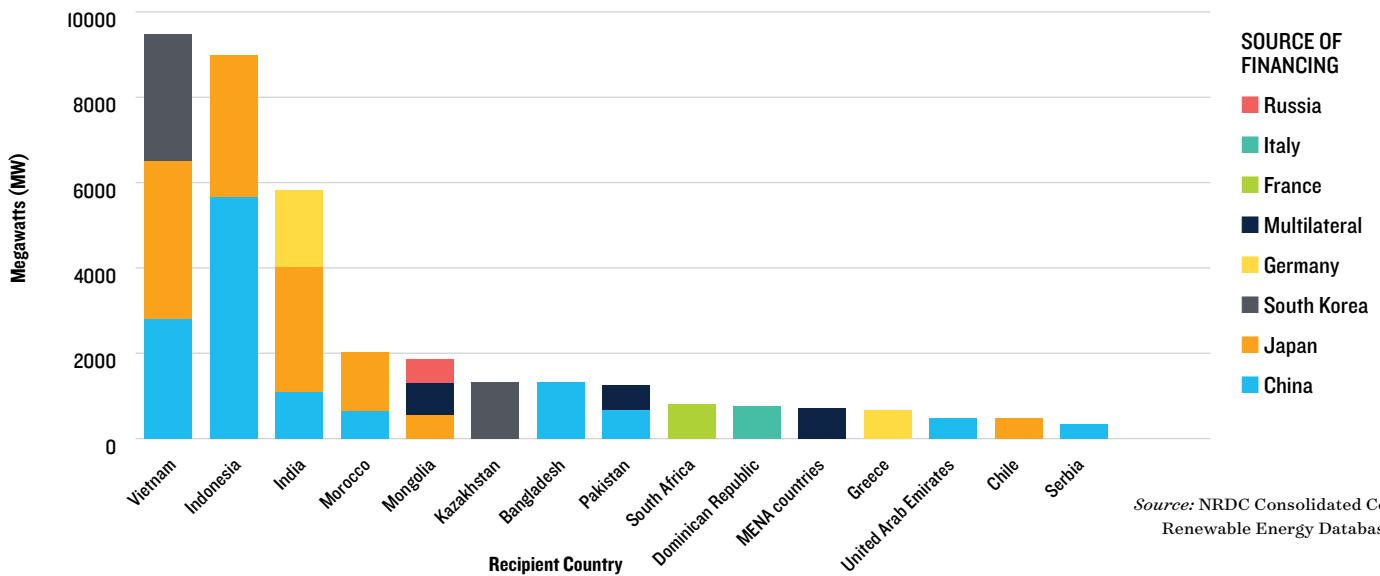
Source: NRDC Consolidated Coal and Renewable Energy Database 2017, based on data from various sources; since some of the public financial institutions involved do not fully disclose energy financing data, these figures could be underestimates; see Methodology section for further details.

Future Coal Versus Renewables Projects: Most G20 public finance for future projects is still aimed at coal, to the tune of \$28 billion USD. By comparison, only \$14 billion USD in public financing is being considered for renewable energy.

Top Potential Financers of Future Coal Projects: The leading potential financers for upcoming coal projects abroad are China (\$13 billion USD), Japan (\$9 billion USD), South Korea (\$3 billion USD), India (\$1 billion USD), and Australia (\$1 billion USD). Germany, the United States, Italy, and Russia may provide additional financing for coal, although the amount of financing is not yet disclosed.

Hotspots for Coal Projects: From 2013–2016, G20 financing supported coal projects in Vietnam (9GW), Indonesia (9GW), India (6GW), Morocco (2GW), Mongolia (2GW) and in many other countries.

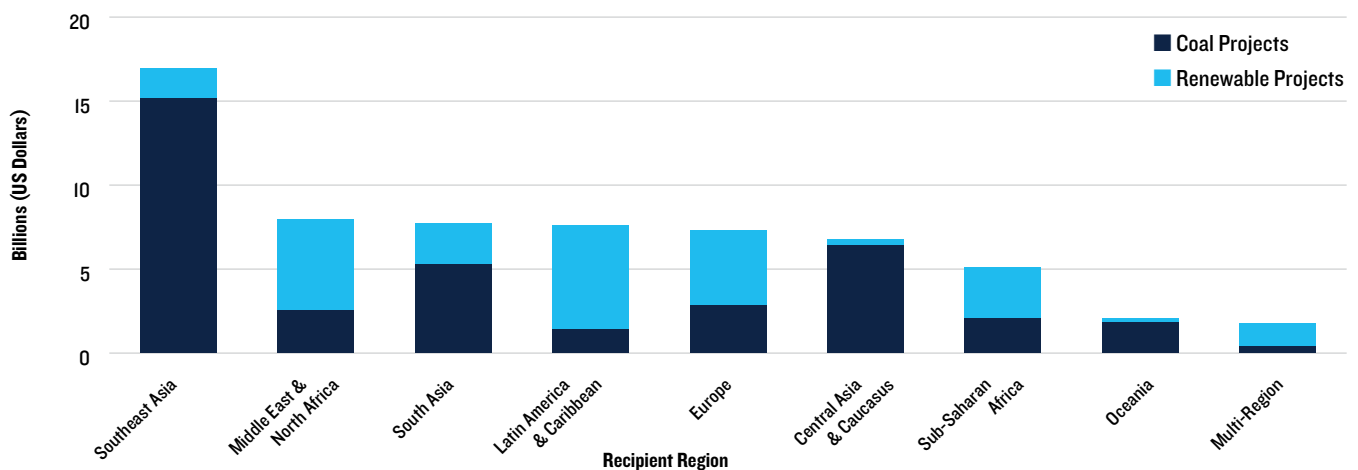
FIGURE ES2: TOP RECIPIENT COUNTRIES OF FINANCING FOR COAL POWER PLANTS (2013–2016)



Source: NRDC Consolidated Coal and Renewable Energy Database 2017

The imbalance between investments in coal versus renewable energy is especially stark in South and Southeast Asia, where financing for coal projects from a handful of G20 institutions far exceed investments in renewable energy. G20-financed coal power plants may have support from some government officials and utility companies in recipient countries, but they often face strong opposition from the local communities. Also, demand for stronger pollution standards is increasing. Yet G20 countries continue to support power companies, generator and turbine manufacturers, and construction companies involved in coal power projects, rather than help developing countries diversify away from coal and into renewable energy.

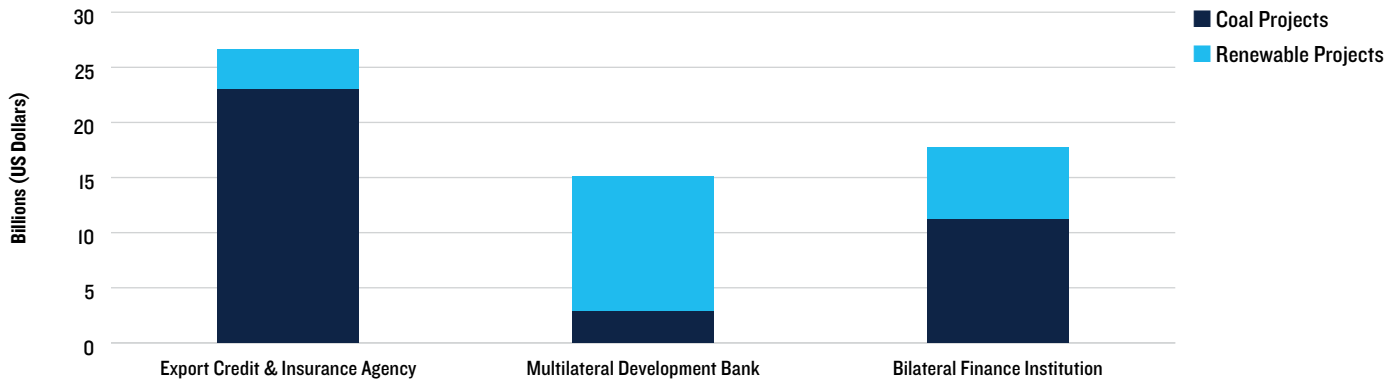
FIGURE ES3: RENEWABLES VS. COAL FINANCING BY REGION (2013–2016)



Source: NRDC Consolidated Coal and Renewable Energy Database 2017.

Financial Institutions Responsible for the Most Coal and Renewables Projects: Among the G20 financing institutions involved, export credit and insurance agencies financed far more coal than renewable energy projects. The multilateral development banks finance both renewables and coal. Other G20 public finance institutions have a mixed track record. Some have paved the path to renewable energy. Others, such as Japan International Cooperation Agency and China Development Bank (based on available public information), provide far more support for coal projects despite global commitments like the Paris Agreement and the United Nations Sustainable Development Goals. While all nations need to honor the Paris and SDG commitments, G20 nations have a special responsibility as the lead influencers in the global economy. Continued financing for coal by G20 nations also directly undermines the G20 Climate and Energy Action Plan for Growth, released in the summer of 2017 in Hamburg, Germany.

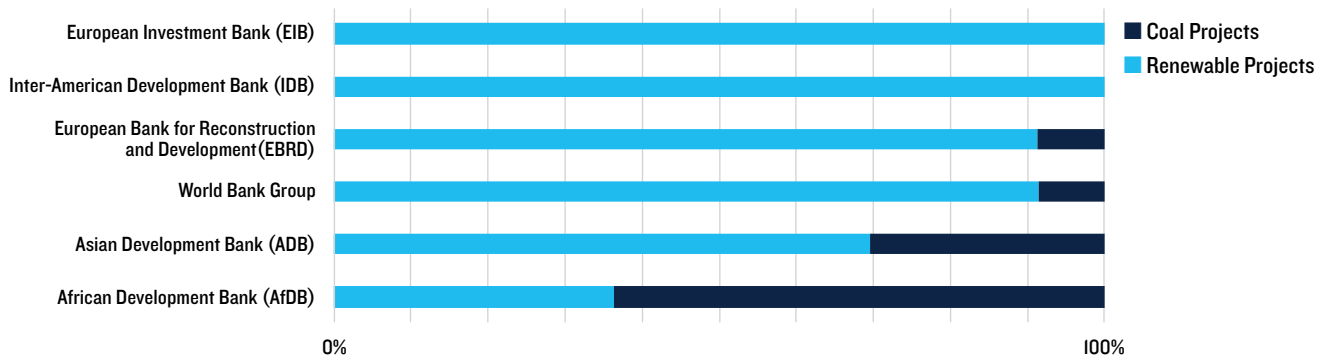
FIGURE ES4: RENEWABLES VS. COAL FINANCE BY DIFFERENT TYPES OF FINANCIAL INSTITUTIONS (2013–2016)



Source: NRDC Consolidated Coal and Renewable Energy Database 2017.

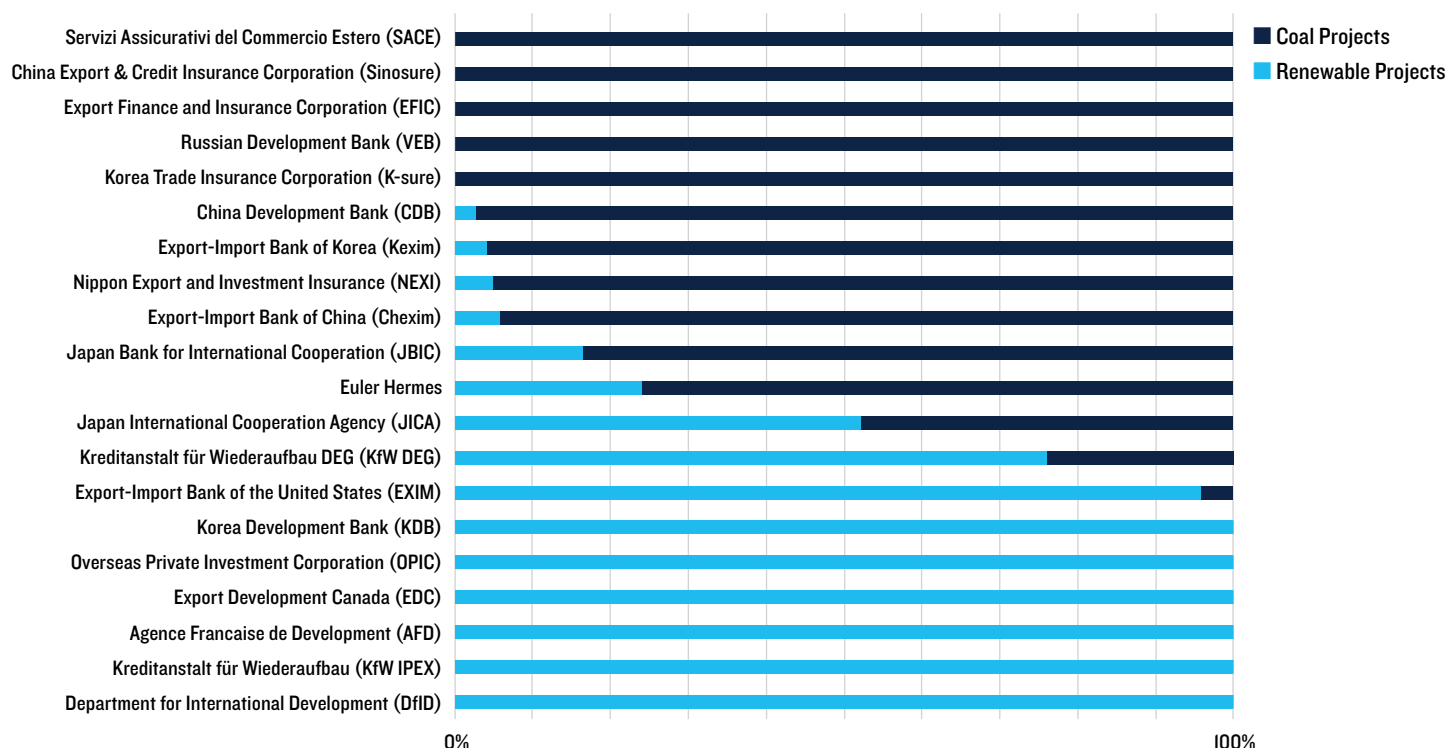
The power is shifting, though. Policies adopted by some of the G20 countries as of January 2017—through membership in the OECD arrangement on export credits—will limit financing for coal plants in the future. Rapidly falling costs for renewable energy are making these technologies competitive with, and sometimes even cheaper than, coal power, especially if we fully count the costs from coal’s health and climate impacts. Over the past three years, some G20 institutions have begun to recognize the superior viability of large-scale renewable energy projects and moved their money accordingly. Some G20 financing institutions have now shifted most of their support into renewable energy projects across dozens of countries. This list includes the U.S. Overseas Private Investment Corporation, Germany’s KfW Development Bank, and the European Bank for Reconstruction and Development. Even some of the institutions financing the most coal power projects overseas (e.g., China Development Bank, Japan International Cooperation Agency, and Japan Bank for International Cooperation) have expanded their portfolios to include renewable energy.

