

INVESTMENT CLIMATE IN PRACTICE

INVESTING IN INFRASTRUCTURE

THE POWER OF RENEWABLE ENERGY FOSTERING INVESTMENT AND COMPETITION TO GENERATE ELECTRICITY

Renewable energy is a viable, cost-effective way to provide power to rural and remote areas, lower electricity generation costs over time, and reduce costly power outages. Renewable energy technologies could benefit the nearly 1.5 billion people who lack electricity access—85 percent of whom are in rural areas—and reduce losses for firms due to power outages (which are equivalent to about 8 percent of their sales in low-income countries). This note discusses key steps for opening the power sector to renewable energy projects in developing countries while encouraging efficient, competitive markets. It recommends policy approaches, measures to ease entry, and ways of reducing investor risks for on- and off-grid renewable energy projects.

More than 80 countries have introduced initiatives to promote investments in renewable energy generation. These initiatives are important for their environmental benefits and as a way to deliver electricity to rural areas and increase energy security.

Renewable energy projects have attracted investments in developing countries, creating jobs and advancing growth. In 2009 developing countries (excluding Brazil and China) had about \$8 billion in renewable energy investments. Renewable power may also reduce costs of doing business incurred by investors due to unreliable power systems. In Eastern Europe and Central Asia eliminating power outages in 2005 could have raised gross domestic product by 6 percent (Iimi 2008).

It makes sense for developing countries to promote investments in renewable energy given their potential for lower costs and higher energy security. Such investments can also help develop manufacturing clusters related to renewable energy equipment.

Using renewable energy available in rural and remote areas can be the most cost-effective option for electrification, saving resources on expanding transmission networks and operating power plants run on fossil fuels. Moreover, renewable energy can cause wholesale spot energy prices to fall over the long run by displacing costly fossil fuel plants. The benefits of renewable energy are even greater when inefficient conventional power plants account for a large share of electricity generation (Pöyry 2010).

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Investment Climate work aims to create an enabling policy environment and more competitive markets in the power sector, which can encourage private participation to meet the needs of access and reliability.

In addition, renewable energy allows countries to diversify their energy supplies and expand their generation capacity using sustainable natural resources—limiting their dependence on imported fuels, separating energy prices from international fossil fuel prices, and making power systems more reliable.

Investments in renewable energy typically incur higher costs and risks than traditional investments in generation. These costs and risks require government interventions to address market failures and ease barriers to the use of renewable energy. Such projects differ from conventional power plants in three ways:

- ❑ Investment requirements are higher.
- ❑ Operation and maintenance costs are lower, and decline over time because of technological advances.
- ❑ Transmission networks have to be extended and reinforced to deliver energy produced in distant locations to national systems.

These features create risks that require adjustments to the legal and regulatory framework of the power sector. For example, capital costs for wind power plants can be more than five times those for combined cycle plants fired by natural gas, and total costs may be more than 50 percent higher—increasing investment recovery times. In addition, renewable energy projects are subject to the availability and accessibility of resources—such as rain, wind, and solar radiation—that cannot always be predicted or managed.

To promote investments in renewable energy, governments need to foster investment climates that allow for easy entry into the power sector, reduce investor risks, and facilitate operations. Tax and nontax fiscal incentives can complement policies to encourage investment (Table 1; see James and McGregor 2011 for a discussion of tax and non-tax incentives). Governments and their development partners can apply this four-step approach to identify interventions in renewable energy markets that can deliver socially desirable investments and outcomes (Figure 1).

STEP 1: SET TARGETS FOR RENEWABLE ENERGY

Renewable energy projects connected to transmission systems (on-grid) and in remote areas (off-grid) should aim to minimize generation costs and maximize access. Setting targets for shares of renewable energy in power consumption and developing national energy master plans that define government visions for renewable energy use are helpful in guiding policies that encourage investment. The targets and plans should reflect the optimal mix of power resources.

