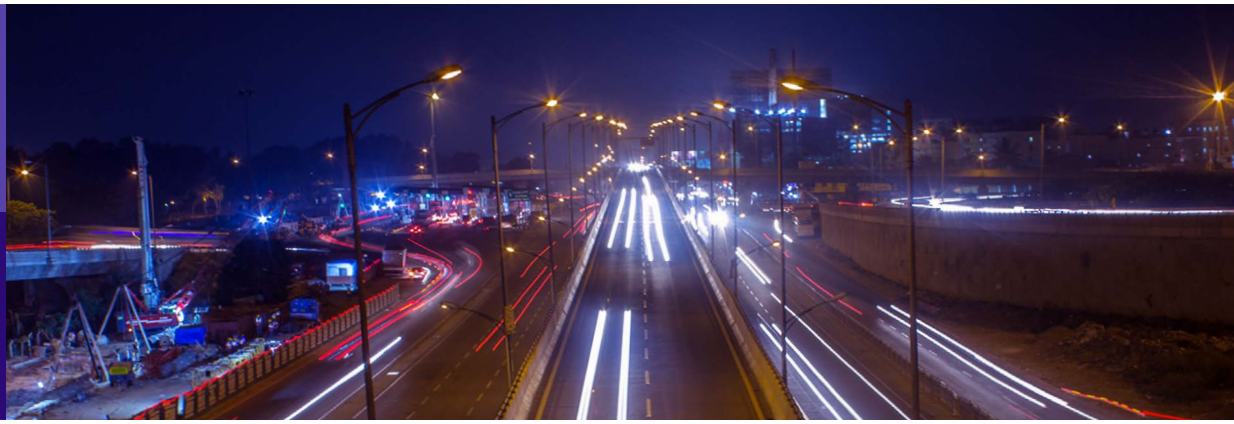


Power

The power sector framework ensures consistent AIMM assessments of IFC's investment projects in the power sector by articulating the development impact thesis, describing core development outcomes, and specifying relevant AIMM indicators.

Development Impact Thesis

Enhancing access to power in emerging markets and developing economies is a key priority for IFC and the World Bank Group. Access to reliable, affordable, and sustainable energy is critical for spurring growth, delivering essential services, and creating jobs. However, emerging markets and developing countries face large power deficits. The poor quality of electricity services is the most frequently cited obstacle to doing business in these countries, where firms rely on costly backup solutions to stabilize supply. As a result, limitations in electricity access, quality, and cost have constrained firms' contributions to growth and job creation by negatively affecting productivity, cost competitiveness, and investment.

