

The background features a light gray wireframe globe centered on the right side. To the left of the globe, there are several decorative elements: a thick, curved brushstroke, a vertical line of five small gray circles, and a series of thin, overlapping curved lines at the bottom of the page.

Part Three

A CALL TO ACTION: POLICY RECOMMENDATIONS
AND MARKET IMPLICATIONS
FOR DISTRIBUTED GENERATION

3.1 A FRAMEWORK FOR ACTION

The evolution of the energy sector is determined by the interaction of technology, policy, and markets. The regulatory and legislative policies adopted have a major influence on how the market environment for distributed generation will evolve, and therefore, on the behavior of private market players. The preceding chapters have set out the context for the emergence of distributed generation resources and the benefits of their greater use. This chapter seeks to explain the real-world policy issues and tradeoffs related to the rapid development of the distributed generation sector, and the implications for the major private-sector players.

Part 3 identifies the broader energy policy goals and discusses the key policy issues for distributed generation in light of the distributed benefits identified in Part 2. Within a U.S. context—but using an approach adaptable to other societies—it offers a portfolio of policy recommendations at the federal and state level that support the rapid development of distributed generation. Given the ongoing debate over further restructuring of the power sector, we provide separate recommendations both for states that have adopted or will adopt some degree of restructuring and for those that have decided to continue traditional utility regulation. As of 9 May 2002, seventeen of the United States had adopted or were implementing “retail choice,” twenty-six had chosen not to, one (California) had abandoned it, and six had deferred action; these proportions are constantly changing, but U.S. restructuring seems at best stalled.

We have not made specific recommendations for the private sector, because each company has unique strategic objectives, market conditions, and organizational capabilities. Instead, we provide *implications* for the private sector: for investor-owned utilities, public power utilities, financial markets, commercial and industrial customers, and real estate developers. The implications provide insight into distributed generation’s threats to and opportunities for current business models, and into the issues that arise as organizations attempt to respond, drawn from the practical experiences of early market adopters of distributed generation options. Finally, Part 3 addresses the question of relevance—why the outcome of the distributed generation debate matters to the customer.

Like distributed benefits themselves, market and policy issues are highly company-, geography-, and time-specific. While it would be impossible to capture a fully detailed understanding of these issues in every specific context, we have endeavored to identify the common issues facing most regulators, managers, developers, users, and supporters of distributed generation technologies. From this basis, we define exciting and rewarding opportunities to accelerate distributed generation (DG) and to capture its wider benefits to society.

3.2 POLICY GOALS AND OBJECTIVES

3.2.1 Overview

The formulation and implementation of policy is ultimately concerned with the proper degree to which collective values should be imposed on private individuals and firms. Because the operations of energy utilities are related to vital public services, they have historically been deemed “affected with the public interest”¹ and subjected to varying degrees of regulation. Even where substantial progress has been made in liberalizing or restructuring utility businesses, they remain subject to regulation; no jurisdiction has truly “deregulated” the electric or natural gas businesses in the pure *laissez-faire* sense of the word.

Policy is never formulated or implemented in a vacuum. More than a century of commercial, legal, and policy development has shaped the energy services industries we know today, and forms the foundation on which the future of distributed generation will be built. Decades of emphasis on the central station model of electrical supply, transmission, and distribution are reflected in laws and regulations governing construction approval, siting, cost allocation and recovery, and operations. These regulations in turn derive from a suite of policy decisions typically summarized as serving “the public interest.” Laws and regulations advance policy objectives, and policy objectives are based on maximizing collective

value according to current views of public demands, technological options, and economic, social, and (increasingly) environmental and security benefits.

For distributed generation, the policy questions are framed by understanding three questions: What are the relevant objectives? Which barriers must be overcome? And how can social tradeoffs be most efficiently managed?