FIGURE ES5: RATIO OF COAL TO RENEWABLES INVESTMENTS BY MULTILATERAL DEVELOPMENT BANKS (2013–2016)



Source: NRDC Consolidated Coal and Renewable Energy Database 2017.

FIGURE ES6: RATIO OF COAL TO RENEWABLES INVESTMENTS BY BILATERAL FINANCE INSTITUTIONS (2013–2016)



Source: NRDC Consolidated Coal and Renewable Energy Database 2017.

RECOMMENDATIONS

Based on the responsibility of G20 countries to lead the fight against climate change and the important role they should play in helping developing countries build low carbon energy systems, we recommend that:

G20 governments should direct their financing institutions to fully disclose energy financing data.

G20 governments need to immediately end international public financing for coal power plants, except in very rare circumstances in which there is no other option for energy access in low-income communities.

G20 governments should direct their public finance institutions to prioritize finance for clean energy projects, in line with the Paris Agreement, Sustainable Development Goals, and the G20’s Hamburg Climate and Energy Action Plan for Growth.

Recipient countries, at the same time, need to prioritize the long-term well-being of their citizens by incentivizing investments in renewable energy. Utility companies should consider the comprehensive costs and benefits of coal, factoring in the long-term economic risks of stranded coal assets as well as the ultimate climate, health, and environmental costs. Any proposed new coal plants should include the most sophisticated pollution controls, and sponsors should demand concessional loans for renewable projects.

While G20 members may be making progress toward their own commitments under the Paris Agreement, their investments in coal projects abroad impede global climate progress and undercut the agreement’s ultimate potential. In short, the G20 countries need to put their money where their mouth is and shift all of their investments from coal to clean energy.

THE DATA

We collected data from a variety of public and commercial sources (see Methodology section) to analyze G20 public financing for international coal and renewable energy projects (solar, wind, and geothermal) in the form of loans, grants, equity financing, guarantees, and technical assistance funds. We reviewed financing for projects by G20 export credit and insurance agencies and bilateral development finance institutions as well as the multilateral development banks in which G20 countries play a major role: the World Bank, African Development Bank, Asian Development Bank, Inter-American Development Bank, European Investment Bank, European Bank for Reconstruction and Development, and Asian Infrastructure and Investment Bank.

Introduction

A seminal 2014 report from the Intergovernmental Panel on Climate Change (IPCC) clearly states that human activities, especially the burning of fossil fuels, have increased the concentration of greenhouse gases in the atmosphere, directly causing global temperatures to rise.¹ Coal use accounts for two-fifths of all global energy-related carbon emissions, more than any other individual source.² Moreover, the IPCC has previously stated that, in order to avoid the worst impacts of climate change, global temperature rise must be capped at 2 degrees Celsius above preindustrial levels. If we want even a 50 percent chance of staying within that threshold, at least 80 percent of remaining global coal reserves must remain unused.³

Fortunately, renewable energy is already taking the globe by storm, becoming competitive with and sometimes even cheaper than coal power. Many G20 countries are leading this transition. According to Bloomberg New Energy Finance, China invested \$366 billion in renewable energy domestically from 2013 to 2016, 30 percent of the global total, followed by the United States (18 percent), Japan (12 percent), the UK (7 percent) and Germany (6 percent.)

In addition to G20 countries' domestic actions to expand renewable energy, it is also important to evaluate how they are using their public funds abroad. This report examines the public financing provided by G20 countries to developing countries, and whether their international actions to support clean energy are in line with their domestic actions.

Many G20 nations have played pivotal roles to galvanize global climate action, but it is worth asking if the investments these nations are making abroad are in line with their domestic actions, or if they are still mainly financing high-carbon coal power plants abroad.

Not only do these investments run counter to the IPCC's prescriptions, but they directly defy the G20's global commitments, including the Paris Agreement, the United Nations Sustainable Development Goals (SDG), and the G20's own Hamburg Climate and Energy Action Plan. These are the very same commitments G20 nations encouraged other countries to make as well.

But the tide is turning in the right direction. In 2013, several countries and development banks announced commitments to reduce coal finance. While the G20's shift from coal to renewable energy is encouraging, more can be done. Every dollar put toward new coal infrastructure is a dollar that could be better spent on clean energy.

ON THE GLOBAL STAGE: G20 CLIMATE COMMITMENTS

We compared G20 public financing for coal versus renewable energy projects starting in 2013. This includes export support and development aid via bilateral and multilateral development institutions. We focused on the G20 because of its diverse global membership and its role in setting worldwide norms, as its members account for 85 percent of global GDP.⁴ It should be noted that the G20 nations are financiers of coal projects in some cases and recipients in others. We focused on international—as opposed to domestic—financing in an effort to understand whether international financing is helping or hindering countries' efforts to achieve their goals under the Paris Agreement and the Sustainable Development Goals.

In December of 2015, 195 nations adopted the Paris Agreement at the 21st Conference of the Parties (COP21) to the United Nations Framework Convention on Climate Change (UNFCCC). The agreement's ultimate goal is to limit global temperature rise to 2 degrees Celsius above preindustrial levels, making best efforts to limit it to 1.5 degrees. The agreement also aims to make “finance flows consistent with a pathway toward low greenhouse gas emissions and climate-resilient development.”⁵ To achieve these goals, it demands concrete action plans and regular progress reports from each signatory. All G20 nations are signatories, although the United States under Trump has announced plans to withdraw by 2020, despite having played a pivotal role in negotiating the original Agreement.

Also in 2015, 192 countries, including all G20 nations, signed on to the United Nations Sustainable Development Goals. These include increasing access to clean energy and growing the share of renewable energy in the global energy mix.⁶ In 2017, the G20 Leaders' Declaration and G20 Hamburg Climate and Energy Action Plan for Growth both reiterated the importance of low-carbon development and the aims of the Paris Agreement and Sustainable Development Goals.⁷ The Action Plan also called on countries to phase out inefficient fossil fuel subsidies that “distort energy markets, impede investment in clean energy sources, place a strain on public budgets, and incentivize unsustainable infrastructure investments.”⁸ Financing for coal projects fits every one of those descriptions of a subsidy that needs to be eliminated.⁹ These developments followed 2013 decisions to limit coal financing by the United States, World Bank, European Investment

Bank, European Bank for Reconstruction and Development, Norway, Finland, Iceland, Denmark, Sweden, France, Germany, the Netherlands and the United Kingdom.¹⁰

Finally, six members of the G20 that are also members of the Organisation for Economic Co-operation and Development (OECD): Australia, Canada, the European Union, South Korea, Japan, and the United States, have committed through the OECD Arrangement on Officially Supported Export Credits to limit financing for coal power. These new rules went into effect on January 1, 2017.¹¹ Several of these nations have already begun to shift their overseas energy financing toward renewable energy. The global mandate to increase access to clean energy and reduce emissions has never been clearer.

METHODOLOGY AND DATA SOURCES

We examined international coal and renewable energy financing from January 2013 to August 2017 by G20 public financing institutions.¹² We also examined the multilateral development banks in which G20 countries play a major role.¹³

Our coal-related data include information on coal power plants, mining, transport, and transmission and distribution projects. Renewable energy projects covered include solar, wind, and geothermal energy and associated transmission and distribution projects.

The NRDC Consolidated Coal and Renewable Energy Database 2017 publicly available [here](#), includes information from institutional websites, news articles, the IJGlobal Project Finance & Infrastructure Journal, SourceWatch, Oil Change International's Shift the Subsidies database, Platts World Electric Power Plants Database, Bloomberg New Energy Finance, and Boston University's Global Economic Governance Initiative on China's Global Energy Finance. The Japan Center for a Sustainable Environment and Society (JACSES) provided information regarding Japan's projects, and Urgewald provided additional information about German institutions, which do not fully disclose their financing information. It is important to note that several countries, including Germany, Korea and China have financial institutions that do not provide detailed financial information regarding projects on their websites. In such cases, non-government sources and news articles such as those listed above were utilized to provide estimates of financing. For this reason, it is possible that financing totals included in this database are not presenting the full picture and there are additional projects that are financed but not included in the database.

Institutions Included in the Database

The institutions covered in this report include multilateral development banks (MDBs), export credit and insurance agencies, and bilateral development banks and agencies.

Major multilateral development banks (MDBs) are backed by large sums of public money from member governments. This allows them to finance recipient governments and the private sector at lower interest rates and on better terms (e.g., longer tenors) than do commercial lenders. We included information on coal and renewable energy investments from World Bank Group,¹⁴ the African Development Bank, the Asian Development Bank, the Asian Infrastructure and Investment Bank, the Inter-American Development Bank, the European Bank for Reconstruction and Development, and the European Investment Bank.¹⁵

Export credit and insurance agencies (ECAs) provide government-backed loans, credits, and guarantees for the international operations of corporations from the home country. ECAs provide public financial backing for risky projects, including coal, that might otherwise never get off the ground. Most industrialized nations and emerging economies have at least one ECA, which is usually an official or quasi-official branch of government. Our database includes information on coal financing from Export Development Canada (EDC), France's Compagnie Française d'Assurance pour le Commerce Extérieur (COFACE), Euler Hermes, Italy's Servizi Assicurativi del Commercio Estero (SACE), Japan Bank for International Cooperation (JBIC), Nippon Export and Investment Insurance (NEXI-Japan), UK Export Finance (UKEF), Export-Import Bank of the United States (Ex-Im US), Export-Import Bank of Korea (Kexim), Export Credit Insurance Corporation of South Africa, Export Finance and Insurance Corporation (EFIC), Export-Import Bank of China, Korea Trade Insurance Corporation (K-sure), and Sinosure-China Export & Credit Insurance Corporation.

Bilateral development agencies and development banks include development finance and aid agencies, international branches of national development banks, and trade promotion agencies. Generally, these institutions finance international coal projects, but they sometimes also support domestic ones. We excluded most of the latter but did include a small number of domestic projects when information was available to demonstrate that the financing was for export-related purposes. Bilateral development institutions include the Japanese International Cooperation Agency (JICA), Germany's Kreditanstalt für Wiederaufbau (KfW), China Development Bank (CDB), Overseas Private Investment Corporation (OPIC), Russian Development Bank (VEB), Development Bank of Southern Africa, Agence Française de Développement, and Korea Development Bank.

Types of Financing

Coal and renewable energy project financing can take many forms, detailed below.

- **Direct project financing:** Loans, grants, and equity financing.
- **Guarantees for projects:** Insurance to cover the overall risk of an investment at a lower cost and longer tenor (typically 12 to 20 years) than commercial insurance.
- **Policy lending and technical assistance:** Allows MDBs and development agencies to influence policies, regulations, and institutions so that costs, benefits, and development preferences are more favorable to certain sectors.
- **Loans to financial intermediaries:** Loans, a line of credit, or equity financing provided by an international institution to a local bank, private equity fund, or special government-managed fund (e.g., an infrastructure development fund). The financial intermediary then passes on the original institution's funds. These loans or lines of credit are not fully counted in the database unless the financing is confirmed for a project that has reached financial close. In most other cases, it can be unclear when and what type of projects will be financed by the intermediary.¹⁶

G20 International Public Finance for Renewable Energy on the Rise, but Coal Still Dominates

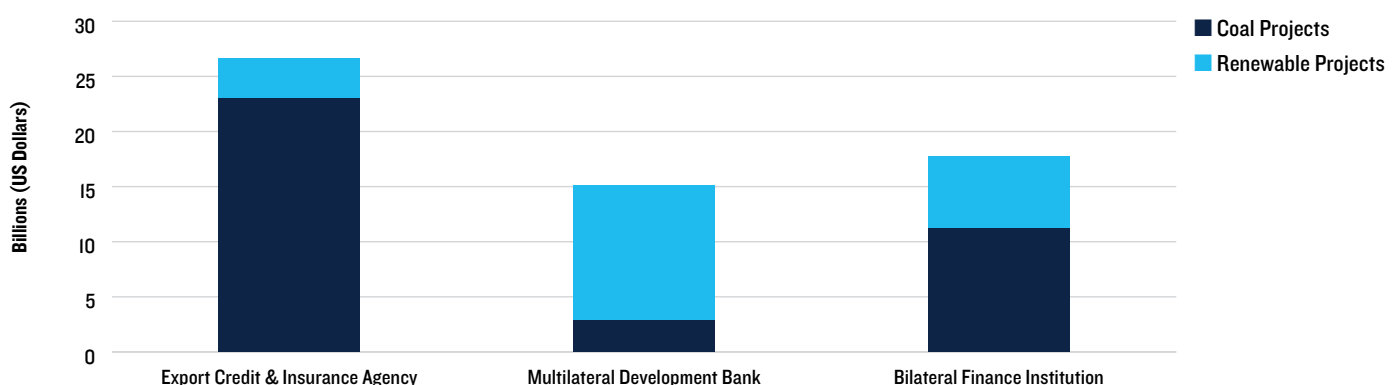
Our database shows that since 2013, international public financing from G20 countries has favored coal over renewable energy, though funding levels vary heavily by region. From 2013 to 2016, G20 public finance institutions invested about \$38 billion USD in coal power projects abroad, compared with \$25 billion USD for renewable energy.