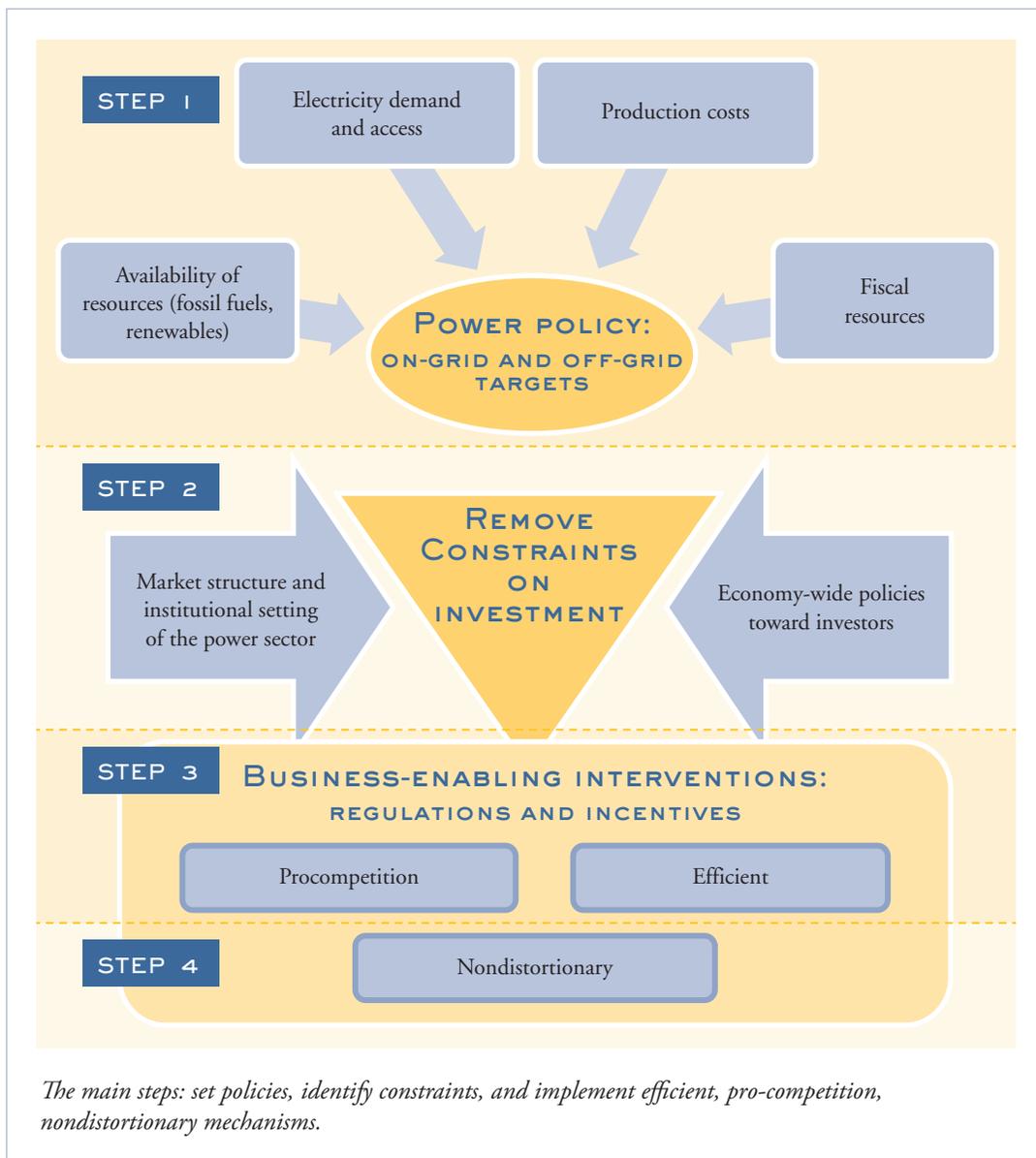
A key decision is whether renewable energy efforts should focus on providing electricity in rural and remote areas—where it has proven to be cost-effective relative to grid connections—or if resources should also promote on-grid projects that could cost more in the short and medium term. This decision depends on the availability of public resources and consumers’ willingness to pay for electricity.

