innovations—including decentralized renewable energy, battery storage, and digitalization—empowers consumers and other decentralized actors to participate in the production of electricity and in so-called demand-response services, generating reverse flows along power networks and introducing the possibility of trade at the retail level. Moreover, as large-scale battery storage becomes increasingly flexible and cost-effective, the need for power systems to simultaneously match supply and demand will recede.

The purpose of this overview is to summarize the lessons from the study and reflect upon their implications for future practice. Ten key findings are followed by the policy implications of those findings. The comprehensive analysis contained in the main report begins with a survey of the uptake of the 1990s power sector model by developing countries, considering both the economic and political drivers of reform. Attention then turns to the implementation of each of the fundamental building blocks of the reform model: sector restructuring and governance; private sector participation; regulation; and market liberalization. Thereafter, reform measures are evaluated in terms of their impacts both on intermediate sector outcomes (such as efficiency and cost recovery) and on final sector outcomes (such as security of supply, access and affordability, environmental sustainability).

The study suggests that future reforms should be shaped by context, driven by outcomes, and informed by alternatives. The 1990s reform model is sometimes misconstrued as a universally applicable policy prescription. However, the findings reported here suggest instead that the 1990s model contains valuable insights that can support improvements in efficiency, cost recovery, and security of supply when deployed in the right circumstances and for the right reasons. However, economic and political preconditions are found to be important determinants of the success of reforms; these deserve closer consideration when determining the appropriate reform path for each country. Reform choices also need to be guided by desired sector outcomes, notably, with respect to decarbonization and universal access objectives. Fortunately, good sector outcomes can be achieved in a variety of institutional settings, as the experience of developing countries around the world has shown. Those settings will be tested, as new business models emerge in response to the technological disruptions that are reshaping the economic logic of the sector.

KEY FINDINGS

This section summarizes the most relevant and interesting results of the study in the form of 10 key findings.

- Finding #1. Uptake of power sector reform in the developing world did not evolve according to the textbook model.
- Finding #2. Power sector reforms were more likely to gain traction if they were consistent with the country’s political system and ideology and led by champions enjoying broad stakeholder support.
- Finding #3. The private sector made an important contribution to expanding power generation capacity in the developing world, albeit with significant challenges along the way.
- Finding #4. Wholesale power markets helped improve efficiency in the minority of countries that was ready for them; many others found themselves stuck in transition.
- Finding #5. Good corporate practices, particularly with respect to human resources and financial discipline, were associated with better utility performance; these were more prevalent among privatized utilities.
- Finding #6. Private sector participation in power transmission and distribution delivered good outcomes in favorable settings; elsewhere, it was susceptible to reversal.
- Finding #7. Regulatory frameworks have been widely adopted, but implementation
has often fallen far short of design, particularly when utilities remained under state ownership.

- **Finding #8.** Cost recovery has proved remarkably difficult to achieve and sustain; the limited progress made owes more to efficiency improvements than to tariff hikes.
- **Finding #9.** The outcomes of power sector reform were heavily influenced by the starting conditions in each country.
- **Finding #10.** Good sector outcomes were achieved by countries adopting a variety of different institutional patterns of organization for the sector.

**Finding #1: Uptake of power sector reform in the developing world did not evolve according to the textbook model**

The diffusion of power sector reform in the developing world was strongly affected by contextual factors. The 1990s power sector reform model spread rapidly across both the developed and developing worlds. A quarter-century later, however, the patterns of adoption are quite different. Organisation for Economic Co-operation and Development (OECD) countries have adopted (on average) close to 80 percent of the 1990s policy prescriptions, although with some notable exceptions. The degree of adoption in the developing world is much lower at under 40 percent. The level of uptake differs systematically according to the geographical, economic, and technical characteristics of countries (map O.1). Specifically, reform adoption is twice as high in Latin America relative to the Middle East, in middle-income relative to low-income groups, and in countries with larger power systems relative to smaller ones. Moreover, the momentum of reform slowed markedly over time, with uptake more limited during the decade from 2005–15 than from 1995–2005.