3.2.2 U.S. energy policy goals and objectives

In theory, the regulation of electricity production, distribution, and consumption is designed to achieve overarching policy goals. Hence, we must arrive at a consensus on our energy policy goals before articulating a regulatory framework to achieve them. That consensus largely exists but has seldom been articulated. Despite decades of dispute over the goals for U.S. energy policy, the National Energy Policy Initiative in 2002 achieved a bipartisan consensus on the key goals of energy policy as seen by an impressive group of experts informed by very broadly based constituency interviews.² These goals that have very broad bipartisan support include, in paraphrase,

¹ “When private property is affected with a public interest, it ceases to be *juris privati* only.” Britain’s Lord Chief Justice Hale (1609–1676). In the words of Chief Justice Waite of the United States Supreme Court, in the case of *Munn v. Illinois*, 1877, “Property does come clothed with a public interest when used in a manner to make it of public consequence, and affect the community at large. When, therefore, one devotes his property to a use in which the public has an interest, he, in effect, grants to the public an interest in that use, and must submit to be controlled.” Subsequent eminent jurists have specifically found that electricity is “peculiarly affected” with the public interest.

² The National Energy Policy Initiative was a bipartisan process to define the energy goals and policy options for the U.S. It interviewed 75 and convened a further 22 internationally recognized policymakers from the public, private, and nonprofit sectors. For a discussion of the policy goals, see National Energy Policy Initiative, Appendix B, Section II, Energy Policy Goals, pp. B4–B9, March 2002. This and all other papers are posted at www.nepinitiative.org.

1. **Improve domestic supply from diverse sources.** Reduce national dependence on foreign sources of supply and diversify national sources of supply.
2. **Increase efficiency of production and use.** Improve efficiency in energy production, transmission, distribution, and end-use applications.
3. **Promote stable, efficient markets and pricing.** Foster the development of truly competitive electricity and gas markets, with appropriate oversight to minimize the potential for abuse of market power.
4. **Enhance delivery infrastructure and systems.** Improve the physical infrastructure and systems for energy transmission and distribution to complement and enable the reform of the markets.
5. **Minimize health and environmental harm.** Apply appropriate and cost-effective regulation and innovation to reduce the health and environmental impacts of energy production and use, while maintaining affordability and reliability.
6. **Develop new technology.** Promote new technologies that enable achievement of national energy policy goals through public sector investment in energy technology research, development, and demonstration (RD&D).

Underlying these goals is the notion that America's energy policies should *simultaneously* provide energy security, economic stability, and environmental protection. Given the increasing volatility of the energy sector, particularly electricity, improving the energy system's ability to adapt and strengthening its governing regulatory institutions should be recognized as worthy goals in their own right.³

³ For more on the importance of creating an energy system that is adaptable to external shocks, see *Brittle Power* (442).

From the sharp divergence between and within the Houses of Congress over 2001–02 energy legislation, there appears on the surface to be far less agreement on national energy priorities and how to achieve them. For example, the furious political debates over whether to allow oil drilling in the Arctic National Wildlife Refuge, and whether to raise light-vehicle efficiency standards, reflected divergent views of how best to advance national security, economic, and environmental goals, and about whether these goals are even consistent with each other. In contrast, the National Energy Policy Initiative was able to bridge these apparent gaps by focusing on existing areas of consensus, reframing the issues in an integrative vision-across-boundaries fashion that turned tradeoffs into synergies, and suggesting innovative win-win policy options. Its key hypothesis was that focusing on what most Americans agree about—such as efficiency, innovation, competition, and fairness—could make less necessary the things they don't agree about.

The result of testing that hypothesis was gratifying. The NEP Initiative's consensus could achieve security, prosperity, and environmental quality simultaneously and without compromise—achieving “an energy system that will not run out, cannot be cut off, supports a vibrant economy, and safeguards our health and environment.” The NEP Initiative's vision, goals, and strategies have been endorsed by a politically diverse group of 33 distinguished experts—half current or recent senior executives in the energy industries, and the other half with such credentials as two Presidential Advisors, two Deputy Secretaries of Energy, five other Subcabinet members, a Director of Central Intelligence, two senior staff economists

from the President's Council of Economic Advisors, chairs or members of two federal and three State energy regulatory commissions, and a House energy leader (505). Their wide political spectrum makes their message especially timely for a fractured Congress and for the electorate it serves. It is as if policy wildcatters had drilled through thick strata of partisan polarization and found beneath...an astonishing gusher of consensus.