TABLE 1: COMPONENTS OF AN ENABLING INVESTMENT CLIMATE FOR RENEWABLE ENERGY

Facilitating entry	Reducing revenue risks and facilitating operations	Providing fiscal incentives to encourage investment
<ul style="list-style-type: none"> ❑ Provisions to allow for independent private providers ❑ Coordinated, streamlined licensing and permitting ❑ Grid access regulations (on-grid projects) 	<ul style="list-style-type: none"> ❑ Price guarantees (feed-in tariffs) ❑ Power purchase agreements ❑ Quantity guarantees ❑ Other regulatory measures 	<ul style="list-style-type: none"> ❑ Tax incentives ❑ Nontax incentives ❑ Disincentives for fossil fuels

Governments should address bottlenecks in these areas to promote investments in renewable energy.

FIGURE 1: FOUR STEPS TO PROMOTE INVESTMENTS IN RENEWABLE ENERGY



In rural and remote areas renewable energy is preferable if natural resources are available, large and dispersed populations lack electricity access, potential electricity consumption is not large enough, and renewable energy plants are cost-effective in the medium term relative to grid connections and fossil fuel plants. Several developing countries have included solar, mini-hydro, and biogas projects in their rural electrification policies.

STEP 2: FACILITATE ENTRY AND REMOVE CONSTRAINTS ON INVESTMENT

Once the factors limiting investments in renewable energy have been identified, interventions to improve the business environment should consider the market structure and institutions affecting the power sector, as well as other economy-wide

policies. The market structure and functioning of the power sector define the range of interventions.

Where there is wholesale competition—that is, competition to serve large customers—market-oriented approaches are possible and preferable. In markets with a single state-owned buyer, supporting measures are part of the conditions that the buyer sets in power purchase agreements. Similarly, institutions governing the power sector determine whether it is prudent to rely more on regulatory interventions (if there is a solid regulatory framework and regulatory independence) or fiscal and financial incentives (which are easier for the central government to administer).

To level the playing field for investors in renewable energy projects relative to conventional plants, governments try to ensure stable, reasonable revenue streams. Governments can ensure prices high enough to attract investors using tools such as feed-in tariffs or ensure minimum production quantity by imposing, for example, mandatory quotas for the use of renewable sources in power generation. But burdens on consumers and government budgets must be balanced against the benefits of the supporting mechanisms.

Regulatory interventions for on-grid and off-grid renewable energy projects address a range of issues to promote market entry and support business operations (Figure 2).

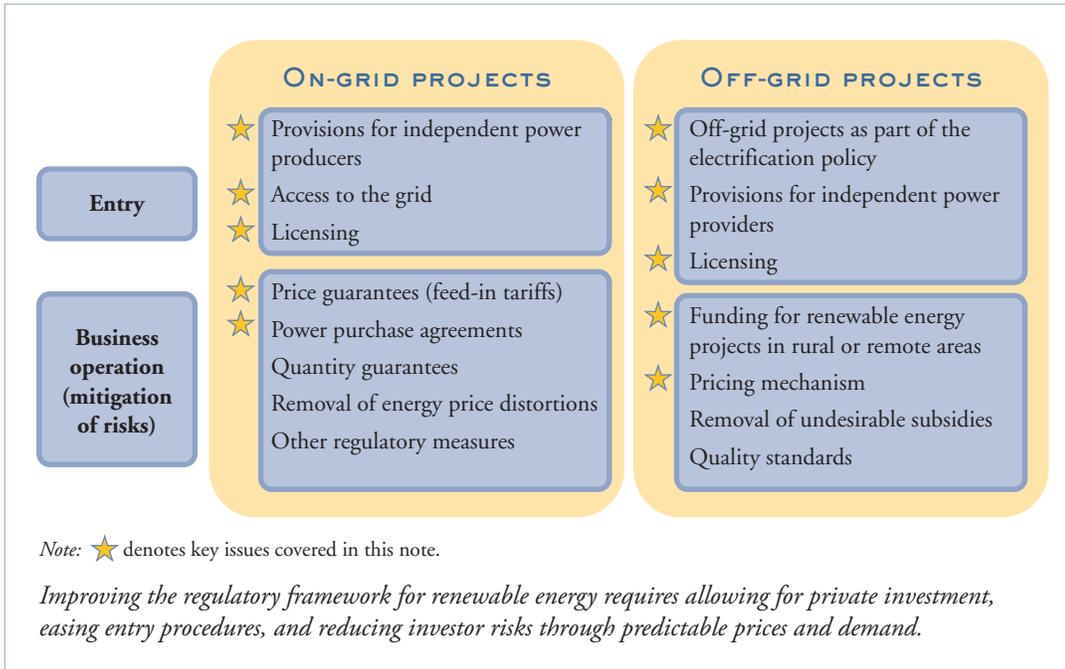
Prioritize regulatory interventions for on-grid projects