**MAP O.1  Power sector reform spread unevenly across the developing world**

*Sources: World Bank elaboration based on Rethinking Power Sector Reform utility database 2015; Regulatory Indicators for Sustainable Energy 2016.*
As a result, reform implementation diverged from the theoretical paradigm. Overall, barely a dozen developing countries were able to implement the 1990s model in its entirety. Instead, most are stuck at an intermediate stage of implementation, sometimes referred to as the “hybrid model” (Eberhard and Gratwick 2008). A further quarter of developing countries—including many small, low-income, and fragile states—have barely begun to reform their power systems. Underlying this partial implementation has been a tendency to cherry-pick components of the 1990s model that were easier to implement, while leaving others aside. Creation of a regulatory entity and private sector participation in generation through independent power projects (IPPs) were, by far, the two most popular reforms, adopted by more than 70 percent of developing countries; the uptake of other reforms was much lower. This à la carte approach to reform does not sit well with the original conception of the 1990s model as a coherent package of mutually supportive reform measures. It meant that countries ended up with contradictory reform combinations, such as private sector participation in distribution without a regulator—or, more frequently, the other way around.

Finding #2: Power sector reforms were more likely to gain traction if they were consistent with the country’s political system and ideology and led by champions enjoying broad stakeholder support

The 1990s reform model drew heavily on economic first principles, with no explicit attention to the political dynamics of the reform process. Yet, the reality is that the power sector is highly politicized across much of the developing world. Power utilities—with their significant employment rolls and contracting volumes, as well as their ability to direct valued electricity services to different communities—are a natural focus for patronage politics. Moreover, the cost and quality of electricity supply has the potential to become an electoral issue that can mobilize public unrest and topple governments.

Power sector reforms almost always take place in the context of a crisis and often as part of a wider national transformation process. There are few examples of countries that reformed in the absence of a crisis or of countries that failed to reform when beset by crisis. The triggering events sometimes originated within the power sector, such as a drought or oil price shock or a situation of unsustainable utility debt. However, in many cases, the power sector was implicated in a wider national crisis, either linked to fiscal stabilization (such as tariff reforms in the Arab Republic of Egypt) or to socioeconomic transition (such as privatization in Ukraine). This finding underscores the fact that power sector reform does not take place in a vacuum; it needs to be understood in terms of the wider political and economic context.

The trajectory of reform varies substantially across countries, with reform announcements providing no guarantee of sustained implementation. The reform process typically begins with the public announcement of a reform program. Some countries then move rapidly toward implementing the full suite of reforms announced, as in the case of Peru (figure O.2a). In other cases, reforms rapidly lose momentum, with delivery falling well short of original aspirations and even being susceptible to reversal over time, as in the case of Senegal (figure O.2b). Overall, the gap between reform announcements and implementation can be quite considerable (figure O.3).

Reform trajectories reflect the political dynamics around the power sector in each country, as well as the strategy adopted for reform implementation. Although reforms are announced by countries
across the ideological spectrum, evidence suggests that those with a stronger market orientation are more likely to make meaningful progress with implementation. Similarly, reforms tend to proceed further in countries that have contestable or multipolar political systems, as opposed to those where power is more centralized. This is consistent with the observation that the reform process typically involves the delegation and decentralization of power by breaking up national monopolies, delegating responsibility to regulators and private operators, and allowing new entry to competitive markets. The strategy for reform implementation at the sector level is also important. Countries that can mobilize a strong reform champion, ideally supported by a stable and competent bureaucracy, generally go further with sector reform. However, unless wider stakeholder alignment is achieved through outreach efforts and ultimately legislative support, reforms may prove
Finding #3: The private sector made an important contribution to expanding power generation capacity in the developing world, albeit with significant challenges along the way

The private sector has contributed just over 40 percent of new generation capacity in the developing world since 1990, a share that has been remarkably consistent across country income groups. The absolute amount of private investment in Africa has been relatively low, but it still represents about 40 percent of total investment, similar to other regions. Across income groups, the share of private sector investment in capacity additions hovers around 40 percent (figure O.4a). For modern renewable energy technologies—now in the ascendancy—the share was almost twice as high, at around 70–80 percent (figure O.4b). Nevertheless, only a handful of countries was able to rely exclusively on the private sector for almost all new generation capacity. Foreign sponsors have been a major source of private investment in power generation, particularly in the Middle East and Sub-Saharan Africa (figure O.5). South Asia stands out as the only region where the majority of private investment has been domestically sourced.

Nevertheless, private investments in generation have not always been guided by principles of least-cost planning. During the 1990s, little attention was paid to power system planning, leaving many developing countries without strong technical capacity in this critical area. This was unfortunate at a time when demand for electricity was growing so quickly across the developing world that the scale of the system had to double every decade in many countries. Even when plans were made, they were seldom enforced. Only one in five countries makes difficult to sustain and vulnerable to reversals of various kinds. Finally, while donors play an important role in introducing reform ideas and supporting their implementation, they do not seem to have much influence on a country’s overall reform trajectory, which is rather shaped by local political factors.