Ideological polarization, perhaps less acute but clearly troublesome, also surrounds the narrower issues of distributed generation policy. Some utilities are concerned over revenue loss, stranded assets, and system performance. Distributed generation's advocates claim reduced environmental impact and seek increased market access. Everyone agrees that the current patchwork of regulations is undesirable. But what is the appropriate framework to resolve these disputes and to seek an effective consensus?

3.2.2.1 Policy portfolio framework

The answer may be to structure a portfolio of policies that can hedge against the risks and uncertainties that are inherent in today's energy system. A balanced portfolio of policies that hedges against risk will be diverse, robust, and adaptive (66). Diverse portfolios reduce risk and increase returns by attempting to reach the "efficient frontier" of diversification against risks. Robust portfolios tend to perform well against a variety of projected outcomes for the energy sector, and provide good hedges against downside risks. Adaptive portfolios evolve over time, operate with clear near-term goals, and have credible exit strategies.

As discussed in Part 2 of this book, the energy system faces several risks that distributed generation can protect against. The critical risks are:

- loss of system reliability in congested zones
- extreme price volatility
- utility financial distress
- environmental degradation and climate change
- unreliable customer service (relative to emerging needs)

Distributed generation can also create new risks if policies meant to promote it are developed inappropriately. The areas of greatest concern are:

- creation of market power within a congested zone
- increased environmental pollution
- instability of distribution systems

The challenge facing regulators is to craft a specific set of policies that can manage these risks, level the playing field for distributed generation, and allow society to capture the benefits fairly and expeditiously.

3.2.3 Key barriers and issues facing distributed generation

All serious observers of the electricity industry recognize that there are many barriers to rapid market capture by distributed generation. Not all are within the control of any one set of actors. For example, lack of information or understanding of distributed generation reduces expressed demand for these technologies and services. Similar lack

of information on the part of regulators and utilities may preclude their considering distributed ways to meet the need for reliable, least-cost service. Business and individual customers typically apply implicit hurdle rates to investment decisions that do not necessarily reflect, and often exceed, common rate-of-return or return-on-investment indices, implying higher risk when in fact risk may be lower. And both regulators and utilities typically approach utility investment decisions from a perspective developed for evaluating central station facilities.⁴ Some barriers are related to the immaturity of technologies and of supporting service and repair industries. And some of these barriers are firmly entrenched in legislative or regulatory provisions governing utility revenue collection.

3.2.3.1 Key barriers

Much has been written about the barriers facing deployment of distributed generation (5, 694). Seven major barriers stand out:

Public sector barriers

- **Interconnection standards.** Utility standards for interconnection and protective equipment to allow on-grid operation of distributed generation sources vary widely and can create potentially prohibitive costs. A utility that wants to prevent such sources from connecting can impose strict connection, protection, and insurance criteria. Because of the complexity, variation, and potential costs of interconnection requirements, uniform standards are under development that will make interconnection requirements more predictable.
- **Siting, permitting, and environmental regulations.** Existing air quality regulations under the Clean Air Act (CAA) and its most recent amendments of 1990 are designed for large central generating stations. Conventional DG technologies installed for emergency standby power are exempt from this process. In most jurisdictions, however, existing standby generators will probably have to re-apply for permits or exemptions in order to operate in a dispatchable mode for peak shaving or grid support. While DG sources are generally too small to trigger New Source Review activity under the CAA, many potential DG applications will be in non-attainment areas for NO_x. In these areas, DG will receive increasing scrutiny with regard to air emissions. This is bad news for reciprocating engines (at least using current standard technologies) and probably for gas turbines, but it is good news for fuel cells and renewables.
- **Utility pricing practices.** Distributed generation can help distribution utilities by deferring investments in distribution capacity, providing voltage support and reactive power, and improving reliability. However, existing utility tariff structures do not generally recognize these benefits, and may not result in their proper allocation, recovery, and feedback to investment decisions.
- **Wholesale market access.** Distributed resources currently have limited access to the wholesale power and ancillary services markets due to current Independent System Operator (ISO) and Regional Transmission Organization (RTO) rules.

