Electricity Restructuring and The Social Contract

Thomas C. Heller, Henri I. Tjiong &
David G. Victor

Working Paper #15

May 2003

The Program on Energy and Sustainable Development (PESD) at Stanford University is an interdisciplinary research program focused on the economic and environmental consequences of energy systems. Its studies examine the global shift to natural gas, the reform of electric power markets, and the supply of modern energy services, such as electricity, in the world's poorest regions.

The Program, established in September 2001, includes a global network of scholars—based at centers of excellence on four continents—in law, political science, economics and engineering. It is based at the Center for Environmental Science and Policy, within Stanford's Institute for International Studies.

Program on Energy and Sustainable Development
At the Center for Environmental Science and Policy
Encina Hall East, 4th Floor
Stanford University
Stanford, CA 94305-6055

http://pesd.stanford.edu

About the Authors

Thomas C. Heller is the Lewis Talbot and Nadine Hearn Shelton Professor of International Legal Studies at Stanford Law School in California. His research interests include international law and political economy, legal theory and environmental law. In addition to publishing widely on these topics he has consulted for several international organizations, including the Intergovernmental Panel of Climate Change, the Electric Power Research Institute and the World Business Council for Sustainable Development. Prof. Heller holds a Bachelor's degree from Princeton University and a LLB from Yale Law School.

Henri I. Tjiong joined PESD as a post-doctoral scholar in September 2002. His research interests include regulatory competition theory, globalization and the law, and legal theory; his work with PESD focuses on electric power market reform. Since 1999, Dr. Tjiong has been a Research Associate with the Max-Planck-Projectgroup, Common Goods: Law, Politics, and Economics in Bonn, Germany. Previously, he served as Consultant to the Consumer Policy Committee for the OECD in Paris, France. Dr. Tjiong holds a J.S.D. from Stanford University School of Law and a J.S.M. from the Stanford School of Law Program in International Legal Studies. He also attended Erasmus University Rotterdam.

David G. Victor is the Director of the Program on Energy and Sustainable Development at Stanford University. His research interests include energy and climate change policy, the role of technological innovation in economic growth. His publications include: *The Collapse of the Kyoto Protocol and the Struggle to Slow Global Warming* (Princeton University Press, April 2001), *Technological Innovation and Economic Performance* (Princeton University Press, January 2002, co-edited with Benn Steil and Richard Nelson). He is author of more than 70 essays and articles in scholarly journals, magazines and newspapers, including *Climatic Change*, *Energy Policy, Foreign Affairs*, *International Journal of Hydrogen Energy*, *The Los Angeles Times*, *Nature*, *The New York Times*, *New York University Journal of International Law and Politics*, *Scientific American*, and *The Washington Post.* Dr. Victor holds a Bachelor's degree from Harvard University and a Ph.D. in political science from MIT.

Electricity Restructuring and the Social Contract

Thomas C. Heller, Henri I. Tjiong & David G. Victor[1]

0. Introduction

The electricity sector is a major contributor to air and water pollution. Electricity also supplies vital services to modern societies—it literally powers economic growth. Given these vital roles, societies have constructed a "social contract" with the electric power industry. They have adopted a wide array of rules to regulate environmental externalities, mandated connections to low-income households, created "lifeline" tariffs and cross-subsidies to ensure that users gain at least a minimum quantity of electric service at little cost, and adopted various schemes to encourage investment in long-term innovation of improved technologies and electric power systems. It appears to have been relatively easy for governments to craft this social contract over the last century, as the electric power system has evolved, because governments have directly regulated the industry and, in most cases, major electric power firms were state-owned enterprises (SOEs). Today, a new wave of industrial organization is spreading across the industry—one predicated on use of markets rather than direct control—and alarm bells are sounding for the fate of the social contract.