FIGURE O.3  For some countries, the gap between reform announcement and implementation has been considerable

power system plans mandatory, which often leaves important decisions about plant capacity vulnerable to the vagaries of political interference or unsolicited bids. In contrast to Latin America and the Middle East, where competitive tendering is more established (although the number of deals in the latter region is limited), direct negotiation of deals for IPPs remains widespread across Sub-Saharan Africa and South Asia (figure O.6). Such nontransparent procurement processes jeopardize value for money in generation and invite allegations of corruption, which has bedeviled IPP programs in some countries—Tanzania being a prominent example. Countries with strong planning and procurement frameworks were more likely to be able to expand generation capacity to keep pace.
with growth in peak demand. The available evidence suggests that the features of the planning and procurement framework most closely associated with good outcomes for security of supply are the existence of institutional capacity for planning, the use of a transparent and participatory process for developing plans, and the adoption of competitive bidding for new generation.

**Striking the right balance of risk between the public and private sector in power generation has proved challenging.** IPPs face a plethora of risks, including demand risk, fuel price risk, exchange rate risk, and termination risk. All can weaken investor interest, particularly in untested markets, until a reliable track record has been established. In response, governments provide contractual protections of various kinds. Oil price and currency fluctuations are often passed through directly to the tariff specified in the power purchase agreement (PPA). “Take-or-pay” clauses prevalent in many African IPP contracts guarantee purchase of power even in the absence of demand; elsewhere, capacity charges at least ensure that fixed capital costs can be covered. Sovereign guarantees often need to be provided to compensate investors in case of premature termination. At one end of the spectrum, IPP programs have sometimes stalled when private sector demands for risk mitigation were not matched by the willingness of governments to provide them. Examples include Egypt’s first IPP program in the early 2000s and Vietnam’s program in the 2010s. At the other end of the spectrum, when governments have assumed excessive risk, IPP programs have sometimes triggered financial crises. Large-scale IPP programs have left governments exposed to currency or oil price risks, as happened during the Asian financial crisis of the late 1990s in Pakistan and the Philippines, where the power sector became a major contributor to public debt.

**Finding #4: Wholesale power markets helped improve efficiency in the minority of countries that were ready for them; many others found themselves stuck in transition**

Only one in five developing countries has introduced a wholesale power market, reflecting the formidable list of preconditions that must be met before such
markets become possible or meaningful. Power markets are for the most part found in middle-income countries whose power systems are relatively large, financially viable, and unbundled (both vertically and horizontally)—and where regulatory governance is sound. However, regional power markets at varying stages of development are also allowing smaller countries in Africa, Central America, and South Asia to capture some of the benefits of power trade.

Close to half of the developing countries have adopted the single buyer model as a (sometimes indefinite) step toward wholesale competition. After some vertical and horizontal unbundling of the sector, IPPs compete alongside incumbent generators to supply power to the publicly owned single buyer, which is typically the transmission (and sometimes also distribution) utility. Although often conceived as a transitional model toward a competitive market, in practice most countries have remained stuck at this stage. A key concern is that the long-term take-or-pay arrangements that are often required to induce IPP investments in emerging markets can introduce distortions into power dispatch and build contractual rigidity into the power system—both of which significantly limit the scope for competition when a wholesale market is eventually introduced.

Effective functioning of wholesale markets requires a high-resolution, short-term pricing mechanism, as well as a sound and adaptive governance structure. The main function of wholesale power markets is to provide efficient short-term price signals to guide dispatch and inform investment. Prices across developing country spot markets have varied widely, ranging between US$20 to US$200 per megawatt-hour, with price trends conveying the evolution of local market conditions, such as expanding investment in India or drought conditions in Colombia (figure O.7). High spatial resolution of prices—such as the nodal prices used in Peru—is important to signal transmission constraints. Close monitoring of market prices and performance by an independent watchdog, such as the system operator or regulator, has proved important to detect abuses of market power often attributable to inadequate restructuring of generation assets prior to the launch of the market (Jamasb, Newberry, and Pollitt 2005; Jamasb, Nepal, and Timilsina 2015; Nepal and Jamasb 2012). This has been particularly challenging in the Philippines, but it has improved over time owing to new entries and the interconnection of segmented markets, reflected in tumbling wholesale market prices (figure O.7). Good governance of the system operator is critical for the impartial and effective dispatch practices that underpin price formation. Some countries have chosen to combine this function with that of transmission system operator, which is a viable option as long as conflicts of interest can be avoided. The functions of system and market operator have also proved possible to combine.