⁴ Thus on 16 May 2002, the Tennessee Valley Authority, when voting \$1.7–1.8 billion to revive a nuclear reactor mothballed for 17 years while increasing its design life 50% and its design output 30%, declared that it had considered “every option available”—all of which just happened to be nuclear or fossil-fueled central generation, as if it were still the 1960s (236). Oddly, the same board had two months earlier abandoned a \$150-million investment in a \$360-million gas-fired power plant on grounds of insufficient demand. That plant would have supplied half as much power but at a fivefold lower price. Two of TVA’s three directors were appointed by President George W. Bush, and the TVA Board has no accountability to either markets or voters, so it is ideally suited to make investment decisions that no private-market actor could make.

- **Retail market access.** No states allow direct retail wheeling of distributed resources, which thus lack access to the retail markets as well. Most states' restructuring, even though launched in the late 1990s when distributed generation was already conquering many markets, was still designed as if the only competitors were and would remain central power stations. Moreover, distribution companies are often barred from owning distributed generators, thus splitting ownership from benefits.

Private sector barriers

- **Manufacturing scale.** Many distributed resources are currently expensive on a unit basis (\$/kW of new capacity). In part, this is due to the recent emergence of the several of such new technologies as PEM fuel cells and microturbines, where manufacturing facilities are clearly subscale. Manufacturing experience in the turbine, wind, and solar industries suggest that the unit costs will drop by 30–50% or more from current prices once production attains minimum efficient manufacturing scale. In some cases, notably PEM fuel cells, long-run production costs at very large volumes could become significantly lower than for gas turbines.
- **Financing uncertainty and cost.** The costs of DG technologies are generally concentrated in relatively high capital costs that, like those of some energy efficiency measures, can be difficult to finance. Power generation projects are more complex and have significant transaction costs. Because of the relatively small scale of distributed generation projects, these costs make up a larger share of the total project cost than for larger conventional projects. These costs are fully at risk in the early stages of project development, so their contribution to financial risk is amplified.

3.2.3.2 Regulatory response

Regulatory responses to these barriers address issues that can be grouped into three major areas: technical interfaces, economic and financial, and environmental. The technical interface issues address which markets distributed generation will participate in, and at what cost. The economic and financial issues address what economic value will be realized and what costs will be borne among the stakeholders. The environmental issues address how the environmental impact of distributed generation will be managed compared with centralized generation. A 1999 Arthur D. Little, Inc. white paper asserted there are eight fundamental distributed generation issues (14). Updating this starting point to 2002, we would add three additional issues. How regulators respond to these eleven distributed generation issues, summarized in the box on p. 316, will ultimately determine whether these regulators have met the widely shared policy objective of creating a competitive environment for distributed generation.

Eleven policy issues for distributed generation (DG)

Technical interfaces

1. *System interfaces:* Should DG interface with grid operations and markets?
2. *Interconnection:* Should the interconnection's technical requirements, processes, and contracts be modified for DG?

Economic and financial

3. *Utility ratemaking (price formation):* Should utilities' primary financial incentive continue to be based on selling more kWh?
4. *Grid-side benefits:* Should grid-side benefits of customer DG be monetized and allocated among stakeholders?
5. *Energy pricing:* Should the price of energy fed into the grid reflect the incremental value, net of costs, to the system?
6. *Stranded costs:* Should utilities be compensated for stranded costs associated with DG installations?
7. *Fixed charges:* Should utilities be compensated for providing standby and reliability services?
8. *Disco participation:* Should distribution companies (Discos) participate in DG?
9. *Public support:* Should DG technologies be supported by financial incentives, subsidies, or public funding of RD&D?

Environmental

10. *Siting and permitting:* Should siting and permitting requirements be modified for DG?
11. *Technology differentiation:* Should environmentally friendly DG receive differential benefits?

These issues are interrelated—how one issue is addressed will affect the results from addressing another. Action taken to address any particular issue relating to distributed generation is informed by and influences a broad range of additional regulatory issues. As such, the preferred approach for policy makers seeking to capture any specific set of benefits from distributed generation is to undertake such action within a broader agenda of regulatory reform. Further, these issues must be resolved at either the federal or state level, or in some cases both (Table 3-1). (For sim-

plicity, this treatment omits other jurisdictions, notably Native Tribes. Yet those sovereign entities happen to hold about one-fifth of U.S. fossil fuel reserves and enormous renewable energy flows. Just Tribal land in the Dakotas, for example, has Class 4–6 windpower resources on the order of 250 GW—equivalent to one-third of total U.S. generating capacity! These lands' unique legal status may permit unusual kinds of commercial transactions.)