This paper examines the alarm. Part I discusses the conventional wisdom about the introduction of market forces in electric power systems. It argues that in nearly every instance of market restructuring—especially in the developing world where the social contracts may be under greatest stress—the actual practice of restructuring is completely different from the theory. Restructuring has not proceeded in the ways foreseen by theorists, and in most instances it has stalled because the theory of market restructuring has not properly reflected the political and organizational realities associated with breaking up state-dominated systems and transforming them into market-oriented animals. Part II discusses the conventional wisdom on the effects of electric restructuring on the environment and the provision of other social goods. There, too, we argue that the actual practice of restructuring has been less threatening to the social contract than feared—in part because restructuring has not advanced on a purely market path and in part because governments and stakeholders have invented various ways to recast the social contract in real time with the restructuring of the industry. Part III, finally, examines the major outstanding issues that arise with the co-evolution of these two patchworks—market reform and reconstruction of the social contract. The paper concludes with a brief discussion of the political and economic sustainability of these piece-meal solutions.

---

[1] Questions or comments may be directed to theller@stanford.edu (Heller), tjiong@stanford.edu (Tjiong) or dgvictor@stanford.edu (Victor).

1. Conventional Wisdom on Electric Power Market Reform

The conventional wisdom of electricity restructuring usually envisions two main stages of reform. The first stage starts with wresting the state owned enterprise (SOE) from the hands of the government and transforming it into independent legal business units (corporatization), often leading to sale of valuable assets to private investors (privatization). The second stage consists of creating a market by requiring these newly independent units to compete and by allowing new firms to enter the market as well. Both these reforms—removal of the state's iron grip and creation of a market for electric services—are designed to create accountability and efficiency through competition for capital and customers. Such reforms depend on complementary reforms, such as the liberalization of access to capital markets, and the creation of institutions such as an independent regulator that can regulate prices and access to the parts of the electric power system that are a natural monopoly—such as transmission lines and distribution networks.

This relatively straightforward model has however rarely been applied fully in practice. Although inordinate attention has been given to the construction of the "ideal" model, most analysts attribute the divergence between theory and practice to "politics," "gaming," or other factors that have so far been treated as a giant residual category of the unexplained. That residual category, we suggest, demands greater attention since most of the real world experiments with restructuring have barely approached the theoretical ideal. In general, the divergence between theory and practice seems to stem from three factors. First, the practice of reform has revealed that the model is not singular and not fully specified. The special technical aspects of electricity markets—in particular, the need for real time balancing of supply and demand because of the high cost of electricity storage—has introduced many complications to market design that were not fully anticipated. Second, the proper operation of electricity markets requires many complementary institutions—such as independent regulators—that have proved difficult for many countries to satisfy, especially where the "rule of law" is largely absent. Third, the standard model for reform has been crafted without attention to political economy; many of its prescriptions, such as releasing tarrifs to the whims of the market, are particularly difficult for democratic polities to implement. This paper argues that any theory of market restructuring must properly take into account the organizational and political realities associated with electricity reform. The following short survey illustrates that the actual practice of reform has in most cases departed significantly from the conventional wisdom of market restructuring.

In the industrialized world, the experiences in California and the UK are polar opposites that have framed much of the discussion. In California, the prohibition against forward contracts forced utilities to purchase entirely from the spot market, where prices soared when supply was tight and energy traders found it much easier to exercise market power than most analysts had thought would be possible. High wholesale costs and fixed retail tariffs put one major California utility into bankruptcy and forced the state to assume hugely expensive electricity supply contracts. In contrast, the UK experience with

restructuring is more widely seen as a success—because of its fuller application of the theoretical model rather than California's partial approach and because of the adjustments made to the model over time. Even there, however, the UK is contending with concentration of ownership—itself the partial result of US firms that have been forced through the collapse of the US merchant power market to raise cash by selling their assets in the UK. The concentration of power in the UK has led to higher prices on the wholesale and retail markets and significant political costs. These costs have led the regulator to abolish the central pool and resort more to the use of bilateral contracts.