Despite expectations, spot market prices have not provided adequate incentives for investment in new generation
capacity across the developing world. There has been relatively little entry by merchant plants and limited willingness of regulators to allow spot market prices to spike during scarcity periods to the levels needed to incentivize new investment. Accordingly, several countries have adopted regulated capacity payments, which, although effective in incentivizing new investment, have led to concerns about excess capacity—for example, in Chile. Capacity markets have also been tried, though without success, in Colombia. Increasingly, supply auctions are proving to be an effective model for ensuring security of supply across several Latin American countries. In supply auctions, potential generators compete for the right to supply power to distribution companies on a long-term basis, but they do so without take-or-pay provisions.

More recently, decarbonization of the generation mix has emerged as a new policy objective to be pursued, creating further challenges for wholesale power markets. With few exceptions, decarbonization was not a major policy objective pursued through least-cost generation plans during the period under study. Generation investments were largely driven by concerns over security of supply, which coincidentally pushed hydro-dominated countries toward greater carbon intensity and oil-dominated countries toward lower carbon intensity. Nevertheless, these experiences illustrate that such policy-directed investment decisions can materially move the dial on carbon intensity once that becomes the objective. More recently, some Latin American countries, as well as India, have adapted their supply auctions to explicitly support the transition to renewable energy by targeting certain generation technologies. The growing share of variable renewable energy has created even further challenges for capital cost recovery in the generation segment, since the presence of resources such as wind and solar—which are characterized by zero marginal cost—can lead to periods of zero and even negative spot prices in some markets. Also, the variability of wind and solar resources increases the need for fast-ramping flexible resources to balance the system as needed, yet many markets lack mechanisms for appropriately incentivizing such ancillary services.

Finding #5: Good corporate practices, particularly with respect to human resources and financial discipline, were associated with better utility performance; these were more prevalent among privatized utilities

Corporatization of public utilities was conceived as a way to put the power sector on a more commercial footing. Prior to 1990, many public power utilities operated as administrative departments of their respective line ministries without any separate corporate existence. Doing so left them subject to the vicissitudes of public administration and unable to adopt a commercial orientation. For this reason, the first step to power sector reform in many countries was to separate out the operational functions associated with service provision into a distinct state-owned corporation, typically operating under company law. In doing so, many important decisions were made regarding the governance of the company and the establishment of management processes.

There is a significant governance gap between corporatized public utilities and privatized ones. A well-established literature on corporate governance of state-owned enterprises provides a clear frame of reference for good practice in this domain. For those jurisdictions where power utilities are entirely state-owned, corporate governance tends to reflect about 55 percent of good-practice measures, suggesting considerable room for improvement. Governance scores tend to be systematically higher for private utilities, falling in the 60–90 percent range, a level only occasionally matched by
public utilities. Boards of private utilities enjoy almost complete decision-making autonomy, whereas those of public utilities have limited freedom on critical matters of finance and human resources—particularly with respect to raising capital and appointing the chief executive officer. Public utilities also suffer considerable interference in the appointment and removal of board members. Overall, public utilities tend to be less rigorous in staff hiring, with more limited use of standard good practices, such as advertising, shortlisting, interviewing, and checking of references. Owing to public sector employment restrictions, they also have less ability to reward employees through performance bonuses or to fire those who perform poorly. Public utilities also tend to fall particularly short with respect to basic accounting practices that are universal in the private sector. When it comes to adoption of information technology, by contrast, there seems to be relatively little difference between public and private utilities.

Good practice on corporate governance is strongly correlated with good utility performance in terms of cost recovery and distribution efficiency—irrespective of public or private management. Surprisingly little has been documented to date regarding the extent to which corporatized power utilities pursued good governance practices and the resulting performance impact. New evidence presented in this study suggests that the quality of managerial practices related to human resources and financial discipline are strongly associated with better performance on distribution efficiency and operating cost recovery (figure O.8). The correlation holds irrespective of whether utilities are publicly or privately managed, since the best-performing public utilities exhibit somewhat better management practices than their peers. Board autonomy and accountability, however, are not so clearly linked to performance. Some of the dimensions of corporate governance that are most strongly associated with efficient utility performance are the publication of accounts consistent with international financial reporting standards, the explicit definition of public service obligations, the ability to fire employees for nonperformance, the use of transparent hiring processes for selecting employees, the adoption of modern information technologies, and the board’s freedom to appoint and remove the chief executive officer.