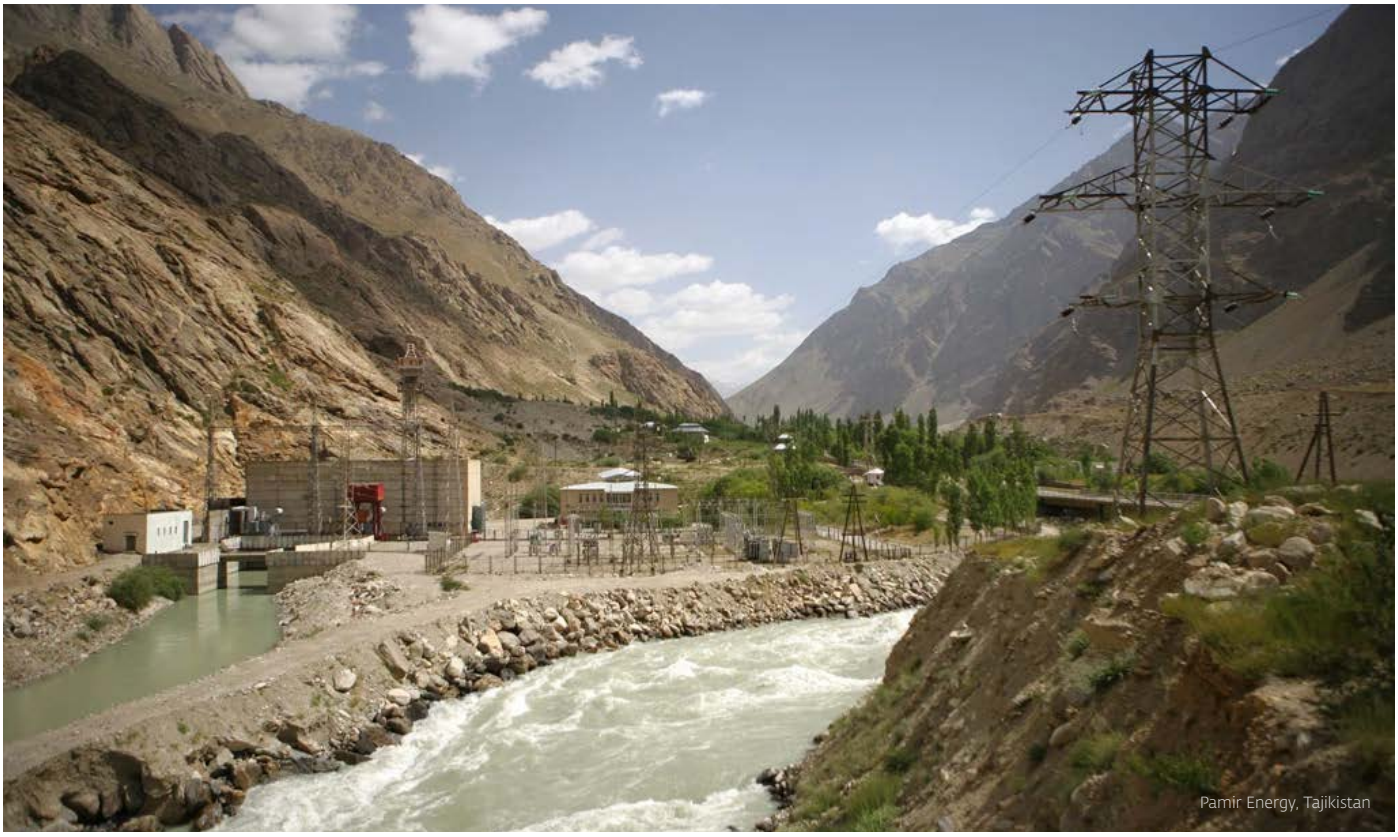
The World Bank Group's engagement in the energy sector is designed to help client countries secure the affordable, reliable, and sustainable energy supply needed to end extreme poverty and promote shared prosperity. Meeting this ambition requires a concerted focus on sustainable options for energy access, including on-grid and off-grid, as well as other viable solutions

that reflect every country's unique resource endowment. IFC's projects in the sector include investments in electricity generation, transmission and distribution networks, retailing of electricity, distributed generation projects, as well as energy storage projects. Figure 1 summarizes the types of development challenges that IFC investments aim to address, and the types of development outcomes that are expected from successful projects, including both direct project outcomes and their indirect impact on the respective markets.

Figure 1

Development Gaps Addressed and Expected Outcomes

	Development gaps addressed	Expected development outcomes
Project outcomes	• Low electricity access rates • Unreliable power supply • High power generation costs and tariffs • Low growth and high unemployment • High carbon intensity of the power system	• Increased access to reliable and affordable power • Adequate and reliable supply of electricity • Direct, indirect, and induced effects on GDP and employment generated • Potentially significant environmental and social effects created
Market outcomes	• Concentrated structure of the market • Unreliable supply of power in the market • Narrow electricity generation mix • Low adoption of new sustainability, climate mitigation, and/or adaptation technologies/processes and practices • Lack of inclusive business models	• Adoption and mainstreaming of innovative business models or technologies that improve efficiency • Diversification of the electricity generation mix • Improved ability of power companies to mobilize capital from various sources • Adoption of environmental, social, and governance (ESG) practices and standards • Mainstreaming of innovative financial products that provide funding sources to catalyze progress on system-wide decarbonization and/or broader ESG objectives



Pamir Energy, Tajikistan

Core Development Outcomes

The Anticipated Impact Measurement and Monitoring (AIMM) methodology assesses project and market outcomes. Project outcomes include increasing access to reliable and affordable electricity for residential and industrial consumers (such as households and firms), wider benefits to the economy (such as growth and jobs effects), and positive environmental effects (such as reduced greenhouse gas (GHG) emissions and adaptation to climate vulnerabilities).