- ❑ **Legal provisions for independent power producers.** Independent power producers are private companies that generate electricity in their own facilities and sell it to the national grid or isolated electricity networks. Without legal provisions allowing private participation in the sector, private renewable energy projects cannot emerge. Lacking private participation, such investments will be entirely dependent on public resources and the ability of state enterprises to undertake them. Entry by private producers is controlled in single-buyer markets, which account for most electricity markets in developing countries.
- ❑ **Price guarantees (feed-in tariffs).** Feed-in tariffs encompass fixed tariffs and premiums above market prices for traditional energy. As of August 2010, 54 countries—including

27 developing ones—had feed-in tariffs for at least one source of renewable energy (REN21 2010). These tariffs guarantee a certain amount of revenue per unit of energy delivered to the system, mitigating price risks for investors. Such tariffs are essential if renewable energy investments would not occur under current electricity prices. Governments should decide how to set these tariffs and premiums (for example, based on actual or avoided costs, or in competitive tenders), whether feed-in tariffs should differ by energy source, technology, size, location, and time of dispatch, how long the tariffs should be applied, and how they should be funded (by higher consumer prices or government financing).

- ❑ **Conditions for power purchase agreements.** To make renewable energy projects more financially viable in developing countries, long-term power purchase agreements are a useful complement to feed-in tariffs, guaranteeing production volumes for a certain period (usually 10–20 years). Conditions of these contracts are especially important in single-buyer markets because they are the only way to enter the generation market. Moreover, when there are concerns about a utility's capacity to pay for electricity, additional guarantees are essential.
- ❑ **Transparent rules to access the national grid.** Access rules and grid codes are essential to allow renewable energy projects to dispatch energy to national power systems. Regulations should prevent discrimination in access against independent producers, uncertainty about connection costs and access charges, delays in connection timeframes, and limitations to access due to transmission congestion.
- ❑ **Licensing procedures.** This type of intervention addresses licenses and concessions to exploit natural resources for power generation, siting and building regulations, and environmental impact assessments. Simple, transparent procedures are needed to ease entry and surmount a range of potential problems. These include conflicts of interest that arise when license grantors own plants that compete with new renewable energy plants, entry deterrence due to lack of licensable sites, requirements that favor large or national firms, complex and

FIGURE 2: GOVERNMENT INTERVENTIONS TO PROMOTE INVESTMENT IN ON-GRID AND OFF-GRID PROJECTS



overly lengthy procedures for environmental impact assessments, and delays caused by unclear procedures, unexpected public consultations, and a lack of participatory spatial plans that specify territorial and maritime zones for renewable energy projects. In addition, there is enormous variation in the duration of administrative processes: in Europe the lead time on wind projects ranges from 18 to 60 months. (The European Commission is conducting public consultations to expedite the deployment of energy infrastructure.)