Finding #6: Private sector participation in power transmission and distribution delivered good outcomes in favorable settings; elsewhere, it was susceptible to reversal

Private sector participation in transmission has not been widespread, but some successful examples exist in Latin America and Asia. The reform model of the 1990s was primarily concerned with establishing private sector participation in generation and distribution. The transmission segment was regarded as a natural monopoly, exercising system-coordination functions best handled under public ownership. Nevertheless, the experience of some countries in Latin America has illustrated that new transmission lines can readily be bid out under build-operate-transfer structures where the investment climate is adequate. These contracts are similar to those used for IPPs, but more straightforward, to the extent that there are no fuel costs or dispatch issues to consider, and remuneration is reduced to a simple annuity payment covering capital and operating costs over the life cycle. Cases of system-wide transmission concessions or even divestiture are much rarer.

Some of the early-reforming countries introduced widespread private sector participation in their distribution sectors. The financial health and operational strength of distribution utilities is a key driver of overall power sector performance. A financially precarious distribution utility can undermine the
entire payment chain, while operational weaknesses in the local grid can prevent power from reaching customers even when it is available. For precisely these reasons, the 1990s model prescribed private sector participation in the distribution tier as one of the first measures to be taken to turn around an ailing power sector. This is reflected in the surge of private sector participation in distribution that took place during the 1990s (figure O.9). Divestiture of distribution utilities was prevalent among early-reforming countries in Latin America, Central Asia, and Eastern and Central Europe, although it was comparatively rare in Africa and in East and South Asia. Nevertheless, even among countries undertaking privatization of power distribution utilities, relatively few privatized the entire distribution sector. More typically, public and private distribution utilities have coexisted within the same country, with private operators often serving capital cities or larger commercial centers. The decision to privatize only some distribution utilities may reflect differences in the commercial viability of the service areas, or variations in the local political environment, particularly in countries where electricity distribution remains a subnational responsibility.
Private sector participation in distribution has proved susceptible to reversals, and appetite for the reform subsided in the 2000s. Overall, 32 distribution transactions in 15 developing countries have been reversed (in the case of divestitures) or prematurely terminated (in the case of concessions and other contractual instruments), particularly during the first decade of reform. The probability of reversal was particularly high in Sub-Saharan Africa, affecting more than 20 percent of transactions. Sub-Saharan Africa’s experiments with utility management contracts, in particular, have been checkered, encountering difficulties in recruiting and retaining qualified managers and suffering from tense labor relations and inadequate transfer of skills to local staff. Privatization reversals were most often associated with defective operational data (for example, serious underestimation of system losses) that led to unsustainable bids (for example, in the Indian state of Odisha), or with the government’s unwillingness to apply tariff regulation as laid down in the legal framework (as in the Dominican Republic). Stakeholder opposition has also been a serious issue in some cases (as in Senegal, where the labor unions vehemently opposed utility privatization). Customers, in particular, often bear the brunt of tariff hikes associated with privatization, without always seeing an immediate impact on the quality of service, and this can sometimes lead to public disaffection (as in the Pakistani city of Karachi or Uganda). Such concerns led to a dramatic tail-off in private sector participation in electricity distribution after the early 2000s (figure O.9).

Private sector participation in distribution is strongly associated with full cost recovery. Private sector participation is the only reform that is associated with higher levels of full capital cost recovery, as opposed to recovery of operating costs alone. Among the countries reviewed that have undertaken significant and sustainable privatization of the distribution segment, it is exceedingly rare for tariffs to fall below full cost recovery levels. This partly reflects the fact that countries achieving higher levels of cost recovery are more likely to attract private sector participation; it also indicates that the presence of the private sector obliges the government to follow through on tariff regulations that call for cost recovery pricing.

With respect to efficiency, the performance of privatized distribution utilities is on par with the top half of performers among public utilities. Many of the privatized utilities studied perform to a high degree of operational efficiency (figure O.10). However, a group of publicly owned utilities (in the Indian
state of Andhra Pradesh, Morocco, and Vietnam) performs as efficiently as the privatized utilities. There are also some privatized utilities facing difficult operating environments (such as in the Pakistani city of Karachi or the Indian state of Odisha) that perform no better than some of the worst public utilities. At the same time, some of the worst-performing public utilities are cases of failed privatization (as in the Dominican Republic and Senegal).

**There is also evidence that private sector participation is associated with good sector outcomes.** Ultimately, the impact of reform is best evaluated in terms of results. Analysis undertaken for this study suggests that private sector participation has a significant positive impact on generation capacity and electricity access in low-income countries and that it supports the expansion of renewable energy in middle-income countries.

**However, by far the strongest driver of electrification is income per capita, rather than any structural reform.** The substantial progress on electrification made in many countries approaching middle-income status from 1990–2015 primarily took the form of utility-driven, grid-based electrification programs backed by clear political targets and public investment. In some cases (such as India, Morocco, and Vietnam), these efforts...