Public finance institutions have been slow to catch up with the changing global energy landscape and the overall private sector trend, which favors renewable energy over coal power. Granted, some public finance institutions have made significant progress shifting their international investments from pollution-heavy coal projects to clean energy projects. These include the Overseas Private Investment Corporation, Kreditanstalt für Wiederaufbau, European Bank for Reconstruction and Development, World Bank Group, Asian Development Bank, and European Investment Bank. Still, as will be discussed later, many financial institutions still need to make significant changes to bring their financing to align with the Paris Agreement and Sustainable Development Goals.

While MDBs and some bilateral development finance institutions have increased their financing for renewable energy over coal, other bilateral development finance institutions and export credit and insurance institutions have provided more money for coal. This is largely due to differing mandates between development finance institutions and ECAs. Most development finance institutions have a mission to improve quality of life, economic prosperity, and security in developing countries. Export credit and insurance agencies, on the other hand, primarily promote overseas projects to benefit their home countries and enhance the profits of their domestic industries. For them, global benefits are either a secondary goal or not an important consideration at all.¹⁷ So in countries with eager coal technology exporters, such as China, Japan, and South Korea, company profits can directly conflict with a recipient country's long-term economic, social, and environmental interests, as discussed later in this report.

Unsurprisingly, then, G20 export credit and insurance agencies have continued to finance far more coal than renewable energy projects. The multilateral development banks have shifted much of their financing into renewable energy, but still finance some coal projects. G20 bilateral development agencies have a mixed track record. Some are taking a lead in shifting finance away from coal and into renewable energy, while others, such as JICA and CDB, have continued to favor coal projects.

FIGURE I: RENEWABLES VS. COAL FINANCE BY DIFFERENT TYPES OF FINANCIAL INSTITUTIONS (2013–2016)

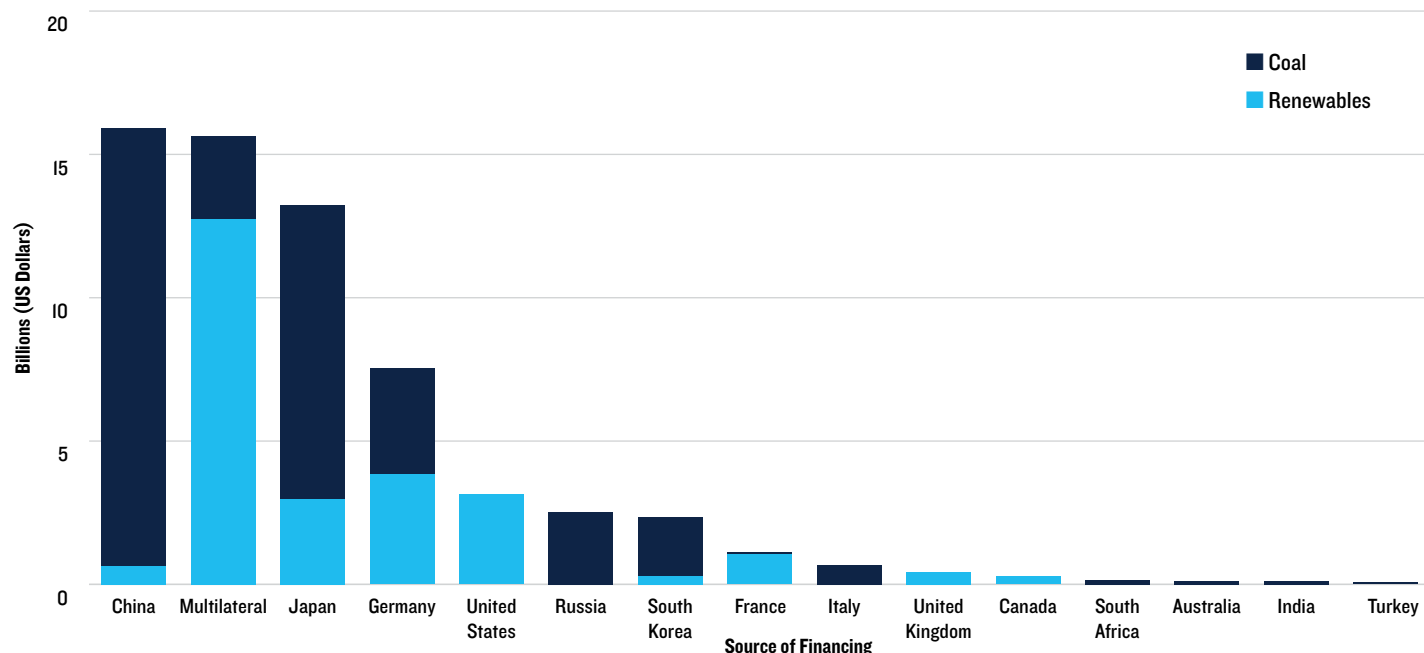


Source: NRDC Consolidated Coal and Renewable Energy Database 2017.

The Biggest Coal Portfolios in the G20

The top five G20 coal financers from 2013 to 2016 were China (\$15 billion USD), Japan (\$10 billion USD), Germany (\$4 billion USD), Russia (\$3 billion USD), and South Korea (\$2 billion USD). That's a collective \$34 billion USD, representing 89 percent of G20 coal financing. Multilateral institutions or other sources provided \$3 billion USD, or 8 percent of the total from 2013 to 2016.

FIGURE 2: FINANCING BY G20 COUNTRIES FOR COAL AND RENEWABLE ENERGY PROJECTS ABROAD (2013–2016)



Source: NRDC Consolidated Coal and Renewable Energy Database 2017.

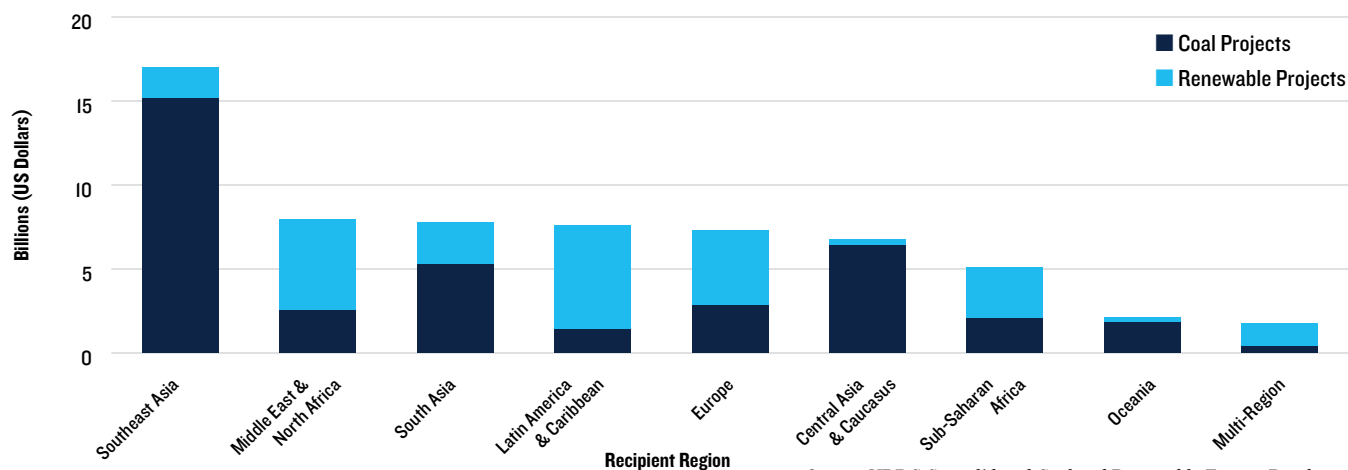
During the same period, G20 countries have invested only \$25 billion USD in renewable energy abroad. The top five renewable energy financiers were Germany (\$4 billion USD), United States (\$3 billion USD), Japan (\$3 billion USD), France (\$1 billion USD), and China, (\$0.6 billion). These five countries supplied 46 percent of G20 renewables financing. Multilateral banks provided \$13 billion USD, 51 percent of the financing for renewables projects.

The coal projects tended to be on a larger scale. For instance, Japan provided more than \$3 billion USD in public funds for the Java Batang coal plant, a massive 2 GW facility in Indonesia.¹⁸ Typical public financing for a renewables project was under \$100 million USD. The largest publicly financed renewables project to date is the \$964 million Ouarzazate Solar Project in Morocco. The plant will have a capacity of 582 MW, enough to power more than a million homes.¹⁹

Regional Variations and Recipient Countries for Coal and Renewables Finance

Investments in renewable energy versus coal vary broadly by region. In Latin America and the Middle East and North Africa, renewable energy has received more funding than coal. In contrast, coal receives a significant majority of financing in South and Southeast Asia. From 2013 to 2016, G20 public finance for coal projects in South and Southeast Asia totaled nearly \$20 billion USD, compared with only \$4 billion USD for renewable energy.

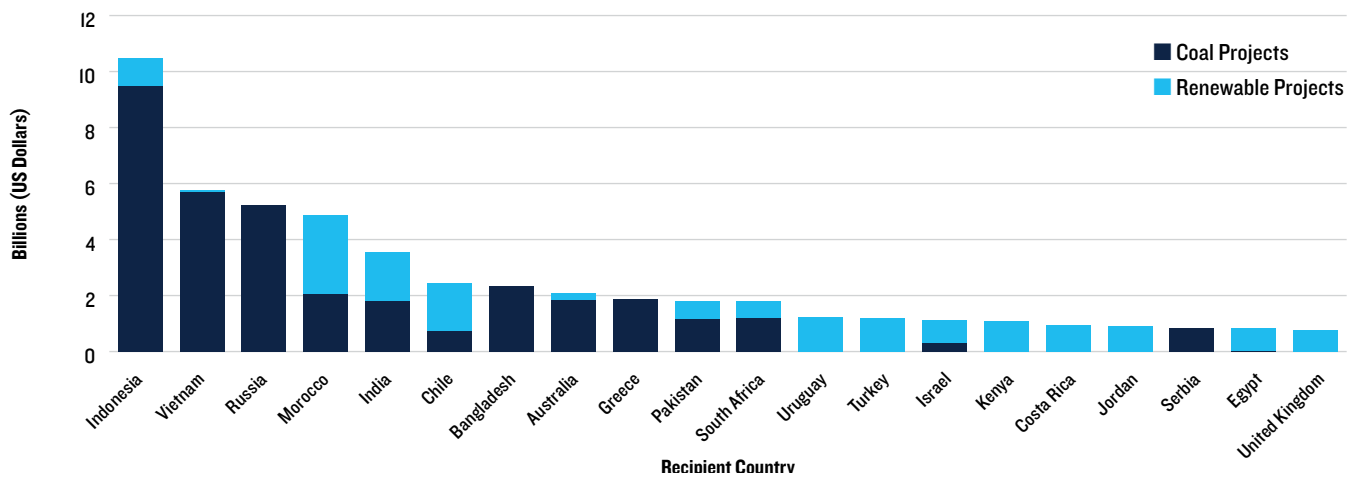
FIGURE 3: RENEWABLES VS. COAL FINANCING BY RECIPIENT REGION (2013–2016)



Source: NRDC Consolidated Coal and Renewable Energy Database 2017.

International public finance from 2013 to 2016 for coal power plants was concentrated in a handful of countries, including Indonesia, Vietnam, and Bangladesh.²⁰ While some of these countries have rapidly growing electricity demand, analysis shows that they may have already planned for far more coal-fired power than they will actually need, leading to excess costs for the public and state-owned utilities.²¹ Vietnam, fortunately, has already scaled back plans for massive coal expansion.²² Meanwhile, several countries that have proactively sought G20 support for renewable energy have had good results. Morocco, Chile, Costa Rica, and India have signed deals for renewable energy projects with G20 financing. Indonesia, despite its massive coal developments, has also received wind and geothermal investments from G20 countries.

FIGURE 4: PUBLIC FINANCING FOR RENEWABLES VS. COAL BY RECIPIENT COUNTRY (2013-2016)



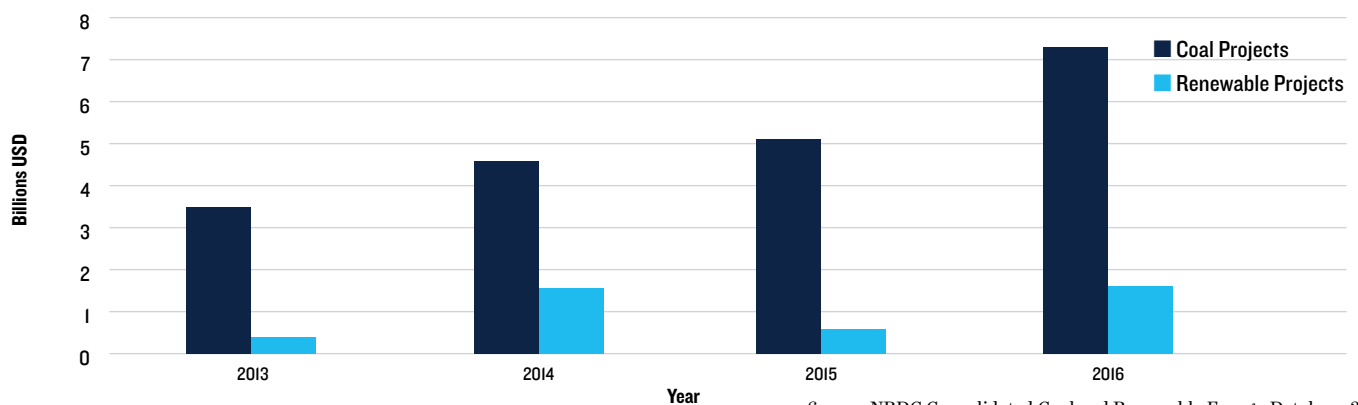
Source: NRDC Consolidated Coal and Renewable Energy Database 2017.