The electricity industry is composed of four main parts: generation, transmission, distribution, and retail. The market in IFC's power framework is defined as the segment in which the project is taking place, including power generation (wholesale) and power networks (distribution/ transmission and retail) markets.

The AIMM framework uses three market attributes to assess market outcomes—competitiveness, resilience, and sustainability. IFC projects contribute to competitiveness through catalytic effects on market structure, the mainstreaming of innovative business models or technologies that improve efficiency, or improvements in domestic and regional electricity trade. Projects contribute to resilience through systemic diversification of the electricity generation mix, the adequacy and reliability of supply, the system's capability to withstand shocks/stresses, and the ability of companies to mobilize capital from various sources. Projects contribute to market sustainability by fostering market-wide adoption of environmental, social, and governance (ESG) practices and standards, and mainstreaming innovative financial products that provide funding for system-wide decarbonization and/or broader ESG objectives.

Key Inputs and Building Blocks of AIMM Assessments

Project Outcomes

When assessing potential project outcomes, AIMM begins by analyzing the development challenge that a project seeks to address in the sector or segment of interest—the development gap. The sector or segment-specific development gap is benchmarked against all emerging markets and developing economies using specific core development gap indicators and data collected by IFC from various public sources. The benchmarking methodology groups countries based on their gap levels per indicator: Small, Medium, Large, or Very Large. The project is placed in the appropriate band based on the data available for the country.

The next step is the assessment of the extent to which the project is expected to contribute to addressing the gap—the project intensity. The assessment of the project intensity is based on specific standard indicators, shown in Table 1, designed to collectively estimate the extent to which the project is effective in assessing the abovementioned gaps. It is assessed along a four-bucket continuum: Below Average, Average, Above Average, or Significantly Above Average.

The core project outcomes of IFC's power projects may be in the form of stakeholder, economy-wide, and environmental effects.

Stakeholder effects: IFC's investment projects can pursue different development objectives to directly affect target stakeholders. Power projects are designed to increase access to reliable and affordable electricity for residential and industrial consumers. For power projects, the core gap indicators on energy access include: (i) Electricity consumption per capita, kilowatt-hour (kWh) per capita; (ii) access to electricity, percentage of population; and (iii) access to electricity, percentage of rural population. Additional gap indicators cover development challenges related to energy quality and affordability (see Table 1).

Economy-wide effects: Projects in the power sector can generate economy-wide effects through economic growth and job creation. To assess this outcome, the power framework uses three gap indicators (labor market participation rate, unemployment rate, and informal employment) and two intensity indicators (value-added and employment multipliers).

Environmental effects: Projects in the power sector can also generate positive environmental effects. The gap and intensity indicators depend on whether the project pursues climate mitigation or adaptation objectives. For example, for climate mitigation, the core gap indicators include sector share of country emissions and GDP growth rate adjusted by emissions intensity, while intensity indicators include efficacy of GHG reduction, energy intensity, electric efficiency, and carbon intensity.

The AIMM system combines the development gap and intensity assessments to arrive at the project outcomes rating (Marginal, Moderate, Strong, or Very Strong).