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**FIGURE O.10** Private sector participation is associated with much higher levels of cost recovery, while performance on efficiency is within the range observed for public utilities

![Graph showing private sector participation and efficiency](image_url)

Note: Red boxes indicate utilities that have seen privatization rollback.*
predated the sector reform process in the country. In other cases (such as Kenya, Tanzania, and Uganda), they were adopted long after the power sector reform, usually in response to the limited dynamism of electrification in the post-reform period. Grid electrification may be loss-making for the utility at the margin, meaning that it cannot be left to commercial incentives alone. With the advent of solar technology, decentralized private sector actors are playing an increasingly important role in the electrification process, although the jury is still out on the question of whether the most remote populations can be served on a purely commercial basis.

**Finding #7: Regulatory frameworks have been widely adopted, but implementation has often fallen far short of design, particularly when utilities remained under state ownership**

The creation of regulatory agencies was widely embraced and supported by sound regulatory frameworks in many countries. As of 2015, over 70 percent of developing countries had created a power sector regulator. On paper, the associated regulatory frameworks were relatively well-designed, incorporating provisions to balance the autonomy and accountability of the regulatory framework. In addition to the central functions of all such entities—regulation of tariffs and service quality (based on detailed methodologies laid down in the regulatory framework), regulators are widely responsible for licensing market entry, including negotiation of the terms of PPAs (85 percent) and competitive procurement (60 percent). They may also play a role in other important policy areas, such as clean energy (80 percent), power market design (65 percent), and electrification (55 percent).

In practice, however, it has proved very difficult to apply regulatory frameworks as written, and this has adversely affected the efficacy of regulation. Regulatory frameworks are to varying degrees overlooked or contradicted in practice (Andres, Guasch, and Diop 2007; Gilardi and Maggetti 2011). Whereas, on average, countries meet about 47 percent of good practice regulatory standards on paper, this score drops to 30 percent in practice. The gap between regulation on paper and regulation in practice can be relatively narrow (as in Peru and Uganda, where the gap is less than 10 percentage points) or extremely wide (as in the Dominican Republic and several Indian states, where the gap can be 30–50 percentage points) (figure O.11a). One critical area is the authority of regulators to determine electricity tariffs, which is legally granted in 94 percent of countries but actually honored in only 65 percent—with a lot of caveats. Not surprisingly, the achievement of operating cost recovery is significantly related to the quality of regulation as practiced rather than as written.

**Although originally conceived as an enabler of privatization and competition, regulation was often introduced into sectors still dominated by monopolistic state-owned actors.** Many countries that fit this description adopted legal frameworks based on the principles of incentive regulation, according to which the regulator harnesses the utility’s profit motive to incentivize efficient delivery of high-quality services. Such incentives are not typically effective unless regulated utilities operate according to strong commercial principles, making them responsive to incentives. Regulation does seem to have worked quite well, however, in countries with largely privatized distribution sectors. Moreover, evidence indicates that the presence of private actors in the sector is associated with much closer adherence by regulators to the established legal framework. The reason may simply be that it is more difficult for the government to deviate from enacted regulations when third-party private actors are involved.

Where utilities remain in public hands, the Ministry of Finance can become an
important player in the tariff-setting process. Countries where utilities remain publicly owned are often characterized by weak regulatory authority over tariff-setting and a soft budget constraint overall. When tariffs are not allowed to keep pace with costs (figure O.12), a degree of fiscal liability is created bringing the Ministry of Finance into the frame. Several countries, such as Egypt and Senegal, have explicitly recognized this in their tariff-setting frameworks, committing to fiscal transfers that exactly compensate for any shortfall in cost recovery from tariffs. This approach acknowledges that sector costs must ultimately be covered by a combination of taxes and user charges and provides a
coherent framework for making such trade-offs. Nevertheless, the Senegalese experience illustrates the challenges of meeting such commitments during periods of fiscal stress.

While regulators have struggled with tariff-setting challenges, quality-of-service regulation has not received the attention that it deserves and is too often observed in the breach. The shortfall in practice is particularly large for regulations pertaining to quality of service and market entry (figure O.11b). Indeed, few countries were found to have a meaningful system in place for regulating quality of service. (Colombia and Peru are among the few that do.) On the one hand, legal requirements to develop and monitor quality-of-service standards and penalize noncompliance are not always observed by regulators. On the other hand, utilities may lack the information systems to fully comply with such a framework and to manage reliability issues adequately. This is a serious deficiency, given the importance of service reliability for customers.