The experiences in other countries reveal the myriad of other difficulties that arise in restructuring. In France, it has proved extremely difficult to break up the incumbent (EdF). Management has been separated from the state through corporatization, but no transfer to private ownership has been contemplated. New entrants are allowed into the French market, but the continuing dominant position of EdF makes investors wary. In Germany too, a series of mandates and policy plans for reform have not actually changed much in the structure of the industry. Large companies with concentrated ownership (by the Länder and cross-holdings from other companies) have not been required to divest. The new electricity law requires open access to the network, but the law is implemented by association agreements that leave operation and monitoring in the hands of the existing companies. The German government is only now about to create an independent regulator with authority for electric matters.

In developing countries, generally, the gap between an ideal model and actual practice is even more glaring. China started its electricity reform in 1985, around the same time as the UK, but the pace of change has been much slower, in large part because the government did not want to break up the existing state-owned enterprises. The impetus for reform was to attract new capital to the sector so that supply could keep up with soaring demand; yet the government until very recently has been loathe to relinquish state domination of the sector that provided a service vital to industrialization. Thus China began as many other countries have: it carved out segments of the market for entry from new independent power producers (IPPs). Yet a close look at the identity of these new entrants reveals that they are, in most cases, thinly disguised local and provincial governments that have many of the hallmarks of state-dominated entities, such as preferential access to capital and political power to assure that their plants are dispatched. China has been enormously successful in attracting IPP investment—some of it private—perhaps precisely because it did not attempt to restructure the entire power sector and introduce the massive market uncertainties that would imply.

India started electricity reform in the early 1990s—also with generation and special new incentives for IPPs to invest in "fast track" projects. Persistent legal and political uncertainties eclipsed that strategy—only a handful of "fast track" projects actually attracted investors—and Indian markets continued to suffer deficits in the quantity as well as financing of power. Full scale reforms began in the mid 1990s in Orissa, where state-owned generators as well as distribution companies were sold to private (foreign) investors

on the logic that private firms could run these enterprises more efficiently and thus halt the flood of red ink that the State of Orissa had been financing at the opportunity cost of other critical development projects. The Orissa experience, widely seen as a disaster, reveals a generic problem in the dismantling of state-dominated systems: information. In that case, investors in the newly privatized distribution companies were unaware of the full extent of the massive losses (due mainly to theft); yet the absence of a proper metering system and the lack of political will to charge higher tariffs to poor users made it impossible to recraft the private distribution companies into profit-making enterprises that could sustain private investment. In the shadow of Orissa's failure, the process of restructuring has resumed only recently with newly crafted mechanisms for encouraging private firms to operate distribution services in ways that encourage the reduction in theft and make better use of real accounting. The central government has also created special funds to reward states that make progress in restructuring, thus easing the financial pain of restructuring, and a new network of independent regulators is charged with setting tariffs that make the cross-subsidy to low-income users more explicit. These mechanisms were invented through experience with the particular difficulties, such as the political obstacles to raising tariffs and the lack of accurate accounting procedures in state-owned distribution companies that are generic to many countries.

In Mexico, perennial efforts at reform since the early 1990s have stalled due to constitutional problems that, while unique to Mexico, reveal a general point: often governments do not have the unabashed authority needed to implement large scale economic reforms. The Mexican constitution provides that electricity provision is a public service that only the state may provide. Various strategies for working around the Constitution, including the liberal use of IPPs, are already in place, but fuller reforms that would include breaking up the state-owned monopolies await constitutional amendment, which is increasingly difficult to attain as Mexico liberalizes political power and no single party has sufficient working majority to usher through the necessary constitutional reforms. Meanwhile, a crisis brews as the state is unable to finance new capacity and private investors are wary of committing additional resources in the shadow of legal and financial uncertainty.

The case of Brazil reveals the difficulties in encouraging investors to build energy systems that are different from existing system. The market, on its own, may not invest adequately in the diversity of energy systems that a society needs to assure energy security. Brazil's electricity system is dominated by large scale hydroelectric dams that are cheap to dispatch but periodically plunge the nation into darkness when rains fail. The government has backed construction of a gas pipeline from Bolivia, as well as opening of offshore gas exploration to outside firms, with the hope of encouraging investment in new gas-fired electric power systems. But of 16 planned gas-fired plants, only 6 have been built—and each of those owes its existence to special subsidies that have proved difficult to sustain politically. Yet it has also proved politically impossible to break apart the hydro system and impose the higher tariffs that are necessary to reflect the real cost to the economy of reliance upon hydroelectricity and to encourage private investment in gas. In Brazil,

"restructuring" has proceeded mainly when the federal and state governments have needed to raise cash by selling assets, rather than according to any plan that would actually introduce real market forces.