Prioritize regulatory interventions for off-grid projects

- ❑ **Off-grid projects as part of electrification policy.** Governments should avoid crowding out private investments in off-grid projects and relying on grid expansion as the primary means for electrification even when such expansion is not cost-effective.
- ❑ **Private participation in off-grid projects.** Laws should allow private providers to manage mini-grids and to generate in small facilities close to consumption centers and interconnected to distribution networks. Firms in rural areas that already generate

power for their own consumption could sell excess electricity to nearby populations. To ease entry, coordination mechanisms between distribution companies (usually state enterprises), providers, the electrification authority, and other government agencies should be enshrined in sector regulations.

- ❑ **Allocation of funds for projects in rural or remote areas.** National rural electrification policies should develop transparent mechanisms to allocate funds for communities and private companies to develop renewable energy projects if deemed necessary. Competitive tenders for allocating subsidies are recommended for this purpose.
- ❑ **Pricing mechanism.** Prices should allow providers to recover their investments within a reasonable period and to cover operation and maintenance costs. Prices in urban areas should not be used as a reference for rural areas because costs differ. For projects that do not receive public funds, prices can be unregulated but supervised. For other projects, prices should guarantee their financial equilibrium, taking into account rural consumers' capacity to pay and any available government subsidies or other potential financing.

- **Light-handed licensing.** Licensing conditions and procedures for generation and distribution should not impose unduly high costs on providers. For example, small generation projects may have a fast-track procedure or be exempted, as in Nepal and Tanzania. And public and private projects should be treated the same in terms of approval requirements.

STEP 3: ENSURE THAT POLICIES FOSTER COMPETITIVE, EFFICIENT MARKETS

The goal of incentives for renewable energy investments is to put renewable and conventional energy projects on a level playing field. Incentives provided at the kickoff stage should shrink as renewable energy becomes more competitive with other sources of energy. For that to happen, renewable energy projects should progressively be exposed to competition and market risks using market mechanisms (such as competitive tenders when awarding power purchase agreements or falling premiums instead of fixed feed-in tariffs). In addition, support for renewable energy should not seek to attract investment at any cost for consumers and governments—whether through high electricity tariffs for consumers or higher costs and risks for governments because of excessive guarantees—but also guarantee that the mechanisms selected are the most efficient. That approach imposes the least cost on the economy.

Regulations can help ensure competitive conditions for business operations while promoting efficiency. Such regulations include using tenders to allocate the benefits of feed-in tariffs, power purchase agreements and electrification funds for energy generators that ask for the lowest prices or subsidies, overseeing power procurement practices of single buyers and distribution companies to avoid distortions in competition (such as collusion among investors or discrimination against certain investors), and setting clear rules to avoid manipulation of energy spot prices or dispatch volumes. To design specific interventions, a thorough assessment of each of these issues is required given the unique conditions of each country.

Design pro-competitive regulations

Tenders. Tendering can lower the costs of energy and be used to grant feed-in tariff benefits to the

most efficient providers. For example, if Peru had not used an open, competitive tendering mechanism, consumers would have paid nearly a third more for renewable energy. In small projects, complex tendering processes may discourage entry. Thus governments may require competitive processes only for projects above a certain size.

The design of tenders is central to preventing distortions in competition. Conducting cost studies to determine a reasonable range for tariffs is also useful as an internal reference. In addition, governments should take actions to prevent speculative behavior in tenders—such as requesting financial and operational guarantees—so that investors seek credible energy prices that ensure bankable projects that comply with required operational schedules.

Efficient feed-in tariffs. Depending on their design, fixed feed-in tariffs that are independent of market prices can discourage efficiency and require higher payments from consumers, taxpayers, or both. In liberalized wholesale markets, sliding premiums (premiums that fall when electricity prices rise) or systems with minimum and maximum tariffs are more compatible with the functioning of the electricity market and may reduce the burden on users. Tariff “degression” (fixed tariffs that fall over time), as used in Germany, is another way to induce technological improvements and limit the costs of support mechanisms.