Finding #8: Cost recovery has proved remarkably difficult to achieve and sustain; the limited progress made owes more to efficiency improvements than to tariff hikes

Full cost recovery has been a challenge for power utilities. Only about half of them can be considered financially viable. Over the 25-year period under review, the extent to which end-user tariffs covered the full capital cost of supplying electricity increased from 69 percent to 79 percent, and about as many countries saw their performance on cost recovery deteriorate as improve (figure O.13a). Strikingly, even countries with relatively low cost of service sometimes struggle to achieve full capital cost recovery. In fact, full capital cost recovery is almost exclusively confined to utilities that have been privatized. Experience shows that progress toward cost recovery is subject to sudden erosion by exogenous factors, such as droughts, devaluations, and oil price shocks. Although full capital cost recovery has proved difficult to attain, almost all of the utilities have achieved operating cost recovery.
Moreover, about half of the utilities can be considered financially viable in the sense of covering both operating costs and historic debt service and repayment obligations, albeit without providing a full rate of return on their asset base.

Where progress on full cost recovery was made over time, cost reductions played a greater role than tariff adjustments in bringing utilities closer to this goal. Specifically, average system losses across the study sample of countries fell from 24 to 17 percent between 1990 and 2015, and improvements were observed in more than 80 percent of jurisdictions (figure O.13b). Indeed, some countries would already be able to fully recover costs based on current tariffs if they could raise their commercial and operational efficiency to industry benchmarks. Tariff adjustments, however, have proved hard to apply as some regulators have seen their recommended adjustments aggressively scaled back or even completely overturned by the political authorities.

Utilities with revenue shortfalls are seldom fiscally compensated. The quasifiscal deficit across the study sample remains high, averaging close to one percentage point of gross domestic product, with underpricing being the major contributor in most cases. Financial analysis of the utilities showed that such shortfalls are not typically compensated by fiscal transfers from the state. Instead, utilities are forced to adopt a range of suboptimal coping strategies that often include taking on high-cost short-term commercial debt to cover cashflow shortfalls or simply falling into arrears with upstream suppliers of bulk fuel or electricity.

Cross-subsidies among customer groups and across consumption levels have long been the norm for electricity
tariff structures and may further undermine cost recovery. About three-quarters of developing countries practice cross-subsidies between commercial and residential customers, with the former paying on average more than twice as much as the latter for each unit of electricity purchased. A similar share of countries makes use of increasing block tariffs for residential customers, which typically provide sizable discounts at low or even average consumption levels and then step up tariffs for higher levels of consumption without ever reaching full cost recovery even in the highest consumption brackets. Deeper analysis shows that while modest amounts of cross-subsidy have been accommodated historically without seriously prejudicing the achievement of cost recovery, cross-subsidization can seriously undermine the financial equation of the utility if even the highest-paying customers are not paying at the cost recovery level.

Finding #9: The outcomes of power sector reform were heavily influenced by the starting conditions in each country

The 1990s power sector reform model was largely derived from principles believed to apply universally, independent of context. In practice, numerous preconditions—both economic and political—have emerged as important in shaping the applicability of the approach. Across the developing world, systematic differences can be observed in the uptake of the 1990s reform model across countries, based on factors such as income group, system size, and political system. Contextual factors also seem to have played a role in shaping the outcome of reforms (table O.1). The analysis distinguishes among “comprehensive reformers,” which applied at least 70 percent of the prescriptions of the 1990s model; “limited reformers”; “stronger performers,” which scored above average on outcome variables capturing progress on security of supply, electrification, and decarbonization; and the remaining “weaker performers.”

A first group of countries largely applied the full policy prescriptions of the 1990s reform model and went on to see a range of positive outcomes as a result, experiencing improved operational efficiency and cost recovery, as well as enhanced security of supply. Foremost among these were Colombia, Peru, and the Philippines. In all these cases, the reform package was adopted comprehensively and relatively rapidly during the 1990s without major implementation setbacks. A continuous

### Table O.1 Overview of preconditions among groups of countries at the time of reform

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<thead>
<tr>
<th>Sector preconditions</th>
<th>Country preconditions</th>
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<tr>
<td>Cost of electricity ($/kWh)</td>
<td>Full cost recovery (%)</td>
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<tr>
<td>Comprehensive reformers</td>
<td></td>
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<tr>
<td>Stronger performers</td>
<td>0.15</td>
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<tr>
<td>Weaker performers</td>
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<tr>
<td>Limited reformers</td>
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<td>Weaker performers</td>
<td>0.23</td>
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</table>

Source: World Bank data.
Note: The Rethinking Power Sector Reform observatory countries are assigned their categories, specified in the table. All figures relate to the pivotal reform year for each country during the decade of the 1990s or the nearest data point available in some cases. India and Ukraine are excluded from system size calculations. GDP = gross domestic product; GW = gigawatt; kWh = kilowatt-hour; pa = per annum; pc = per capita.
process of second-generation reforms fine-tuned the operation of the model. Each of these countries faced its own challenges, but these could be accommodated, by and large, within the parameters of the new institutional framework.