Excess coal infrastructure also squanders South and Southeast Asia’s massive renewable energy potential. For example, India has more than 100 GW of wind power potential, and Pakistan has more than 130 GW.²³ Indonesia has more than 530 GW of solar potential.²⁴

EXAMPLES OF PROJECTS IN SOUTH AND SOUTHEAST ASIA

COAL	RENEWABLE ENERGY
Java Batang coal plant (2,000 MW) in Indonesia	Sarulla geothermal plant (330 MW) in Indonesia
Payra coal plant (1,320 MW) in Bangladesh	Thatta wind farms (150 MW) in Pakistan
Song Hau coal plant (1,200 MW) in Vietnam	Karnataka wind farm (110 MW) in India

FIGURE 5: INTERNATIONAL PUBLIC FINANCING FOR RENEWABLES VS. COAL IN SOUTH AND SOUTHEAST ASIA BY YEAR (2013-2016)

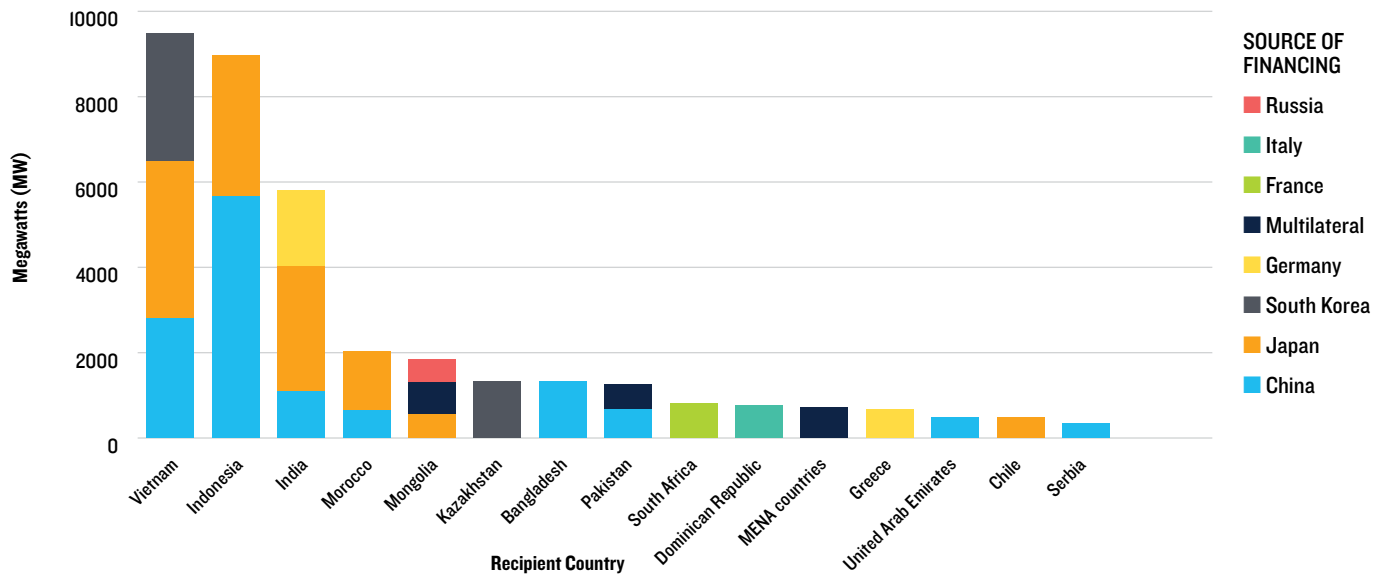


Source: NRDC Consolidated Coal and Renewable Energy Database 2017.

Recipient Countries for Coal Financing 2013–2016

Most G20 coal financing has supported coal projects in Asia. The countries with the most coal power installed as a result of G20 international public financing are Vietnam (9 GW), Indonesia (9 GW), India (6 GW), Morocco (2 GW), and Mongolia (2 GW).

FIGURE 6: TOP RECIPIENT COUNTRIES OF FINANCING FOR COAL POWER PLANTS (2013–2016)

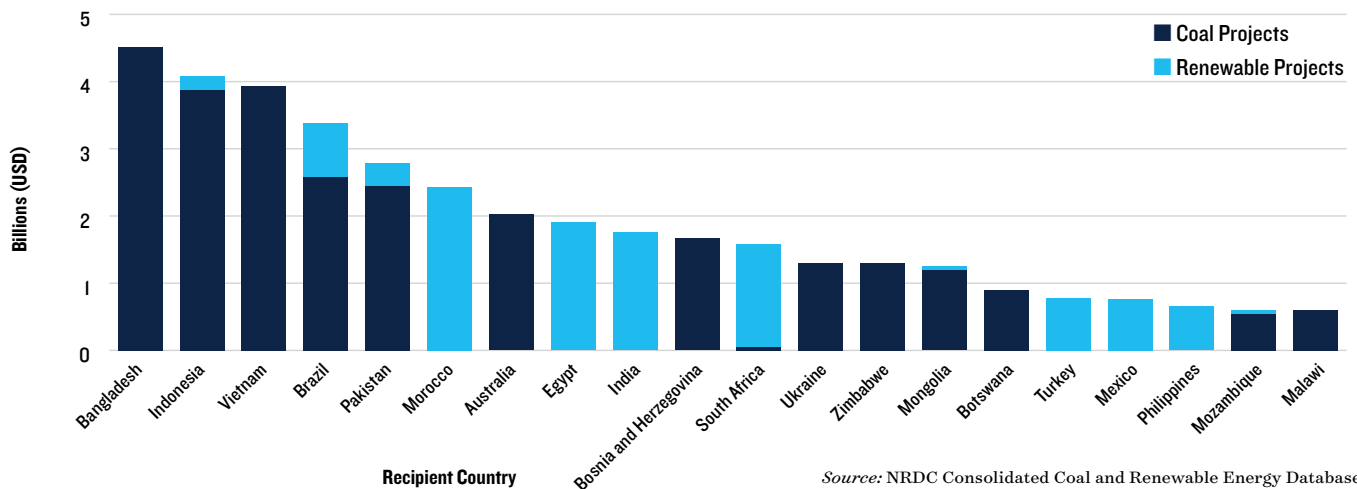


Source: NRDC Consolidated Coal and Renewable Energy Database 2017.

Coal and Renewable Energy Projects Under Consideration for G20 Public Financing

Most G20 public finance for future projects is still aimed at coal, to the tune of \$23 billion USD. By comparison, only \$14 billion USD in public financing is being considered for renewable energy. For future renewables financing, the top five recipient countries are Morocco (\$2.4 billion USD), Egypt (\$1.9 billion USD), India (\$1.8 billion USD), South Africa (\$1.5 billion USD), and Brazil (\$800 million USD).

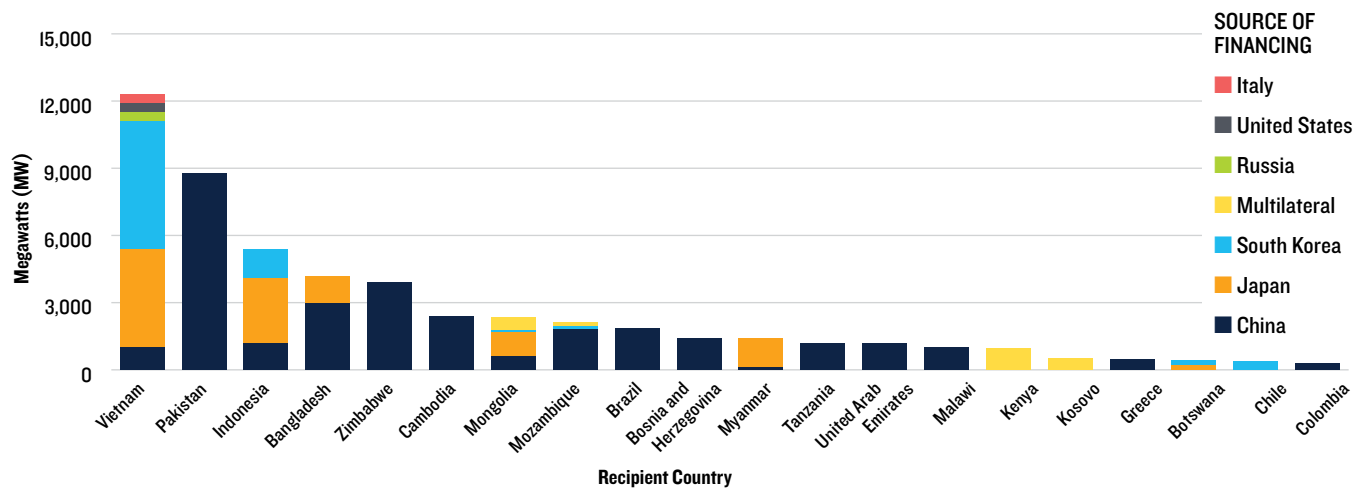
FIGURE 7: COAL VS. RENEWABLES FINANCE (PENDING)



Source: NRDC Consolidated Coal and Renewable Energy Database 2017.

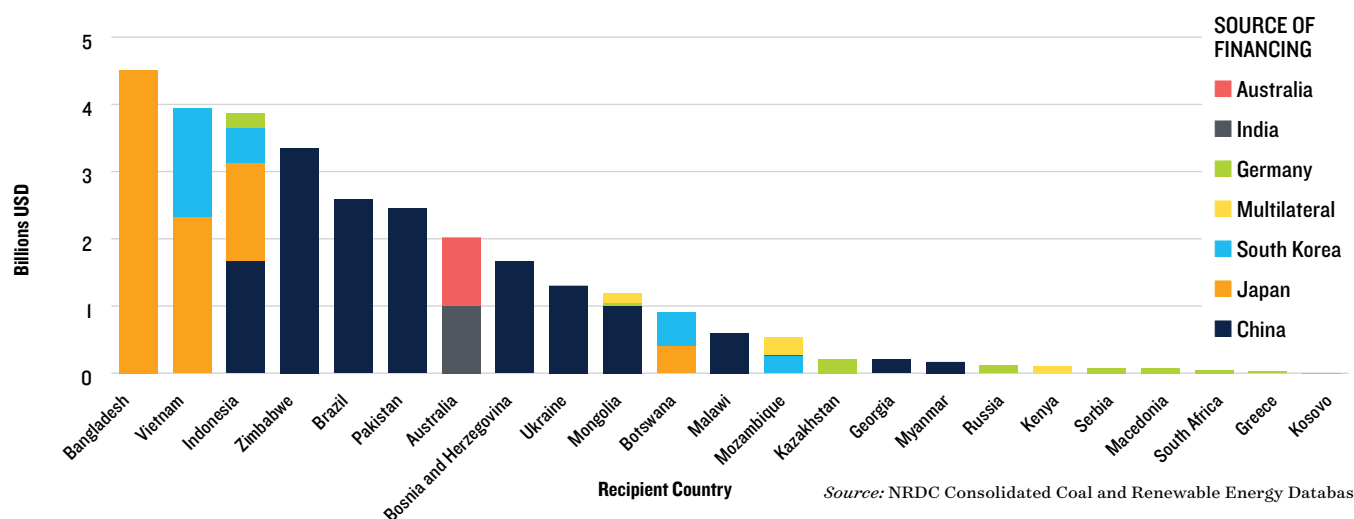
There are plans for G20 financing of new coal power in Vietnam (12 GW), Pakistan (9 GW), Indonesia (5 GW), Bangladesh (4 GW), and Zimbabwe (4 GW). The leading potential financiers of these upcoming coal projects are China (\$12 billion USD), Japan (\$6 billion USD), South Korea (\$1 billion USD), India (\$1 billion USD), and Australia (\$1 billion USD). Germany, the United States, Italy, and Russia may provide additional financing for coal, although the amounts have not yet been disclosed.²⁵ Financing of future coal power plants in these countries is inconsistent with G20 efforts to help developing countries adapt to climate change. For example, the Asian Development Bank recently noted that many parts of Asia could be as much as 6 to 8 degrees Celsius hotter by the end of the century without greater action to reduce greenhouse gas emissions. Building new coal power plants will increase these developing countries' risks for future catastrophic economic, agricultural, health, and social impacts from climate change.²⁶

FIGURE 8: COUNTRIES WITH UPCOMING COAL PLANTS LIKELY TO BE FINANCED BY INTERNATIONAL SOURCES



Potential coal financing includes projects in Bangladesh (\$4.5 billion USD), Vietnam (\$3.9 billion USD), Indonesia (\$3.8 billion USD), Brazil (\$2.6 billion USD), and Pakistan (\$2.4 billion USD). Since some financial information is undisclosed, the order of recipient countries differs when ranked by the size of the power plant in megawatts (MW) versus the size of the investment (US\$). Financing information is often disclosed later on, so countries are likely planning even more financing than we have listed.

FIGURE 9: FINANCING FOR PENDING COAL PROJECTS



Source: NRDC Consolidated Coal and Renewable Energy Database 2017.