Not all the experiences with restructuring reveal problems. Argentina and Chile, especially, have all been relatively successful in introducing market forces into state-dominated systems. In both cases—as in the U.K.—the process of reform in the electric sector was part of broader reforms that created the political space and institutional capacity needed to implement complex and politically sensitive reforms. The collapse of Argentina's economy in 2001 has since undermined many of that country's reforms, but Chile's system based fully on merchant power and merit dispatch remains robust—Chile, unlike Brazil, has even attracted investors to gas to diversify the electric power system away from drought-sensitive hydroelectricity. Even in this successful case of restructuring, the political dimensions of reform are vitally important. The ability to invest in gas-fired generation depends on the supply of gas; only after Chile and Argentina settled (to some degree) old animosities was it possible to build long-distance gas pipelines from gas-rich western Argentina to gas-poor Chile; the successful shift to gas in Chile's power market began in 1997, the same year that the first of these new pipelines began operation.

In other countries the pressure to restructure has been less intense because the incumbent power system appears to function well and shortages of power generation have not loomed. In South Africa, for example, the seemingly efficient state-owned monopolist, Eskom, has cleverly used its political capital to limit the impact of market reforms. Even in this case, however, political factors determine the shape of reforms that are gathering momentum. In some quarters, reform of Eskom is attractive as a way to spin off perhaps 30% of the valuable enterprise to firms controlled by non-whites. Even more pressing is reform of distribution companies—as in India—where the practice of setting politically attractive low tariffs and imposing cross-subsidies on wealthy consumers to compensate for low tariffs for the poor has created losses for many distributors and given an incentive for large power users to find ways to exit the system.

The existing theory about market reform is unable to explain this wide range in experience because the theory has been largely blind to politics and institutions. It has tended to lump the wide array of political factors into the broad residual category of "political will" that societies should somehow muster. Yet the abundance of failures in market reform suggests that it is difficult to align political forces for reform. Moreover, the tendency for reforms—especially in developing countries—to start with IPPs and marginal reforms in generation and to defer the task of reforming tariffs would suggest that political factors yield predictable patterns. Notably, a constant factor in the political reality of reform—in all of the abovementioned cases—has been a concern for the social contract implied by the attempt to restructure the electricity sector. Reforms that fail to address this concern—for example, by attempting to raise tariffs on the poor without a compensating plan for protecting access to vital electric services—spawn their own political opposition and usually fail. Another weakness of the existing "theory" of market reform is its lack of

attention to institutional design and authority—especially the critical role of independent regulators, who in many settings do not have the authorities nor the information needed to provide the public service of regulation.

All told, the existing theory of economic restructuring has been dominated by normative ideas—what should constitute a proper electric market—rather than a vision of how such reforms actually occur. Indeed, apart from the few cases such as Chile and the U.K., what is most striking about electricity market reform two decades since the first wave of reforms began is how little large scale reform has actually been undertaken and persisted in practice. Undue concentration on the techno-economic criteria of electricity reform has crowded out sensible attention to existing resources, institutions and capacities that would have significantly affected the shape of the energy sector.