Efficient transmission systems. Transmission charges that vary based on location and grid connection costs borne by renewable energy plants result in higher costs for renewable energy, but they foster efficient location of plants. Thus, taking into account the locations of renewable energy resources and transmission systems, governments need to select the most efficient mechanism for access charges (uniform or based on location) and for sharing the costs of the additional transmission requirements.

Smart technical rules. Rules should ensure a reliable electricity supply and not unduly burden renewable energy projects. Because renewable energy depends on the availability of natural resources, energy production is unstable and cannot be accurately predicted, particularly for wind power. Some countries, such as Spain, provide incentives to renewable energy plants that can manage the delivery of intermittent energy and mitigate the inaccuracy of energy delivery predictions.

STEP 4: PREVENT POLICY DISTORTIONS

The final step for government interventions in the renewable energy market involves ensuring that the interventions are designed so that they minimize economic distortions.

Avoid or limit unintended negative effects

Well-designed instruments should not:

- ❑ Disrupt the dynamics of incentives to technological improvements by setting tariffs or premiums for long periods instead of having them fall over time.
- ❑ Crowd out private provision of goods and services by limiting investments in efficient conventional power plants.
- ❑ Support inefficient firms by not using mechanisms based on competition to select renewable energy projects with the lowest generation costs.
- ❑ Cause major distortions to competition by limiting price competition through rigid feed-in tariffs, deterring future entry through long-term contracting, or creating conditions that facilitate collusion among competitors.
- ❑ Distort trade in regional markets through differentiated retribution practices for domestic and imported electricity.

Consider links between incentives and review them regularly

Most countries apply a range of instruments to support renewable energy. India and the Philippines use feed-in tariffs, quotas, and financial and tax support mechanisms. India also uses tradable certificates for renewable energy. Governments should assess whether all these components are needed and ensure that they do not have unintended effects when combined.

Support mechanisms should be assessed regularly for their necessity and relevance in light of technological improvements and the evolution of green markets. The review process must take into account the imbalance among stakeholders—well-informed investors in renewable energy relative to dispersed consumers who bear diffuse costs due to renewable energy support mechanisms—to avoid capture and make socially beneficial decisions.

CONCLUSION

Renewables are an attractive option for expanding electricity supplies in developing countries. They benefit rural populations that lack access and businesses that face recurrent power outages. Specific interventions to promote renewable energy in the power sector depend on the context and require periodic adjustments to ensure that policy goals are achieved efficiently, limiting burdens on consumers and taxpayers.

Government interventions to promote renewable energy markets should be transitional until renewable energy technology develops enough efficiency and scale to compete freely in the electricity market on a level playing field.

To facilitate the entry of on-grid renewable energy projects, developing countries need to foster conducive business environments that allow independent power providers to participate in such projects, establish price mechanisms that guarantee revenue while promoting long-term efficiency, implement power purchase agreements that facilitate entry, give renewable energy projects nondiscriminatory access to power grids, and establish coordinated, transparent, streamlined licensing procedures to ease entry.

Promotion of off-grid investments requires that these projects be part of national electrification policies, involve private power providers and transparent funding mechanisms for renewable energy electrification projects, set pricing mechanisms that allow investments to recover their costs in a reasonable period, and expedite licensing procedures.

To guarantee competitive and efficient entry, governments should implement competitive tenders to allocate feed-in tariffs, power purchases, and electrification funds to providers that offer the lowest energy generation prices or subsidies. It is also essential to oversee competitive conditions in the power procurement practices of single buyers and distribution companies.

Finally, policymakers need to be aware of the unintended effects of implementing an array of instruments and periodically review the suitability of support mechanisms to minimize distortions on competition, efficiency, and private investment.

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The Investment Climate Advisory Services of the World Bank Group helps governments implement reforms to improve their business environments and encourage and retain investment, thus fostering competitive markets, growth, and job creation. Funding is provided by the World Bank Group (IFC, MIGA, and the World Bank) and over 15 donor partners working through the multidonor FIAS platform.

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