Fortunately, there are signs that these coal investments are being recalibrated. In 2016 and 2017, several countries canceled or delayed plans for coal projects. For instance, a coal project in Ghana has been on hold since late 2016, and more than 20 GW worth of coal projects backed by G20 financial institutions in Egypt have also been suspended.²⁷

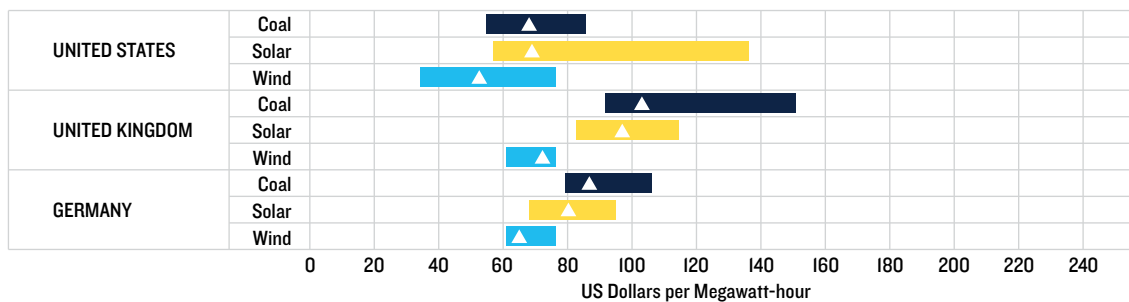
THE CASE FOR RENEWABLE ENERGY

Renewable energy is taking the globe by storm, becoming competitive with and sometimes even cheaper than coal power. Renewable energy prices are falling thanks to technology and market advances as well as better financing options and policies. The International Energy Agency, in a 2017 report, found that renewables will give more people access to electricity than coal power, with a projected 60 percent of new electricity access to be provided by renewables by 2030, compared to only 16 percent from coal. According to a 2016 report by the International Renewable Energy Agency, prices for solar PV modules and wind turbines have fallen roughly 80 percent and 30 to 40 percent respectively since 2009, thanks to technology improvements and economies of scale by the countries that have invested heavily and installed large amounts of solar and wind capacity, such as China, Germany and the U.S.²⁸ Wind and solar projects have recently received extremely competitive bids. Thanks to bids in India's recent power auctions, for example, prices for new solar projects there are already lower than for new coal projects.²⁹ Other signs of the rapidly falling costs for renewable energy include the following:

- In May 2017, a 500 MW section of India's Bhadla Solar Park was awarded with an auction price of just \$0.038 USD per kWh.³⁰ That is lower than the benchmark price for coal in India, which was \$0.052 USD in the first half of 2017.³¹
- In Mexico, a 300 MW project by Fotowatio saw a price of \$0.02699 USD per kWh as of February 2017.³²
- In Chile, bids for solar power went as low as \$0.0291 USD per kWh as of August 2016.³³
- In the United Arab Emirates, a solar project saw bids as low as \$0.0242 USD per kWh in September 2016.³⁴

Australia, South Africa, Saudi Arabia, and Chile are all building wind and solar projects that are cheaper than or competitive with coal power plants.³⁵ Wind and solar's "levelized cost of electricity" (LCOE)—the price at which investment in a new project covers capital and operating costs and generates a healthy return on investment—is already well within the range of fossil fuels in many countries and regions.³⁶ This is true in an increasing number of countries every year. In fact, in 2016 solar and wind were the same price as or cheaper than new fossil fuel capacity in 30 countries.³⁷ In the United Kingdom, Germany, and the United States, onshore wind and solar photovoltaic (PV) power are competitive with or sometimes even cheaper than coal power (see Figure 10).

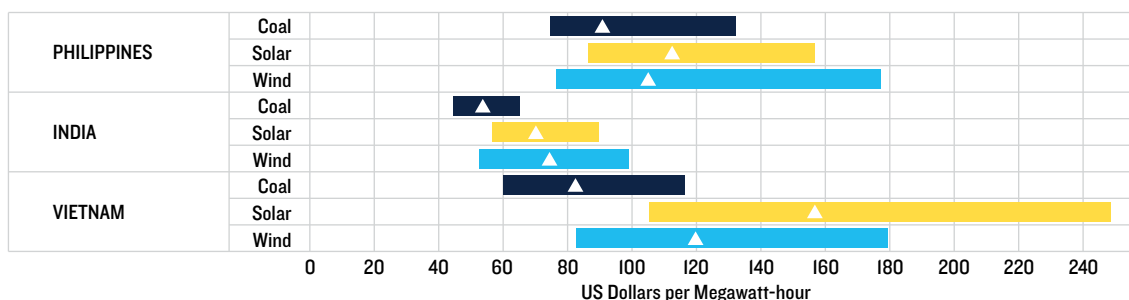
FIGURE 10: COMPARISON OF ELECTRICITY PRICES OF COAL, SOLAR AND WIND IN UK, US AND GERMANY (USD\$ PER MWH)



Source: Bloomberg New Energy Finance, "LCOE range, 1H 2017" dataset, April 2017.

Even in developing countries such as the Philippines, Vietnam, and India, where coal power has traditionally been cheaper, wind and solar PV costs are within the range of coal power projects.

FIGURE 11: COMPARISON OF ELECTRICITY PRICES OF COAL, SOLAR AND WIND IN INDIA, PHILIPPINES AND VIETNAM (USD\$ PER MWH)



Source: Bloomberg New Energy Finance, "LCOE range, 1H 2017" dataset, April 2017.

Where renewable energy is more expensive than coal power, forecasts show that the tables will soon turn thanks to wider deployment of renewables. As shown in the figures below, in Brazil, wind power is already cheaper than coal, and solar PV is expected to become cheaper by 2019. In Mexico, wind power will be cheaper than coal by 2018 and solar power will be cheaper than coal by 2019.

FIGURE 12: FORECAST FOR COST OF ELECTRICITY IN BRAZIL

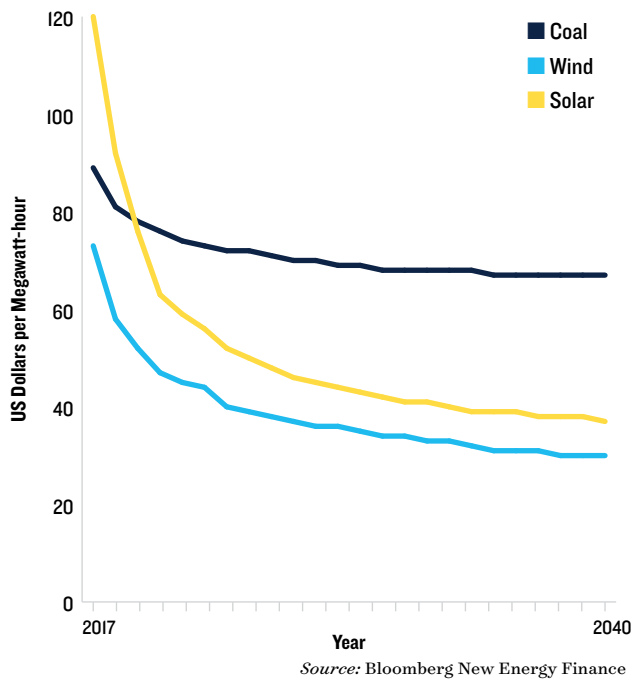
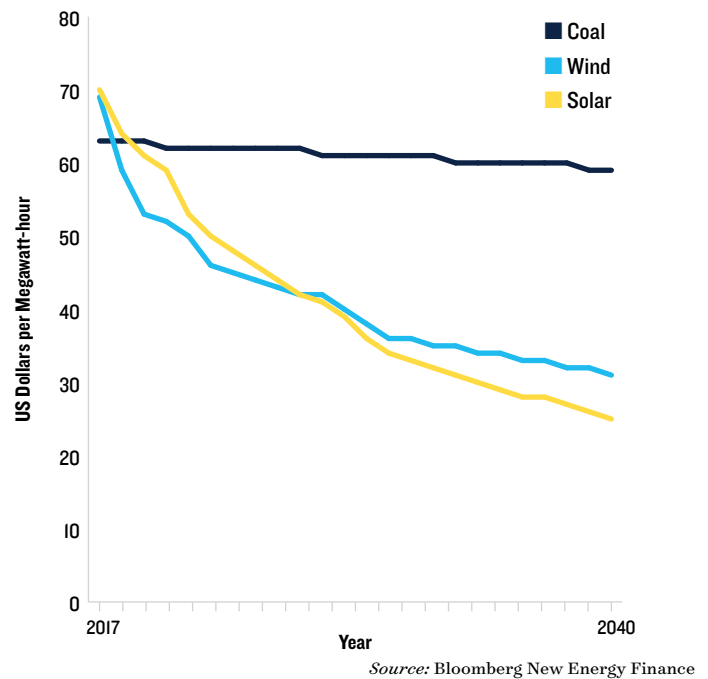


FIGURE 13: FORECAST FOR COST OF ELECTRICITY IN MEXICO



THE CASE AGAINST COAL

The economics of coal projects are worsening. As mentioned earlier, wind and solar power costs are falling, placing many coal projects at risk of becoming stranded assets, which happens when the cost of construction and operation exceed the financial returns.³⁸ Some plants have already succumbed to this fate. In China, existing coal plants are sitting idle and at least four dozen new projects are being scrapped.³⁹ In India, coal's unexpectedly high capital costs are forcing companies to take massive losses.⁴⁰ As countries rethink outdated notions that equate baseload power with coal, new technologies are demonstrating that the energy mix of the future will reflect a massive shift away from coal.⁴¹ As more countries implement carbon pricing, coal plants are becoming even less attractive.⁴²

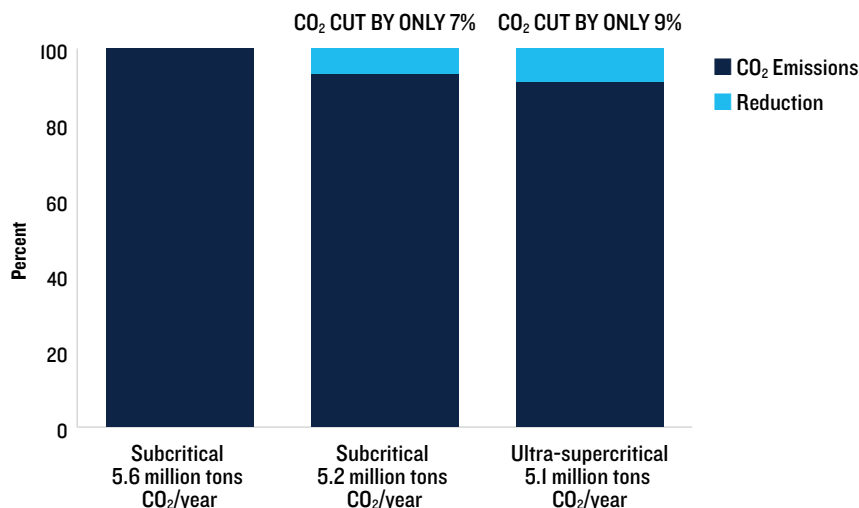
The last major coal project funded by the World Bank and the African Development Bank, the Medupi plant in South Africa, was originally budgeted at \$5 billion USD.⁴³ The project began in 2007, and the utility company Eskom projected that the plant would be fully operational within four years. The first (and, to date, only) operational unit did not come online until 2015, eight years after the project start date and four years later than projected.⁴⁴ Now, a decade along, the project is still not complete.⁴⁵ Medupi will end up costing \$15 billion USD in terms of total capital expenditures, plus a write-off loss of at least \$700 million USD because of a coal supply agreement that stipulates that the utility must honor its purchase commitments despite the massive delays.⁴⁶

But the case against coal is more than just economics. There are also severe climate and health impacts. Coal combustion accounts for two-fifths of global energy-related carbon emissions—more than any other fuel—and therefore is a key driver of climate change.⁴⁷ Coal power plants emit 15 times more carbon dioxide during their entire life cycle than renewable energy systems, and twice as much as natural gas plants.⁴⁸ There are also issues of corruption, which are discussed below. Coal negatively impacts local communities as well, and new plants have provoked fierce opposition in many countries.

Misleading Claims About Carbon Emissions and “Clean Coal” Technology

Coal power plants are considered subcritical, supercritical, or ultra-supercritical, on the basis of how efficiently the equipment burns coal to generate electricity. Coal power plant developers falsely claim that ultra-supercritical technology is “high efficiency, low emissions” (HELE), or “clean coal.” In fact, this technology is only slightly more efficient: ultra-supercritical plants emit 98 percent as much carbon as supercritical plants and 91 percent as much as subcritical plants.⁴⁹ In reality, these plants just reduce fuel and operating costs, making them more profitable to build and run.⁵⁰

FIGURE 14: CO₂ EMISSIONS OF DIFFERENT TYPES OF COAL PLANTS



Source: NRDC analysis based on emissions estimates for a 1,000-MW coal plant, based on the presentation by Munetaka Horiguchi, “Financial Support for Clean Coal Technology by JBIC,” Japan Bank for International Cooperation, November 3, 2014.

Japan’s government claims ultra-supercritical coal technology will contribute to the host country’s sustainable growth. Civil society groups in Japan and around the world, however, rightly point out that this logic ignores the significant environmental, health, and social impacts.^{51,52} Expert analysis shows that even relatively efficient coal-fired power plants are incompatible with the Paris climate goals.⁵³

Furthermore, the designations of subcritical, supercritical, and ultra-supercritical actually reveal nothing about whether the plants will control the sulfur dioxide, nitrogen oxides, particulate matter, and mercury emissions from coal combustion.⁵⁴ The necessary control devices are expensive and require retrofits for existing plants. They can also drive up production costs, which makes coal even less competitive with renewable energy. Developers rarely use pollution controls unless they are required to do so by law.

Many host countries for G20-financed coal

plants do not have strong emissions restrictions or monitoring standards, which allows air pollution to far exceed safe standards.