2. Conventional Wisdom on the Impact of Restructuring on the Social Contract

We have suggested that the first answer to concerns about the impact of market restructuring on the social contract is found in the actual halting practice of reform. Nonetheless, conventional wisdom suggests that restructuring will bode ill for the major dimensions of the social contract—protection of the environment, access to electric services, and investment in innovation for the future. Relentless competition and a focus on the bottom-line are thought to sharpen economic differences and to crowd out broader social considerations. As the government yields direct control over the sector there seems to be little room for social contract obligations to be taken up in the new market context. Indeed, one of the first steps in the conventional theory of market reform is to end cross-subsidization and to terminate the provision of services that reflect financially unsustainable activity by the enterprise. In principle, governments could fill in where the market-oriented enterprise exists—providing direct subsidies and grants, for example, to ensure that the poor remain well-served with electricity. Yet in practice, the conventional wisdom maintains, large on-budget social programs are difficult to sustain politically—especially if electric reforms are part of broader reforms aimed at shrinking the size of government.

In most countries where electricity is supplied by a state-owned enterprise, the social contract has been embedded in the operations of the enterprise. Inflated employee rolls reflected a politically attractive social policy of full employment and job protection; pensions, schooling, shopping services, and sundry other social benefits rounded out a package of social services that the SOE supplied. Typically, electricity was a politicized commodity as well as an economic good proper. Thus uneconomic connections and low tariffs for politically well-organized groups—such as farmers' parties in developing countries where the majority of the population lives in rural areas—were commonplace.

Even in the U.S.—where independent investors, not the state—owned most of the electric power system, a complex web of regulatory obligations and tariff policies gave strong incentives to invest in R&D in new technologies that promised broader social benefits, environmental protection, and in supplying electric services to the less fortunate. For example, public benefit programs were structured as external additions to the core activities of utilities and financed across the board as add-on's in end-user tariffs. These public benefit programs funded a variety of stimulus packages ranging from demand-side management (conservation and energy efficiency), to social services ("life-line rates"), to environmental protection, to utility sponsored innovation.

Restructuring, it is expected, will unravel all this. However, theorists have paid little attention to the possibility that social contract proponents have fought back politically in real time with market reforms to regain a place in the new market landscape. Often they have been successful. In some cases, they have inserted the social contract into the reformed system. In others, concerns about erosion of the social contract have forestalled and shaped the process of reform—for example, the approach adopted in India and many other developing countries of starting reforms with IPPs and other incentives to invest in generation while leaving distribution, which affects final users directly, initially untouched. We review examples of these two strategies—recrafting the social contract while restructuring, and restructuring in ways that follow the contours of how societies have defined electricity's social contract—to illustrate that the social contract appears to be much more robust than the conventional wisdom maintains.

In the US, restructuring began tentatively with PURPA legislation in 1978, which created open access to electricity grids (the system's natural monopoly) for special generators, including so-called "qualifying facilities" (QFs) such as generators that used renewable power and those that made effective use of waste heat. As fuller reforms spread across some states in the 1990s those QFs—whose long-term contracts were much more expensive than the new nimble gas-fired facilities that were arriving with competition—were not repudiated but rather protected through special "stranded cost" provisions that forced the society as a whole to bear the cost of these earlier commitments. Nor has price competition extinguish the incentive to invest in new renewable power facilities; quite the contrary, schemes such as renewable portfolio standards (RPS) require utilities to source a percentage of their electricity from renewable sources. Other special arrangements—such as California's Renewable Resource Trust Fund—provide cash grants for activities that are viewed as socially valuable even though the market, on its own, probably would not invest in them. Such funds help explain the continued social investment in energy efficiency programs, for example, even as restructuring and tariff reform has removed many of the earlier incentives for the utilities themselves to implement programs such as demand-side management (DSM) that helped, often at considerable cost, the society to reduce electric consumption.