Table 1

Gap and Intensity Indicators for Core Project Outcomes in Power Projects

	Gap indicators	Intensity indicators
Stakeholder effects	**Customers: Access** • Electricity consumption per capita, kWh per capita • Access to electricity, percentage of population • Access to electricity, percentage of rural population **Customers: Affordability** • Costs of generation in country, US$ cents/kWh • End-user tariff, US$ cents/kWh **Customers: Quality** • Number of electrical outages per month (System Average Interruption Frequency Index (SAIFI)) • Average hour length of power outages (System Average Interruption Duration Index (SAIDI)) • Percentage of firms in the country identifying electricity as a major constraint for business • Power transmission and distribution losses as a percentage of total output	**Customers: Access** • Energy delivered to off-taker • New customers reached • Percentage of the new users in underserved groups **Customers: Affordability** • Reduction in average cost of generation • Reduction in average end-user tariffs **Customers: Quality** • Reduction in frequency of power outages • Reduction in average length of power outages • Reduction in transmission and distribution losses, including technical and commercial
Economy-wide effects	• Labor market participation rate • Unemployment rate • Informal employment	• Value-added multiplier • Employment multiplier
Environmental effects	**Climate mitigation** • Sector share of country emissions • GDP growth rate adjusted by emissions intensity **Climate adaptation** • Notre Dame Global Adaptation Initiative (GAIN) index • Water stress	**Climate mitigation** • Efficacy of GHG reduction • Energy intensity • Electric efficiency • Carbon intensity **Climate adaptation** • Water resource efficiency • Water savings • Percentage of funding by client to local community development • Improvements in the local community to strengthen climate resilience (binary)

Market Outcomes

To measure the project's contribution to market catalytic effects, AIMM assesses the stage of the market's development and the type of market effects expected from the project. The characterization of the stage of market development is based on elements specific to the sector. Table 2 highlights aspects of competitiveness that characterize the power market's stage of development.

Table 2

Characterization of Market Development Stage in the Power Framework for Competitiveness