For instance, the owners of South Africa’s Medupi coal plant were legally required to meet pollution standards in 2015.⁵⁵ They are still delaying compliance. Elsewhere, JACSES researched coal plants funded by the Japan Bank for International Cooperation between 2003 and 2016. According to the group’s findings, half do not use scrubbers to control sulfur dioxide emissions, and 80 percent do not use adequate control technologies for particulate matter.⁵⁶

Those uncontrolled pollutants from coal combustion cause a broad array of health problems, such as asthma, bronchitis, and reduced lung function. One study estimates that in Southeast Asia alone, air pollution from coal plants is responsible for 20,000 premature deaths per year.⁵⁷ If all coal projects currently planned or under construction in the region are actually built, it would increase premature deaths there to 70,000 per year by 2030.⁵⁸

According to a 2016 International Energy Agency report on energy and air pollution, coal is responsible for the largest share of air pollution in the power sector worldwide. It produces 75 percent of sulfur dioxide emissions, 70 percent of nitrogen oxide emissions, and more than 90 percent of fine particulate matter (PM 2.5) emissions.⁵⁹ Nitrogen oxides produce smog, which causes lung damage and aggravates asthma. Particulate matter from coal plants has severe health impacts, increasing the risk of heart attack and stroke and leading to bronchitis, reduced lung function, and premature deaths.⁶⁰ Coal combustion also produces mercury and wastes such as ash and sludge, which include arsenic and heavy metals. Mercury impairs children’s neurological development and causes chronic diseases in adults. Combustion waste products can contaminate water supplies and poison fish, threatening livelihoods for local fishermen.⁶¹ India and China, where the use of coal currently dwarfs that of most other countries, can serve as a warning for the need to limit the use of coal. The particulate emissions from coal combustion are a key factor behind India’s 620,000 annual premature deaths and China’s 1 million-plus premature deaths linked to outdoor air pollution.⁶²

The coal industry's corruption scandals constitute yet another nail in the coffin. The Japanese business conglomerate Marubeni was fined for bribing high-ranking government officials in connection with coal projects in Indonesia.⁶³ Brazilian company Oderbrecht admitted to bribing Dominican officials to the tune of \$92 million USD for 17 construction contracts, including for the Punta Catalina coal power plant.⁶⁴ Following the corruption investigation, the Brazilian Development Bank canceled its loan. Italian ECA Servizi Assicurativi del Commercio Estero (SACE) eventually funded the project.

The Vietnamese Long Phu-1 coal power project, sponsored by PetroVietnam (PVN), is being considered for financing by several export credit agencies including SACE and the Export Import Bank of the United States—despite the fact that Italy and the United States are both part of the OECD Arrangement to limit financing for coal plants. It has been reported that PVN's board chair, who is also a senior Vietnamese government official, could face corruption charges related to the bidding for the engineering, procurement, and construction contract.⁶⁵ As a result, domestic and international groups have filed a complaint with potential funders to halt the project.

Coal-fired power projects are facing growing opposition across the world. In Ghana, local groups are protesting the proposed 700 MW Aboano coal power plant, which would be the country's first, and which would be financed by the China Africa Development Fund. The Ghana Youth Environmental Movement and Ghana Reduce Our Carbon (G-ROC) sent a letter to the companies involved, Volta River Authority and Shenzhen Energy Group, listing their environmental and health concerns. They objected to the 5 million tons of ash waste per year that would be generated, as well as air pollution and discharges into nearby turtle breeding grounds. They also pointed out that 56 percent of those living in the Ekumfi Aboano neighborhood near the plant are children, who are more vulnerable to pollutants from coal plants such as particulate matter (PM10) and smog.⁶⁶ G-ROC and others have asked the government to halt future coal projects and make good on its May 2015 commitment to invest \$240 million USD in the Renewable Energy Program.⁶⁷ In response to the pressure, Ghana's Minister of Environment has indicated that the country has not yet issued a permit for the plant, and that it would be inconsistent with the fact that Ghana has already formally joined the Paris Agreement.⁶⁸ The Volta River Authority still lists the Aboano coal plant as an upcoming project, but in the meantime it has actually started development of a small solar project and two wind projects of 75 MW each.⁶⁹ These are expected to come online in 2019.⁷⁰

Analysts estimate that Indonesia has so much excess coal power planned that it could lock households and businesses into paying electricity producers for power that is not even needed, placing a huge financial burden on the public.⁷¹ Through effective legal challenges, communities continue to reject proposed coal plants such as Cirebon 2, which may be financed by the Japan Bank for International Cooperation and the Export Import Bank of Korea. The project may be insured by Japan's Nippon Export and Investment Insurance.

In October 2017, the Indonesian Minister of Energy and Mineral Resources announced that the government would not approve any more coal plants on the heavily populated island of Java, Indonesia.⁷² Given the serious respiratory disease, stroke, cardiovascular disease and other heart related diseases associated with air pollution from coal plants, citizens in Indonesia are calling for much tougher emissions standards and monitoring on the plants.⁷³ The minister also noted that Indonesia plans to increase the renewable portion of the energy mix to 23 percent by 2025 from about 12 percent at present.⁷⁴

POLLUTION STANDARDS FOR JAPANESE PLANTS AT HOME AND ABROAD

Japan is the second-biggest G20 financier of overseas coal plants. These plants pose much higher health and environmental risks than the coal plants located in Japan because of the less stringent environmental standards in the host countries.⁷⁵

- Japan-supported plants abroad allow dangerous sulfur dioxide emissions in concentrations up to 25 times higher than are allowed in Japan. For example, Japan's Isogo New 2 plant allows sulfur dioxide emissions of 10 parts per million (ppm), while the Japanese-financed Mindanao plant in the Philippines allows 245 ppm.
- To reduce nitrogen oxides, domestic Japanese plants use a process called selective catalytic reduction (SCR), while plants financed by Japan abroad use low nitrogen oxide burners (LNB), a less effective technology. Japan's Hekinan 5 plant, an older facility that has been in operation since 2002, is allowed to emit only 15 ppm of nitrogen oxides. Meanwhile, the nitrogen oxide limit at Vietnam's Hai Phong II plant—a newer, Japanese-financed plant operating since 2013—has a nitrogen oxide limit nearly 29 times higher, at 438 ppm.
- While the Hekinan 5 plant in Japan is allowed to emit only 5 mg of particulate matter per normal cubic meter, the Hai Phong 2 plant's PM limit is 40 times higher, at 200 mg/Nm³.

FIGURE 15

EMISSIONS CONCENTRATIONS BY POLLUTANT	LARGEST DISCREPANCY IN ALLOWED POLLUTANT LEVELS
Sulfur Dioxide (parts per million)	Up to 25 times higher outside Japan
Nitrogen Oxides (parts per million)	Up to 29 times higher outside Japan
Particulate Matter (milligrams per normal cubic meter)	Up to 40 times higher outside Japan

Source: Compiled by NRDC based on data table from Yuki Tanabe, "Fact Sheet: Coal-Fired Power Plants Funded by Japan Bank for International Cooperation (JBIC)," Japan Center for a Sustainable Environment and Society (JACSES), May 20, 2016, <http://sekitan.jp/jbic/wp-content/uploads/2014/01/factsheet-en.pdf>.

VIETNAM: COAL PLANTS AND THE IMPACT ON AIR QUALITY

G20-financed coal power plants in Vietnam have already led to high levels of air pollution.⁷⁶ In Hanoi in 2016, PM 2.5 pollutant levels were five times higher than World Health Organization standards.⁷⁷ And Vietnam has plans to build several more gigawatts' worth of coal-fired power plants. Since the government does not require the most advanced emissions-control technologies, the facilities are not likely to include them.

Community groups and NGOs across Vietnam have already filed several complaints about the pollution from existing and proposed projects. For example, the proposed Long Phu-I coal plant that will likely be financed by the Russian development bank Vnesheconombank (VEB) and Italian export credit agency SACE is facing strong opposition from community groups. They have noted that the project sponsors underreported projected carbon emissions estimates. The sponsors also claimed that Long Phu-I was an ultra-supercritical plant, yet the turbine manufacturer's website lists the technology as supercritical.⁷⁸ In either case, there would still be significant carbon emissions and pollutants from the plant. In 2015, environmentalists organized protests because of the air pollution from the Vinh Tan coal complex, which was financed by China, South Korea, and Japan. Local communities have expressed similar concerns around ongoing projects such as the Long An coal plant near Ho Chi Minh City, which would pollute water and air, affecting the 13 million area residents.⁷⁹

Drivers of International Public Financing for Coal and Renewables

Many governments in developing countries are making difficult decisions about the type of energy mix to pursue, given limited financial resources, technical capacity, and growing energy demand. At the same time, they are struggling to promote a new model of sustainable low-carbon growth for which large-scale examples are still limited. Unfortunately, leaders frequently receive favorable financing terms for coal projects that use foreign technologies. There are fewer favorable financing options for low-carbon energy systems.

Most Japanese-supported coal projects include engineering, procurement, and construction (EPC) contracts that enrich Japanese companies such as Marubeni, Toshiba, Sumitomo, and IHI. Keidanren—the Japanese business federation that represents these companies’ interests—explicitly targets countries in Asia to promote coal use.⁸⁰ Chinese companies and banks also participate in coal power projects abroad as project contractors, equipment providers, investors and loans providers—due to China’s extensive experience in the coal sector and the push to expand investments in countries in the Belt and Road Initiative. Much of the expansion has taken place in Southeast Asia. However, there are signs that China’s involvement in coal-fired projects may be slowing down as China moves to implement the Paris Agreement and to finance more clean energy projects abroad.⁸¹

South Korea is similarly motivated by profit-making opportunities abroad as Korean companies like Doosan Heavy Industries & Construction have won many contracts for coal power projects across Asia.⁸² For example, Korea Trade Insurance Corporation (K-sure) and Korea Development Bank (KDB) recently financed Korea East-West Power’s coal project in Indonesia that will earn Doosan \$2.7 billion USD over the life of the project.⁸³

The Institutional Challenges of Shifting Finance from Coal to Renewable Energy

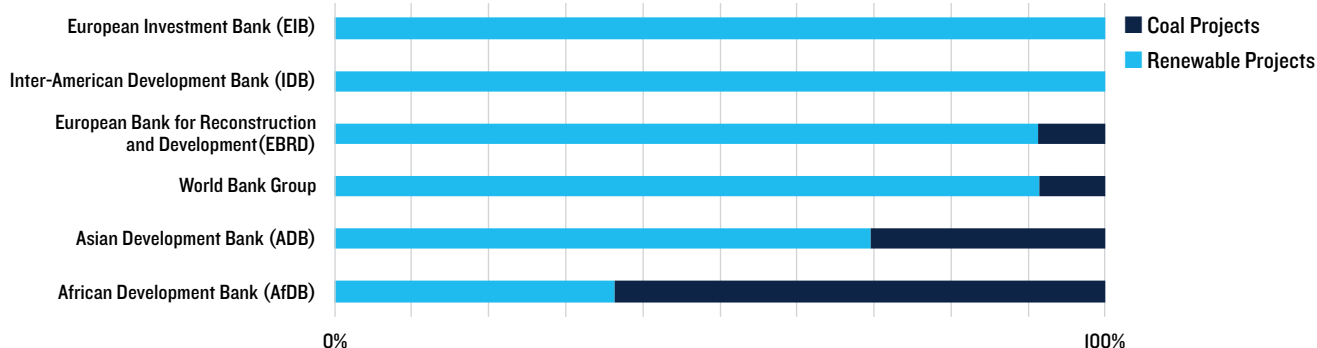
In some cases, G20 continue to fund coal projects because financing institutions and recipient countries voice a preference for “proven” fossil-fuel technologies. Some policymakers and stakeholders may be unfamiliar with renewable energy and do not recognize how rapidly wind and solar costs are falling. Fortunately, though, investment decisions are shifting as that knowledge gap closes.

Several global financial institutions have also restricted coal financing. Since 2013, the European Investment Bank’s Energy Lending Criteria have required emissions standards for any funded coal plants. Also in 2013, the European Bank for Reconstruction and Development’s Energy Sector Strategy excluded almost all coal finance. The World Bank Group’s directions for the energy sector limits coal financing except in rare cases. In France, the United Kingdom, and Germany, development agencies have also restricted financing for coal (although Germany continues to provide export credits for coal projects).⁸⁴

Unfortunately, other multilateral development banks and export credit agencies are lagging behind. The OECD Arrangement from 2015—which includes Australia, Canada, the European Union, Japan, South Korea, and the United States—incorporated only partial restrictions on coal finance, depending on the location, type, and size of the proposed coal plant. The Asian Infrastructure and Investment Bank allows for financing of coal power in limited circumstances in its 2017 Energy Sector Strategy, although bank officials have signaled that it has no plans to finance coal power.

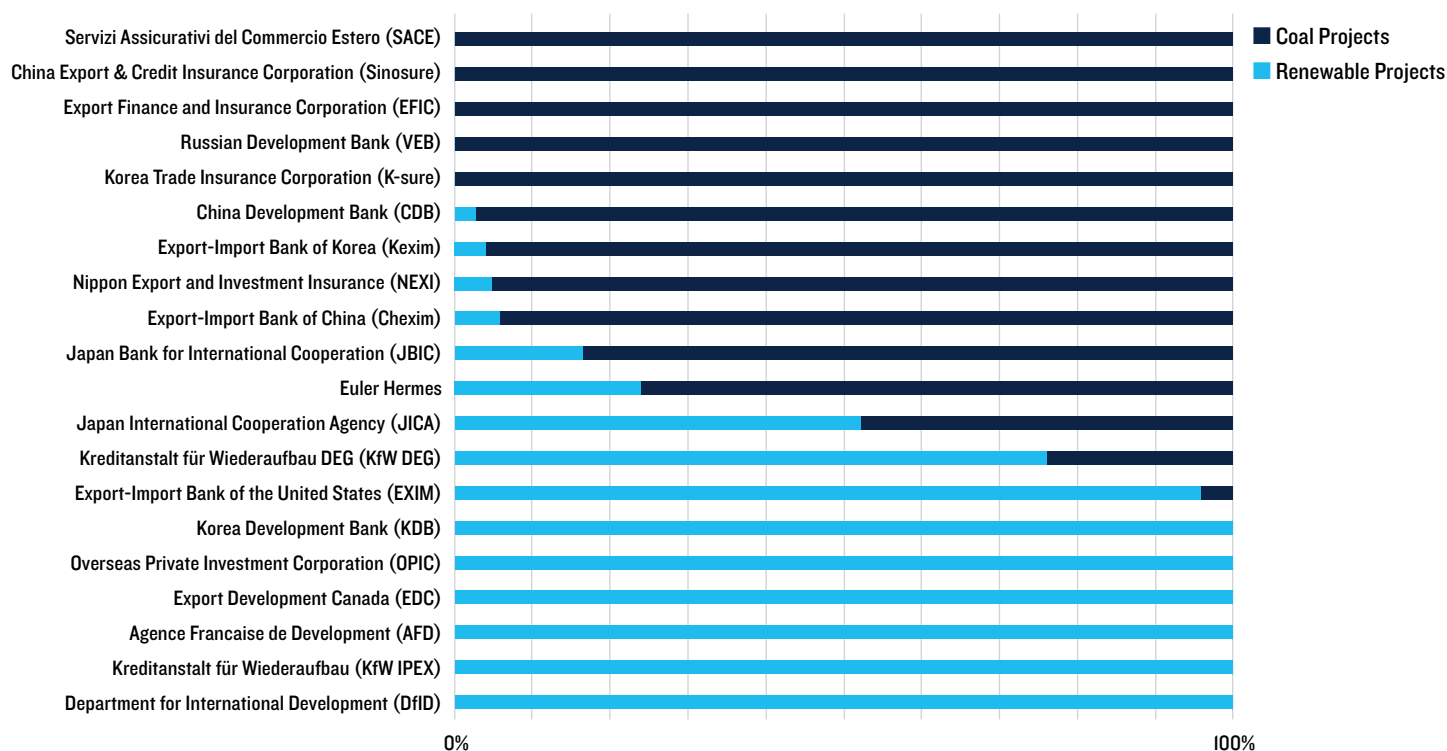
Meanwhile, renewable energy has enjoyed a greater share of investments from the private sector arms of the World Bank (International Finance Corporation), African Development Bank, Asian Development Bank, European Bank for Reconstruction and Development, and Inter-American Development Bank. These investments were in addition to funding for fossil fuels.⁸⁵ The president of the Asian Infrastructure and Investment Bank, one of the newest MDBs, says that there are no current coal projects in its pipeline and that it would not consider any proposals if the bank is “concerned about their environmental and reputational impact.”⁸⁶ In September 2017, the bank approved \$210 million in financing to support 490 MW of solar PV power plants in Egypt. In September 2017, the Asian Development Bank made its first commitment to measuring and monitoring carbon emissions for its projects, similar to current practices at the Inter-American Development Bank.⁸⁷ The European Bank for Reconstruction and Development and the European Investment Bank also report on their projects’ emissions.⁸⁸ If other banks, like the World Bank, adopted similar standards, they could help limit future coal finance.