In Europe, similar reforms have also assured markets for renewable power and energy efficiency. The restructuring of the UK electricity market proceeded side-by-side with support for renewable power supply. The Non Fossil Fuel Obligation (NFFO) orders, initiated in 1990, reserved capacity from renewable energy sources at a fixed price. Later NFFO orders introduced competition for the market by inviting bids from renewable energy providers to provide that capacity, just as tradable RPS credits being considered in several U.S. jurisdictions would make it possible to meet renewable power goals while using the market to help cut costs. In the Netherlands, support for renewable energy is integrated into the electricity market with voluntary obligations for distribution companies to purchase a fixed percentage share of electricity from renewables. In turn, the distributors secure the subsequent capacity by buying so-called "green certificates"—tradable instruments that allow distributors to meet the mandate while using a market to lower cost. In Germany, the Renewable Energy Law (2000) extends the previous feed tariff (REFIT) regime—applicable to wind power—to other renewable energy sources. Even as consumer tariffs declined during the late 1990s as a result of liberalization, threatening the economic viability of more costly wind generation, the new law fixes a price for renewable power based on the actual cost of generation—giving greater certainty that this socially attractive source of electricity will survive in the marketplace. Protecting a portion of capacity against competition is not strictly compatible with market liberalization; yet it would be impossible to sustain political support for market reform in Germany (and thus more broadly in Europe) without such protections.

In general, in the industrialized countries the process of reform has seen parallel efforts to create new incentives for investment in renewable power, energy efficiency, and environmental protection. The only major aspect of the "social contract" that has gone largely neglected has been the incentive to invest in innovation. Across the industrialized world, the uncertainties created by restructuring have caused electricity firms to curtail their spending on innovation and to focus on the present—total spending on R&D has plummeted. This lamentable result reflects the organization of political power—although interest groups that support renewable power, energy efficiency (and, to a lesser degree, assured access to electricity for the poor) are well-organized and powerful, the beneficiaries from innovation are more diffuse and thus less influential.

In developing countries, as well, the political support for preserving social contracts appears to exert a strong influence on the style of reform. Whereas the principal concerns in the industrialized countries have focused on environment (including renewable power and energy efficiency), in the developing world the political organization around the social contract has focused much more on employment and other services of SOEs as well as on the tariff structure and assured access to electricity for critical groups.

In China, the slow pace of restructuring stems in large part from the central government's fear that creation of competitive (efficient) enterprises would lead to massive lay-offs and unemployment. In India, those same concerns have been coupled with democratic pressures to keep tariffs low for well-organized rural consumers. In effect,

subsidies for these mainly agricultural users have skewed consumption toward agriculture (about one-third of total electricity consumption, compared with less than one-tenth in China) and have also caused inefficient cropping and irrigation practices. Only after sustained crisis, which has forced the State Electricity Boards (the SOEs that distribute electricity in India) into bankruptcy, are tariff reforms under way—though still slowly in most states.

In Mexico, politicians have traditionally reproduced the social contract by subsidizing electricity tariffs for rural and residential customers. Political groups that fear the unraveling of those subsidies have seized on the current legal difficulties to protect the status quo of state monopolies. Political patronage, which has traditionally favored the PRI (which ruled the country as a single party for seven decades but is in opposition at present), has also slowed the pace of reform.

In Brazil the process of reform began with selling distribution companies in a few major cities—because those were the most valuable assets that could attract the currency that Brazil needed to address its fiscal difficulties in the late 1980s. The newly privatized distribution companies have faced considerable difficulties with the enforcement of charges billed to low-income users as well as theft, which in turn has made it difficult for these firms to reduce losses and earn a profit. Following the standard approach to market reform, Brazil's electricity restructuring included the removal of subsidies for low income households, which combined with allowing markets to determine the price of electricity resulted in a substantial rise in tariffs for the poor. This situation was politically unacceptable and not allowed to stand; Brazil's regulator (ANEEL) re-established a discount tariff regime for low income users. In this case, reforms imposed hardships that contravened what was accepted as the "social contract", and the system responded to repair the breach.

In South Africa, strengthening of the social contract has occupied the central place in the ANC's policy on electricity reform. No vision for restructuring is politically viable without a plan for increasing the number of connections to low-income (predominantly black) households as well as empowerment of black-owned firms. Long before the ANC took power this new vision of the social contract was taking shape; Eskom knew the direction of the political winds and began (at its own expense) a highly effective program of electrification, starting in the politically most symbolic township: Soweto. As Eskom has been corporatized the fiscal responsibility for the electrification program has shifted to the state, and a market-based system allows firms and state-owned enterprises (including Eskom) to bid the service of electrification. ANC's goal of connecting 2.5 million low-income households was achieved prior to its envisaged deadline.