A second group of countries also adopted comprehensive reforms but did not experience the same comparatively smooth implementation and positive outcomes. In Pakistan, for example, the unbundled power sector has been plagued by a chronic circular-debt crisis that undermines the payment chain; the only privatization in the distribution sector continues to be disputed in the courts after more than a decade of litigation. In the meantime, the country struggles to achieve security of supply and universal access to electricity. Other illustrative cases include the Dominican Republic and the Indian state of Odisha, where an extensive power reform was undertaken, including privatization of distribution utilities. However, in both cases, it proved difficult in practice to apply the prescribed framework of tariff regulation, leading to a subsequent renationalization and persisting concerns about security of supply, as well as weak performance on both intermediate and final outcomes.

Some insight into these disparate experiences can be gained by comparing the preconditions that existed in these two groups of comprehensive reformers at the time of the reform in the 1990s (compare the first two rows of table O.1). In particular, those countries where reforms proved to be successful started out from a much more advantageous national and sectoral position than the others. In terms of country context, the strong performers started out with much better operational performance in terms of system losses (19 percent versus 30 percent), much higher levels of electrification (82 percent versus 53 percent), and a much more developed energy system with significantly higher installed capacity (20 gigawatts versus 15 gigawatts). Their per capita electricity consumption was about four times as high. Even among the group of countries that made only limited reforms, the stronger performers enjoyed significantly better preconditions than those with weaker performance.

Finding #10: Good sector outcomes were achieved by countries adopting a variety of different institutional patterns of organization for the sector

Although the 1990s reform model started out with a unified reform blueprint, that blueprint was adapted to widely varying degrees. A significant minority of countries remains with a traditional vertically integrated national utility model, while the majority finds itself under an assortment of hybrid models.

Countries where adoption of reforms has been slower or more limited have, in some cases, performed as well, in terms of sector outcomes, as those that went further with the reform agenda. Comparing across a wide range of postreform outcomes covering security of supply, social inclusion, and environmental sustainability shows that the stronger performers divide into two equal groups comprising both comprehensive and limited reformers (table O.2). The performance differences are remarkably small between these two groups of countries; the limited reformers do slightly better on reliability, access, and affordability, and slightly worse on overall adequacy of capacity and carbon intensity. In a similar fashion, the weaker performers are also evenly split between countries that took a more comprehensive or limited approach to reform.
Of particular interest, then, are the institutional paths taken by limited reformers that achieved stronger performance outcomes. Salient in this group are countries like Morocco and Vietnam, as well as the Indian state of Andhra Pradesh. What these cases appear to have in common is a continued role for a competent state-owned utility, with a more targeted role for the private sector.

Morocco kept a vertically integrated, publicly owned monopoly at the core of the sector, while opening to the private sector for certain generation plants and city-level distribution concessions. Rather than focusing on structural reform and the creation of regulatory capacity, Morocco’s energy policy was characterized by the articulation of clear and ambitious social and environmental objectives at the highest political level. Those objectives were accompanied by clear institutional responsibility and accountability for delivery and supported by adequate investment finance, capturing both public and private sources as appropriate.

In Vietnam, the sector continues to be dominated by the incumbent utility operating as an unbundled public sector holding company with weak regulatory oversight. Vietnam’s power sector journey prioritized the achievement of universal access through a sustained and well-financed program spearheaded by the national utility of Vietnam (EVN). The country is moving toward the staged implementation of a wholesale power market, in which a minority of privately owned generators competes alongside publicly owned subsidiaries of EVN.

In the Indian state of Andhra Pradesh, the state government completed unbundling and regulatory reforms but stopped short of privatizing the distribution segment. Instead, considerable efforts were made to sharpen incentives for managerial performance through the establishment of clear performance indicators relating to revenue collection, combined with frequent monitoring by senior management and financial reward for good outcomes. This approach was combined with legal reforms to make power theft a prosecutable criminal offense.

Finally, although Kenya does not feature among the stronger performers globally, it does present the best overall range of sector outcomes among the Sub-Saharan African case studies considered. Kenya’s approach to reform was also incremental and distinctive. In particular, majority public ownership was retained in the distribution sector, but an almost equal share of equity floated on the Nairobi Stock Exchange provided an additional discipline on corporate governance of Kenya Power.