FIGURE 16: RATIO OF COAL TO RENEWABLES INVESTMENTS BY MULTILATERAL DEVELOPMENT BANKS (2013–2016)



Source: NRDC Consolidated Coal and Renewable Energy Database 2017.

FIGURE 17: RATIO OF COAL TO RENEWABLES INVESTMENTS BY BILATERAL FINANCE INSTITUTIONS (2013–2016)



Source: NRDC Consolidated Coal and Renewable Energy Database 2017.

Top Coal Financers and the Shift into Renewable Energy Projects

Encouragingly, even the biggest international coal financers—China, Japan, and South Korea—are also financing clean energy projects. China Development Bank and Export-Import Bank of China are becoming increasingly important global players in the promotion of renewable energy projects in countries that are part of China’s Belt and Road Initiative. Both banks helped fund Pakistan’s Quaid-e-Azam solar park, currently the fourth-largest solar park in Asia and the only one of the 10 largest that is not based in China or India.⁸⁹ The project successfully completed its first phase, connecting more than 300 MW to the grid in 2016, enough to power 200,000 homes. As the project expands and reaches 900 MW, it will be one of the largest solar parks in the world.⁹⁰ More such Chinese-financed renewables projects are likely in the future, given the support that China’s leadership has shown for building a green Belt and Road, and China’s own recognition of the seriousness of addressing climate change and implementing the Paris Agreement and Sustainable Development Goals.

The Korea Development Bank has provided nearly \$50 million USD for Chile's 100 MW El Pelicano Solar Project. Once completed, this project will supply 60 percent of the energy for Santiago's subway transit system, the second-largest in Latin America with 2.4 million daily passengers.⁹¹ The Export-Import Bank of Korea provided \$64 million USD for the 89 MW Al Fujeij Wind Power Project under development by Korea Electric Power Corporation (KEPCO). While KEPCO has profited from its involvement in many coal projects, it has also indicated it will increase its share of renewable energy projects in foreign countries.⁹²

The Japan International Cooperation Agency and European Bank for Reconstruction and Development are financing Mongolia's Tsetsii wind farm, the country's second renewable energy project. The 50 MW facility will raise the share of renewables in the national electricity mix from 6 to 10 percent.⁹³

Companies and the Coal to Renewables Transition

Several companies from G20 countries that are sponsoring or working on projects abroad are active on both coal and renewable energy projects, as revealed by an analysis of the Platts World Electric Power Plants Database. Korea's Hyundai is engaged in solar, coal, wind, and geothermal projects; POSCO and Samsung have solar, wind, and coal projects; and Daelim, GS Engineering & Construction, Doosan, and KEPCO have both coal and wind projects under development. China's Sinohydro is developing solar, wind, and coal projects; TBEA has solar and coal projects; and Dongfang and Tian-EPC are involved in both coal and wind. Japan's Sumitomo and Marubeni are engaged in solar, wind, coal, and geothermal projects; Mitsubishi Heavy Industries is doing coal, wind, and geothermal; and Mitsubishi Hitachi Power Systems is developing coal and geothermal. Hitachi has done solar, wind, and coal projects; Toshiba Plant Systems and Services and JGC are working on both coal and solar. Among American companies, GE/Alstom is developing wind, solar, geothermal, and coal projects, Bechtel has solar and coal projects, and AES Corporation announced that it will no longer build new coal projects worldwide and is diversifying into renewables and battery storage. India's Tata is developing solar, wind, and coal projects, while BHEL, L&T, and Punj Lloyd are engaged in both coal and solar projects.

SHIFTING FINANCIAL FLOWS TO CLEAN ENERGY: RECOMMENDATIONS

Recommendations to Boost Host Country Policy Support for Renewables

Host countries need stable regulatory frameworks to encourage renewables development, including renewable portfolio standards, tax incentives, and feed-in tariffs.⁹⁴ These policies can help create the economics of scale and competitive power prices that would allow renewable energy to compete with fossil fuels. Currently, renewable energy projects must compete against large coal projects that receive subsidized lending and protections from international public finance institutions. This makes the cost of financing for renewables projects more expensive than financing for coal. If host governments support renewables, it could help lower debt costs and secure concessional financing, especially from development banks. Now, as countries consider their options for innovative storage technologies and large-scale renewables projects, we have the opportunity to create innovative energy systems.⁹⁵ Potential issues include fair rules for the arbitration of disputes, currency fluctuation, and dispatch risks when the electricity supply exceeds demand.

Fortunately, we will not need to subsidize renewables for long as their costs continue to fall. Long-term contracts can also eliminate the need for subsidies, and net metering can encourage investment in renewables. At the same time, renewable portfolio standards can help create demand. Governments also need to eliminate the existing subsidies for coal mining and coal plants and stop favoring and subsidizing coal projects by providing cheaper debt financing options.⁹⁶

Recommendations for Utilities, Power Producers, Manufacturers, and Construction Firms

Utility companies should consider the comprehensive costs and benefits of coal, including the long-term economic risks of stranded assets and the ultimate climate, health, and environmental costs.

All proposed new coal plants should budget for the most sophisticated pollution controls on sulfur dioxide, nitrogen oxides, particulate matter, and mercury and other heavy metals. Otherwise, it is not economically sound to compare the cost of coal with the cost of renewable energy. Last, project sponsors should demand that financiers offer concessional loans for renewable projects, just as they have done for coal.

Companies must continue to move away from coal projects into renewable energy. Many are already building facilities, manufacturing generators, or making turbine equipment for both coal and renewables projects. Although the majority of these are coal projects, the companies are proving that the market already exists for alternatives and that they are capable of working on them. These companies and many others can benefit from the transition to low-carbon technologies as demand grows.

Recommendations for G20 Governments Funding Power Projects Overseas

G20 governments should align public finance with their own stated climate principles and stop throwing good money into the coal furnace. That money is far better spent on the energy that will take us into the future—wind, solar, and other renewable resources. Based on the responsibility of G20 countries to lead the fight against climate change and the important role they should play in helping developing countries build low carbon energy systems, we recommend that:

Better transparency will also go a long way. G20 governments should direct their financing institutions to fully disclose energy financing data.

G20 governments need to immediately end international public financing for coal power plants, except for very rare circumstances in which there is no other option for energy access in low-income communities.

G20 governments should direct their public finance institutions to prioritize finance for clean energy projects, in line with the Paris Agreement, the UN's Sustainable Development Goals, and the G20's Hamburg Climate and Energy Action Plan.

The G20's support for coal directly undermines the Paris Agreement's overall goal of limiting carbon emissions and the potentially catastrophic impacts of climate change. G20 public financing, quite simply, should be redirected to support the low-carbon transition in developing countries. The numerous examples of wind and solar projects that have been financed prove that we can transition to more renewable energy, leaving us with few excuses not to pursue our clean energy future. We can't afford to waste another cent on coal. It's time to shift the way we think about power.

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Appendix A: List of Potential Coal and Renewables Projects That May Receive Public Financing from G20 Countries

PROJECTS (RANKED BY NATIONAL TOTAL OF POWER PLANT SIZE)	POWER PLANT SIZE (MW)	AMOUNT OF PUBLIC FINANCING (USD)
RENEWABLES		
INDIA	2,569	1,755,900,000
ACME Solar Project	100	31,470,000
Azure Jodhpur Solar PV Plant	40	13,030,000
Continuum Madhya Pradesh Wind Farm	170	45,850,000
Green Infra Wind Farm Portfolio	182	59,000,000
Power Grid Corporation of India Corporate Facility		225,000,000
Rewa PV Solar Plant	750	
Shirsuphal Solar Plant	50	14,780,000
Telangana PV Solar Plant	100	74,020,000
ReNew Power Ventures Private Limited		250,000,000
IIFCL - Mytrah Vayu Indravati	155	
IREDA - RE & EE FL Mytrah Vayu Godavari	99	
IREDA - RE & EE FL Ostro Anantpur Wind Farm	100	
IIFCL - Ostro Madhya & Anantpur Wind Farms	192	
IIFCL - Clean Wind Power (Ratlam)	100	
IIFCL Energy Sustainability & Climate Action FL2		295,000,000
India Solar Power - Mahbubnagar Solar Energy	100	66,080,000
India Solar Power - Tamil Nadu Solar Energy	288	55,460,000
India Solar Power - Telangana Solar Energy	143	47,200,000
IREDA - Renewable Energy and Energy Efficiency FL2		177,000,000
YES Bank (India) Climate Action FL		211,220,000
DCM TCCL Green Bond Loan		75,290,000
L&T Green Bond		100,000,000
Org Energy Off-Grid Solar		15,500,000
MOROCCO	1,770	2,435,740,000
Morocco (ONEE) Wind Power Programme	850	516,380,000
Noor Midelt CSP-PV Complex	800	1,760,000,000
Noor Talifalet Solar PV Trio	120	159,360,000

PROJECTS (RANKED BY NATIONAL TOTAL OF POWER PLANT SIZE)	POWER PLANT SIZE (MW)	AMOUNT OF PUBLIC FINANCING (USD)
EGYPT	1,655	1,693,215,746
Access Power and Eren Solar PV Complex	100	116,000,000
Acciona Acciona Benban 2 Solar PV Plant	50	20,000,000
Acciona Benban 3 Solar PV Plant	50	20,000,000
Acwa Power Benban I Solar PV Plant	50	49,000,000
Acwa Power Benban II Solar PV Plant	20	11,000,000
Acwa Power Benban III Solar PV Plant	50	30,300,000
AI Subh Solar PV Plant	50	19,000,000
Alcazar Energy Solar I PV Plant	50	20,000,000
Alcom Energy Solar PV Plant	50	20,000,000
Alfa Solar Benban PV Plant	50	29,000,000
Arinna Benban Solar PV Plant	25	15,000,000
Delta Solar PV Plant	50	20,000,000
EDF EN Benban Solar PV Plant	50	27,000,000
Elsowedy Benban Solar PV Plant	50	27,000,000
Gestamp Solar PV Plant	50	20,000,000
Gulf of Suez Wind Farm	200	290,800,000
Scatec Solar Egyptian PV Solar Portfolio	400	
Shapoorji Energy Benban Solar PV Plant	50	19,000,000
Sharm El-Sheikh Solar PV Plant	40	45,290,000
Taqa Arabia Solar PV Plant	50	20,000,000
Taqa Solar Reserve Solar PV Plant	50	20,000,000
West Nile CSP Plant	100	566,000,000
Kom Ombo PV Power Plant Project	20	45,147,746
Alcazar Solar 3		
Alcazar Solar 4		15,000,000
SECI Benban 3 Winnergy		21,500,000
SEMED SEFF - Phase 2		157,178,000
AlexBank Loan		50,000,000
PAKISTAN	1,433	333,000,000
Sapphire Wind Farm	150	238,000,000
Wind project in Ghoro-Keti Bandar wind corridor	133	95,000,000
Jhampir wind power project	100	
Quaid-i-Azam Solar Park Bahawalpur Expansion	900	
Dawood Wind Farm	50	
Sachal Wind Farm	50	
Sunnec Wind Farm	50	