Table 3-1: Policy issues for distributed generation

Issue	Commercial importance to DG	Jurisdiction			
		Wholesale	Transmission	Distribution	Retail
Technical Interfaces					
1. System interface	High	FERC	FERC, RTO	State PUC	State PUC
2. Interconnection	High		FERC, RTO	State PUC	
Economic and Financial					
3. Utility ratemaking	High	—	—	State PUC	State PUC
4. Grid side benefits	Moderate	—	FERC, RTO	State PUC	—
5. Energy pricing	Moderate	FERC, ISO	—	—	State PUC
6. Stranded costs	Moderate	—	FERC, RTO	State PUC	—
7. Fixed charges	High	—	—	State PUC	—
8. Disco participation	Low	—	—	State PUC	State PUC
9. Public support	Low	DOE	DOE	State PUC	State PUC
Environmental					
10. Siting and permitting	Moderate	—	RTO, EPA	State*	—
11. Technology differentiation	Low	EPA	—	State PUC	State PUC

** Multiple state agencies involved, including public utility commissions, land use councils, and environmental agencies*

3.3 POLICY RECOMMENDATIONS

3.3.1 Overview

Today, there is broad recognition of the importance of distributed energy resource technologies and services, but there is only sporadic specific support. Policy makers, regulators, and industry players have some general sense that there are private and public benefits to be economically captured from increased use of distributed generation. As the benefits this book catalogs and explains are made more tangible through practical experience, pressure will increase to devise policy that accelerates the capture of these benefits. Already, forward-thinking legislators and regulators are implementing measures designed to speed the launch of distributed generation markets.

In spite of all the benefits of distributed generation, a smaller, right-sized energy infrastructure will not supplant existing systems overnight. Indeed, many of the benefits of distributed generation derive directly from their interaction with the existing system. Pre-peak photovoltaic generation, for example, is valuable in part precisely because without it, the distribution system heats and degrades under normal operation (§§ 2.2.8.4, 2.3.2.7). Similarly, the load-following benefits of microturbines and fuel cells help save the fuel and maintenance costs of large plants kept warm to provide spinning reserves (§ 2.3.3.2). Capturing system-related benefits beyond energy value can pay for, and in many cases exceed, any above-market premia inherent in the prices of technologies early in their commercialization life cycle. Price and

cost reductions that come from manufacturing economies of scale for distributed generation can over time put distributed generation on a more competitive first-cost footing with thermal central stations. First cost then becomes the key discriminator for choice of technology and service to meet customer demand. But meanwhile, fair competition requires that real distributed benefits be recognized in the market or in public policy or, preferably, both.

Not surprisingly, then, a number of distributed generation advocates and industry experts have articulated a need for policy reform in order to create greater opportunities for use of these technologies and services. Regardless of the specific mechanisms chosen for implementation, however, policy makers will continue to rely upon and justify their proposals on the basis of a few basic concepts. These include the goals of economic efficiency, protecting customers from improper discriminatory treatment, preserving reasonable opportunities to earn returns on investments, preserving and enhancing safety and system reliability, and preserving such public goods as a healthy environment.

Obviously, the degree of emphasis on each of these values varies from jurisdiction to jurisdiction. A great benefit of the electric utility restructuring or liberalization debate has been a reinvigoration of the debate about the best means for accomplishing these goals. Broad underlying policy principles evolve slowly, however, and those debates are likely to continue. Advocates of distributed generation and of obtaining the benefits that distributed generation offers have, in recent years, begun to argue for adopting specific mechanisms that both promote increased opportunities for these serv-

ices and technologies and serve broad underlying policy objectives. As this book has stressed, it is fair to argue that a shift to greater reliance on right-sized, smaller-scale energy resources is, in sum, better policy, according to even the most restrictive views of what public policy is for.

(End of excerpt)