3. Outstanding Issues on Electric Restructuring and the Social Contract

This brief survey of real experiences with electric market restructuring suggests that the conventional wisdom has been misplaced on at least two fronts. First, the process of restructuring has, in general, not proceeded according to plan. The divergence between theory and practice reflects, in large part, that the theory has been blind to the political economy of reform. Second, the feared erosion of the social contract with market restructuring has not occurred; indeed, some of the experiences suggest that the possibility of market reform has opened political windows of opportunity for even more elaborate formations and protections of social contracts. (The one general exception to this apparent rule is in the area of innovation, where the political stakeholders that might support policies for greater investment in innovation appear not to be well organized.) To some degree, the feared erosion of the social contract has not occurred because relatively little restructuring has occurred. More interesting, however, is that societies have slowed and shaped the process of restructuring because of concerns about the impact on the social contract, and they have found ways to recraft the contract in parallel with restructuring.

To close, we identify three broad clusters of research that could move beyond the cursory observations we have made here into a fuller explanation of the interaction between electricity restructuring and the integrity of the social contract.

First, it is important to look to the political and economic sustainability of the various "solutions" that include the social contract as an integral part of electric restructuring. We have argued that various hybrids of "old" and "new" systems and policies are cobbled together, but whether such arrangements are durable remains uncertain. In particular, three issues merit closer attention:

- Deferral of difficult decisions. In developing countries, especially, the preservation of the "social contract" has occurred in large part through the deferral of difficult decisions such as restructuring of tariffs. Where such decisions are essential—such as where low tariffs create perpetually loss-making enterprises—it remains unclear whether this is a "successful" inclusion of the social contract or just a dissolution in slow motion. In some developing countries such decisions have been made and ways found to preserve social contracts, while in others deferral seems to be the only strategy. What explains the variation?
- Whereas in industrialized countries the debate over the social contract has focused on environmental measures (including renewables and energy efficiency), in developing countries environmental issues generally have not figured prominently in the process of recasting the social contract. Does that merely reflect different political priorities, or is there a structural problem that could mount over time if such environmental concerns are not addressed even as private firms are encouraged to invest in long-lived capital stock that "locks in" particular environmental regimes?

- What is the role of informal and self-created "social contracts?" Most studies focus on formal policies and public decisions, but in much of the developing world the predominant response to the unavailability of electricity, for example, is theft. Should analysts conceive of theft and other individual-instigated responses as part of the societal response, and if so how should they be included in analysis of the social contract?

Second, one of the most fundamental aspects of the social contract is electrification of low-income households. To understand better the ways that incentives to electrify are built into the operation of electric enterprises one should start, perhaps, by looking at actual patterns of electrification rather than formal policies. One place to start the analysis is the rapid expansion of electric access in China from 1985 to the present—when about 600 million people were connected to electric services. That experience should give pause to the conventional wisdom about electrification since China had few of the hallmarks of "effective" electrification policy. Although the Chinese government implemented some policies to promote electrification, in general rural tariffs were high and public programs were spotty. Rather, decentralization of investment control and economic development (such as through township and village enterprises—TVEs) appear to be the main drivers for the Chinese success. A close look at the Chinese experience—perhaps in contrast to the experiences in India, Africa and southeast Asia—is warranted. Without a solid theory that explains electrification it is difficult to discuss real mechanisms for supporting this element of the social contract.

Thirdly, we need to investigate more carefully the interaction between energy markets and innovation—the third major component of the social contract. It seems that markets significantly affect the relative speed of technology adoption and so may stimulate more rapid incorporation of efficient (and environmentally attractive) technologies. For example, the shift to markets accelerated the spread of combined cycle gas turbines. However, the dark side of reform is the collapse—in nearly all the industrialized countries—of organized spending on long-term innovation. Are the same problems evident in developing countries? Do the patterns in developing countries matter—since they, in general, are not epicenters of electric power innovation? Which strategies can help recraft this aspect of the social contract?