PROJECTS (RANKED BY NATIONAL TOTAL OF POWER PLANT SIZE)	POWER PLANT SIZE (MW)	AMOUNT OF PUBLIC FINANCING (USD)
MEXICO	670	766,980,000
Cemex IFC Facility		117,000,000
Solem Solar PV Complex	290	175,000,000
Credit Line for Bancomext		100,000,000
Mexico Climate Action FL		110,920,000
Mexico Climate Action FL - Coahuila	200	43,660,000
Mexico Climate Action FL - Zacatecas	180	50,740,000
SolarCity (Mexico) Green Securitization Facility		169,660,000
CHILE	509	173,340,000
Aela Energia Chilean Wind Portfolio	299	173,340,000
Atacama I Solar Complex	210	
KENYA	390	391,030,000
Kenya Wind & Solar PV Portfolio	10	
Kipeto Wind Farm	100	256,030,000
Meru Wind Farm Phase I	100	135,000,000
Olkaria I Geothermal Extension		
Kenya Power Distribution Last Mile Connectivity	70	
Radiant and Eldosol Solar PV Power Plants	40	
Akiira I Geothermal Power Plant	70	
JORDAN	410	408,247,000
Al Safawi Solar PV Plant	51	35,000,000
Daehan Wind Farm	50	80,100,000
Mafraq Solar PV Plant	60	27,000,000
Masdar Jordan Solar PV Plant	200	200,000,000
Tafila Wind Farm	50	33,000,000
Refugee Response Framework - Municipal Resilience		33,147,000
PERU	312	158,120,000
ENEL Green Power Peru	312	158,120,000
PORTUGAL	285	27,240,000
Portugal Floating Offshore Wind	25	27,240,000
Windfloat Innovfin FDP	25	
Expoentfokus Solar PV Farms Portugal	135	
Solar PV Farms Portugal	100	
SOUTH AFRICA	200	1,535,460,000
Kiwano Solar Thermal Plant	100	995,460,000
Redstone CSP Plant	100	540,000,000

PROJECTS (RANKED BY NATIONAL TOTAL OF POWER PLANT SIZE)	POWER PLANT SIZE (MW)	AMOUNT OF PUBLIC FINANCING (USD)
HONDURAS	187	
Fray Lazaro 55 MW Photovoltaic Solar Power Project	55	
CA CCFL II - Nacoame Solar PV Plant	51	
CA CCFL II - Solar PV Plants	81	
KAZAKHSTAN	177	110,500,000
Burnoye PV Solar Farm Phase 2	50	54,500,000
Gulshat PV Solar Plant	48	30,000,000
Kulan PV Solar Farm	29	26,000,000
Yereimentau Wind Plant	50	
POLAND	162	83,110,000
Banie Wind Farm	106	35,940,000
Banie Wind Farm Phase 2	56	47,170,000
SENEGAL	158	250,000,000
Taiba Ndiaye Wind Farm	158	250,000,000
SERBIA	158	85,630,000
Dolovo Wind Farm	158	85,630,000
INDONESIA	135	196,000,000
Jeneponto I Wind Farm	63	96,000,000
Rantau Dedap Geothermal Additional Facility		
Tolo Wind Farm I	72	100,000,000
NIGERIA	125	81,650,000
Abiba Solar PV Power Plant	50	1,650,000
Pan African Solar PV Plant	75	80,000,000
ZAMBIA	123	28,000,000
Lusaka Solar PV Plant	55	28,000,000
Ngonye Solar PV Plant	34	
Scaling Solar PV Zambia I	34	
GUATEMALA	93	41,300,000
Horus Solar PV Plant	93	41,300,000
TURKEY	78	777,603,800
Baglar RES Wind Farm	78	
Yapi Kredi Loan for SMEs and Green Energy		177,000,000
TurSEFF III		429,856,000
Isbank Comprehensive Financing Facility		57,691,800
Akbank III - MidSEFF III		113,056,000

PROJECTS (RANKED BY NATIONAL TOTAL OF POWER PLANT SIZE)	POWER PLANT SIZE (MW)	AMOUNT OF PUBLIC FINANCING (USD)
BURKINA FASO	57	96,910,000
Ouagadougou Solar PV Plant	30	85,690,000
Zina Solar PV Plant	27	11,220,000
MONGOLIA	55	60,000,000
Sainshand Wind Farm	55	60,000,000
ARMENIA	55	4,000,000
Masrik Solar Plant	55	4,000,000
LATVIA	50	
Ventspils Region Onshore Wind Power Project	50	
GREECE	50	154,060,000
Terna Energy Additional Facility		53,760,000
Viotia Wind Parks	50	
Framework Loan for Renewable Investments		100,300,000
GHANA	50	
Siginik Solar PV	50	
BOLIVIA	50	65,500,000
Oruro Solar PV Plant	50	65,500,000
CHAD	40	780,000
Starsol Solar PV Plant	40	780,000
MOZAMBIQUE	41	61,900,000
Mocuba Solar PV Plant	41	61,900,000
BRAZIL	34	800,250,000
Sobrado Solar Photovoltaic Power Project	34	
Araripe III		50,250,000
Financing Program for Sustainable Energy		750,000,000
MALI	33	50,000,000
Scatec Segou Solar PV Plant	33	50,000,000
REGIONAL PROJECTS IN MULTIPLE COUNTRIES	25	146,320,000
Solar Ventures Fund	25	
Off-Grid Solar Acceleration		29,500,000
Green for Growth Fund		
GEEREF NeXt		55,460,000
Denham International Power Fund		
Evolution II		31,860,000
Green for Growth Fund III		29,500,000

PROJECTS (RANKED BY NATIONAL TOTAL OF POWER PLANT SIZE)	POWER PLANT SIZE (MW)	AMOUNT OF PUBLIC FINANCING (USD)
EL SALVADOR	23	50,000,000
Proyecto La Trinidad Solar Portfolio	23	50,000,000
CAMBODIA	10	9,200,000
Svay Rieng PV Solar Farm	10	9,200,000
GAMBIA	10	41,300,000
Gambia Renewable Energy Framework	10	41,300,000
VIETNAM		
RE project in Phu Yen		
EU COUNTRIES		
KGAL ESPF 4		
EU Offshore Wind Developer Fund		
Odewald Infrastructure Fund I		
Glennmont Clean Energy Fund Europe III		
PHILIPPINES		651,600,000
ThomasLloyd Renewable Portfolio Financing		601,600,000
Credit Line for BDO Unibank		50,000,000
LATIN AMERICA		100,000,000
Credit Line for CAF		100,000,000
SRI LANKA		107,500,000
DCM CBC DPR Green		100,000,000
Arpico Retail		7,500,000
MALAYSIA		
Jinko - PERC		
ARGENTINA		81,000,000
CP Achiras S.A.		20,000,000
La Castellana		61,000,000
BELARUS		4,497,160
BelSEFF - Belinvestbank EE Credit Line		4,497,160
SLOVAK REPUBLIC		39,397,200
SLOVSEFF III Extension - UniCredit Bank CZ&SK		22,361,200
SLOVSEFF III - Slovenska Sporitelna		17,036,000
FINLAND		
YIT Lestijarvi Wind Parks		
TONGA		
Project for installation of wind power generation system		

PROJECTS (RANKED BY NATIONAL TOTAL OF POWER PLANT SIZE)	POWER PLANT SIZE (MW)	AMOUNT OF PUBLIC FINANCING (USD)
COAL		
VIETNAM	14,940	3,888,800,000
Long Phu 2 Power Plant	1,320	
Quang Tri 2 Power Plant	1,200	
Quynh Lap 2 Power Plant	1,200	
Kien Luong-1 Coal Plant	1,320	
Thai Binh Coal Plant & Transmission Lines (IV)		
Vung Ang 3 Coal Plant	1,200	
Vinh Tan 3 Coal Plant	1,980	50,000,000
Vinh Tan 4 Coal Plant Expansion	600	838,800,000
Vung Ang 2 Coal Plant	1,200	625,000,000
Van Phong 1 Coal Plant	1,320	650,000,000
Long Phu 1 Coal Plant	1,200	
Nam Dinh 1 Coal Plant	1,200	
Nghi Son 2 Coal Plant	1,200	1,725,000,000
PAKISTAN	8,790	2,448,000,000
Keti Bandar Power Station	1,320	
Rahim Yar Khan Power Plant	1,320	956,000,000
Thar Block-I No. 1	660	
Thar Block-I No. 2	660	
Oracle Power Plant Thar Block-VI No. 1	600	
Oracle Power Plant Thar Block-VI No. 2	600	
Muzaffargarh Coal Plant	1,320	
Hubco Coal Plant	1,320	1,492,000,000
Gwadar Coal Plant	330	
Thar Engro Coal Plant Phase II	660	
INDONESIA	6,100	3,874,557,000
Cirebon IPP Expansion Phase 3	1,000	
Jambi Province 2-Unit Mine-Mouth Coal-Fired Power Plant	400	500,000,000
Mulut Tambang (Sumsel 9)		
Suralaya Power Plant		232,575,000
Kalselteng 2 Coal-Fired Power Plant Project	200	241,982,000
Indramayu Expansion	2,000	
Sumsel I	600	
Coal Plant in Bantaeng	600	1,160,000,000
Cirebon Coal Plant Phase 2	1,000	1,740,000,000
Kalbar-2 Coal Plant	200	

PROJECTS (RANKED BY NATIONAL TOTAL OF POWER PLANT SIZE)	POWER PLANT SIZE (MW)	AMOUNT OF PUBLIC FINANCING (USD)
BANGLADESH	4,190	4,510,000,000
Matarbari Coal-Fired Power Generation Hub	1,200	4,510,000,000
Payra Coal Power Station in Kalapara Phase 2	1,320	
Maheshkhali Coal Plant	1,320	
Gazaria Coal Plant	350	
ZIMBABWE	3,900	3,350,000,000
Hwange Power Station Expansion	600	1,200,000,000
Supply and installing a coal dense media separation plant		
Lusulu 2 Binga Coal Plant	350	
Lusulu 3 Binga Coal Plant	700	
Lusulu 4 Binga Coal Plant	700	
Gwayi SASEC Mine Power Station	1,200	1,300,000,000
LUSULU I Binga Coal Plant	350	850,000,000
CAMBODIA	2,520	
Sihanoukville CIIDG Coal Plant Units 4-7	540	
Laem Yai Saen Coal Plant	1,830	
Sihanoukville CEL Coal Plant (Expansion)	150	
MONGOLIA	2,359	1,189,870,000
Efficiency and environmental measures in the Mongolian power plant fleet		39,870,000
Tavan Tolgoi Coking Coal Project		
Ulaanbaatar CHP5 Power Plant	1,043	150,000,000
Tevshiin Gobi Coal Plant	600	1,000,000,000
Tavan Tolgoi Coal Plant	600	
MOZAMBIQUE	2,100	540,000,000
Coal-Fired Power Plant in Moatize	300	250,000,000
Nacala Rail and Port Project		265,000,000
Beira Port Coal Terminal		25,000,000
Jindal Coal Plant	180	
ICVL Coal Plant	200	
Ncondezi Coal Plant Phase 2 and Later	1,500	
Ncondezi Coal Plant Phase I	300	
BRAZIL	1,840	2,584,000,000
Pedras Altas Ouro Negro Power Station Units I and 2	600	984,000,000
USITESC Coal Plant	300	1,600,000,000
Pampa II Coal Plant	340	
Vale Coal Plant Unit I and 2	600	

PROJECTS (RANKED BY NATIONAL TOTAL OF POWER PLANT SIZE)	POWER PLANT SIZE (MW)	AMOUNT OF PUBLIC FINANCING (USD)
MYANMAR	1,400	168,000,000
Toyo-Thai (Inn Din) Coal Plant	1,280	
Tigyit Coal Plant	120	168,000,000
BOSNIA AND HERZEGOVINA	1,400	1,664,130,000
Ugljevik 3, Ugljevik-Istok 2 and Delici Coal Mines	600	782,250,000
Tuzla B Coal Plant	450	881,880,000
Banovici Coal Plant	350	
UNITED ARAB EMIRATES	1,200	
Hassyan Coal Plant Phase 2	1,200	
TANZANIA	1,200	
Mbeya Mine Mouth Coal Power Plant	300	
Mchuchuma Coal Mine and Power Plant	600	
Lahmeyer Rukwa Coal-to-Power Project	300	
MALAWI	1,000	600,000,000
Kamwamba Coal Plant, Zalewa Phase I	300	600,000,000
Kamwamba Coal Plant, Zalewa Phase II	700	
KENYA	982	100,000,000
Lamu Coal Plant	982	100,000,000
KOSOVO	500	5,316,000
Energy Sector Programme III (District Heating)		5,316,000
Kosovo Power Plant	500	
GREECE	450	23,479,189
Coal-fired power plants: core components for flue gas cleaning system of the Aghios Dimitrios power plant		23,479,189
Florina	450	
BOTSWANA	420	904,000,000
Morupule A Coal Plant Refurbishment	120	204,000,000
Morupule Coal Plant	300	700,000,000
CHILE	375	
Mejillones 4	375	
ZAMBIA	300	
Maamba Coal Mine and Plant Phase 2	300	
COLOMBIA	300	
Coal plant near Bogota	300	
GEORGIA	150	200,000,000
Gardabani/Tkibuli Power Plant	150	200,000,000

PROJECTS (RANKED BY NATIONAL TOTAL OF POWER PLANT SIZE)	POWER PLANT SIZE (MW)	AMOUNT OF PUBLIC FINANCING (USD)
INDIA		
Coal project in India		
UKRAINE		1,300,320,171
Coal Mining Machinery: pit prop and unlockable non-return valve		320,171
Kiev and Lviv Coal Plants		1,300,000,000
MACEDONIA		75,753,000
Construction of a new district heating system (Energy Efficiency and Renewables Programme, Phase IV)		75,753,000
AUSTRALIA		2,021,344,717
Carmichael Coal Mines and Railway		2,000,000,000
Coal mining machinery: expansion of longwall mining system for Narrabri mine		4,268,943
Equipment for coal mining: extension for Narrabri mine		17,075,774
SOUTH AFRICA		44,823,906
Coal-fired power plants: control system and field instrumentation		44,823,906
RUSSIA		110,992,529
Coal Processing: technological equipment		81,109,925
Coal-fired power plants: mixer for ash conditioning incl. services		1,067,236
Coal-fired power plants: pipes to equip vessels		23,479,189
Coal mining machinery: folding shovel excavator		3,201,708
Coal mining machinery: hydraulic control for shields		1,067,236
Coal mining machinery: tracked loaders		1,067,236
KAZAKHSTAN		210,245,464
Coal-fired power plant: steam turbines and generators		210,245,464
Karaganda Coal Processing Plant		
SERBIA		79,015,245
Coal mining machinery: crusher, spreader, portal scraper, equipment		19,210,245
Nikola Tesla A Power Plant		59,805,000