Highly underdeveloped markets	Underdeveloped markets	Moderately developed markets	Highly developed markets
Market structure The sector is dominated by a vertically integrated utility that controls all lines of activity (generation, transmission, distribution, and supply/retail). The company is not sensitive to customer needs and lacks incentives to improve services/engage in technological innovation. The company is likely 100% state-owned. The government exercises direct regulatory and financial oversight of the utility company. The sector suffers from poor accountability, with taxpayers bearing most investment risks. Different government agencies are engaged in forecasting, planning, building, investing in, operating, and managing the sector, as well as setting and collecting retail tariffs. Share of private companies in total capacity is 0%.	**Market structure** Electricity market is undergoing restructuring with attempts to clarify and redefine roles of market players and market rules. There are some cost-based (but often politically influenced) tariffs. Distribution and transmission networks are poorly managed with operational and technical inefficiencies. No transparent third-party access (TPA) is in place for independent power producers (IPPs) to access the distribution or transmission grid. The state-owned vertically integrated company is being corporatized to legally account separately from the government and institute financial discipline. Very minimal IPP participation, mainly in small-scale renewable generation. Share of private companies in total capacity is less than 10%.	**Market structure** The sector is being liberalized, with competition in some segments of the market (generation and retail) to facilitate competitive entry and reduce market power. The transmission network is open and accessible to all under transparent and non-discriminatory prices. The grid is managed by an independent operator that maintains reliability, manages transmission congestion, and operates various markets to facilitate trade, liquidity, and risk management. There is an independent system operator to direct the safe, reliable, and economic operation of the interconnected electricity system, determine the order of dispatch, and make arrangements for expanding and enhancing the transmission system. The state has privatized some of the distribution assets. Private sector participation is increasing. TPA is in place for networks, but there is some curtailment of IPPs from the network. The government and/or dedicated independent agencies set policy and regulation, and oversee the sector's activities. Restructured/corporatized state-owned enterprises (SOEs) in generation act as off-takers. SOE presence in segments with natural monopolies (such as distribution). The share of private companies in total capacity is less than 40%.	**Market structure** The sector is fully liberalized, with free entry in generation, distribution, and supply/retail. The wholesale market exists with day-ahead and intraday markets. The balancing market and ancillary markets are fully functional. All networks are fully unbundled appropriately from generation. The private sector actively participates in distribution. All generators have effective TPA to both distribution and transmission networks. The government and/or dedicated independent agencies set policy and regulation, and oversee the sector's activities. The market is competitive, with restructured and privatized utilities. The share of private companies in total capacity is close to 60–70%.
Market regulatory/policy framework Liberalization of the sector has not started. There is no clear regulation of the sector. The state-owned utility is not regulated based on performance improvements and may be used by the government as part of the political agenda for patronage employment to favor domestic suppliers of fuel and equipment and to funnel revenue to government budgets outside of the tax system. There is no account unbundling between the generation arm and other parts of the utility. There is no clear pass-through mechanism of wholesale costs of generation to the end-user tariff. There is no renewable energy (RE) support mechanism.	**Market regulatory/policy framework** Regulation of the sector is developing, with the sector being regulated by a government ministry or an energy agency under the governance of an energy law. The electricity market is centrally managed by a system operator that purchases electricity through long-term PPAs. The PPAs are not transparent, and many are not competitively awarded. An RE support mechanism is in place (feed-in tariff/feed-in premium/auction type) and a few projects have started operating under the system.	**Market regulatory/policy framework** The generation sector has been partially liberalized and several IPPs are competing in the market. The centralized system operator's purchase decisions consider competing offers from IPPs. A market for bilateral contracting between IPPs and large industrial customers is starting to form. Regulatory rules and supporting network institutions are effectively applied to promote efficient access to the transmission network for wholesale buyers and sellers, including mechanisms to efficiently allocate scarce transmission capacity. The retail tariffs are unbundled to separate prices for competitive retail supply activities from the regulated network (transmission and distribution) charges. Cross-subsidies from industrial customers to households are gradually reduced as prices for households are realigned with underlying costs. Liberalization of the distribution and supply/retail is advancing, with barriers to entry being removed. An RE support mechanism is in place (feed-in tariff/feed-in premium/auction type) and a substantial number of projects have already been operating under the system.	**Market regulatory/policy framework** Fully liberalized sector with free entry in generation, distribution, and supply/retail ensured under a transparent regulation and implemented through an independent energy regulator. A wholesale market exists with day-ahead and intraday markets. The balancing market and ancillary markets are fully functional. Regulatory rules promote efficient access to the transmission network and provide signals for the efficient location of generation facilities. The RE segment is competitive, with some technology such as wind/solar selling on day-ahead or intraday markets. Hydro generators are actively selling on the balancing market. Other less developed technology types may still rely on a competitive support mechanism (such as auctions).
Product offering Electricity generation is made up of inefficient thermal plants. RE share in generation mix is nearly zero while the country has economically viable RE potential.	**Product offering** Electricity generation is highly undeveloped and comprises old, inefficient thermal plants. A significant number of plants are reaching end of life. RE generation is highly undeveloped, with mainly large-hydro projects if any. Non-hydro RE share in generation is less than 1%.	**Product offering** The electricity generation sector is in development phase with a few high-efficiency thermal plants already operating. RE generation is in development phase with some wind, solar, biomass, hydro, and geothermal projects. Technology used is getting closer to best available technology. The following data points are used to determine the gap: Non-hydro RE share in generation is increasing approximately between 1% and 5%.	**Product offering** The electricity generation sector is well developed and efficient, with most plants using the best available technology. RE generation is well developed, with some wind/solar projects competing with conventional generation. The following data points are used to determine the gap: RE share in generation mix, excluding hydro, is more than 5%.
Financial integration All energy projects rely on state financing, state budgetary support, or loans from state banks. No innovative financial instruments to manage related ESG risks or promote adaptation (through insurance or green bonds).	**Financial integration** Most energy projects rely on state financing, state budgetary support, or loans from state banks. Minimal loans to corporations are available from private banks or other intermediary investors.	**Financial integration** Project financing is available by commercial banks, and energy projects primarily rely on bank lending. However, institutional investors have limited or no access to project finance. There is a nascent, but limited, bond market with some corporations financing through bond issuance.	**Financial integration** Energy projects are financed through a mix of financing instruments and investors. Pension funds and other institutional investors are active. Financing instruments for energy projects (corporate bonds, green bonds, and commercial loans) are easily utilized and recognized in the market. Stock market is liquid.
Spatial integration: Trade and domestic links The country has no interconnection capacity with neighboring countries, and if there is, it is only used for extreme events. If used, electricity is traded through long-term non-transparent power purchase agreements (PPAs). The country does not export electricity. Majority of the country is not connected to the electricity network.	**Spatial integration: Trade and domestic links** The country is connected to a neighboring country network with which it sporadically trades. Many areas do not have electricity coverage, where distributed generation could be a solution, but this has not been pursued.	**Spatial integration: Trade and domestic links** The country is connected to most neighboring networks with active trading occurring. A regional exchange is established or there is participation in a regional auction office. Some parts of the country use distributed generation, while others are still not connected to the grid.	**Spatial integration: Trade and domestic links** The country is connected to all neighboring networks and has market coupling. There is 100% electricity coverage, either through direct connection to the network or through distributed generation.

The assessment of the catalytic effects that a project is expected to generate in this market context is anchored on the degree of innovation and scalability. It is ranked on a four-point scale (Modest, Sustaining, Deepening, or Transformational).

Innovation refers to the implementation of new or significantly improved products, practices, processes, and organizational methods compared to existing norms in the market. Scalability encompasses the visibility of the innovation in the market, and the ability for innovation to be scaled given the market conditions in which the project operates (such as policy environment, demand conditions, competitive dynamics, and the capacity of other market players). The degree of innovation may be assessed as Low, Medium, or High, and that of scalability as either Low or High. The type of market catalytic effect is determined by the combination of the degrees of innovation and scalability (Table 3).

Indicators that are often used in the power framework to assess market impacts include:

- Share of private IPPs in the sector
- Share of privately financed RE in the sector
- Number of power sector companies adopting innovations introduced by the project (for example, better energy storage systems, smart meters, and so on).

The AIMM system combines the market stage and the type of catalytic effects to arrive at the market outcomes rating of the project (Marginal, Moderate, Strong, or Very Strong).

Table 3

Assessment of Market Catalytic Effects

		Degree of innovation		
		Low	**Medium**	**High**
Degree of scalability	**Low**	Modest	Sustaining	Deepening
	High	Sustaining	Deepening	Transforming

Risk Assessment

AIMM incorporates risk assessments to account for uncertainties that may hinder a project's ability to realize its expected project and market outcomes. Projects facing material risks to achieving expected development outcomes receive a Qualified rating, while those with moderate risks—or where material risks have been adequately mitigated—receive an Unqualified rating. Table 4 presents some examples of risk factors often considered for IFC's power operations.

Table 4

Examples of Risk Factors for Power Projects

Risk factor	Example
Operational factors	• Client track record of delivering impact in proposed area. • Client's market position and product offering. • Sponsor's technical strength and support to project. • Agreements assuring implementation of specific project components. • Public partner record in meeting contractual obligations. • Government track record in committing counterpart resources.
Sector factors	• Resilience to exogenous shocks. • Financial viability and affordability in the absence of subsidies. • Extent of political support and social buy-in.
Macroeconomic factors	• Overall economic growth projections. • Impact of the macroeconomy on the sector. • Exposure of project development effects to exogenous shocks, for example, foreign exchange risk.
Policy factors	• Enabling environment such as laws and incentives. • Specific regulatory risks.

Scoring Adjustment

AIMM uses a scoring adjustment mechanism to explicitly recognize projects that make a material contribution to addressing negative climate and environmental effects through mitigation or adaptation efforts, and those that make a significant contribution to economic inclusion and expansion of economic opportunities to underserved groups. Projects that meet the eligibility criteria for the scoring adjustment (linked to the level of ambition embedded in their expected results) are awarded additional points to their overall AIMM score.