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Cogeneration: A Successful Response to the Energy Crisis?

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COGENERATION: A SUCCESSFUL RESPONSE TO THE ENERGY CRISIS?

*Charles M. Pratt**

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I. Introduction

The era of cheap energy has ended,¹ replaced by a period of rapidly escalating costs for all forms of energy. This revolutionary change in the cost of energy has profoundly affected the economics underlying the supply of electric energy. Among the governmental responses to this new energy reality is Congress' enactment of the Public Utility Regulatory Policies Act of 1978 ("PURPA").² Congress enacted PURPA to establish regulatory policies to improve

1. The Arab oil boycott of 1973-1974 shocked the United States into the realization that the era of cheap energy was finally over. Shock does not necessarily breed action, however, and eight years later the nation is still struggling to escape from the stranglehold of constant price rises ordered by the Organization of Petroleum Exporting Countries ("OPEC"). Instability in Iran and other parts of the Middle East has served to further reinforce United States dependence on foreign oil.

In the wake of these developments, the United States has begun to reevaluate the way that it thinks about energy. New attention is being focused on the recently moribund coal industry because of America's great coal reserves. The promise of cheap and abundant nuclear energy has been shaken by the accident at Three Mile Island. The Synthetic Fuels Corporation was created in July 1980, but even its most optimistic supporters do not see synthetic fuels as a significant source of energy until the beginning of the next century. Renewable resources, such as solar energy, are also being examined with great optimism. See Comment, *Solar Rights and Restrictive Covenants: A Microeconomic Analysis*, 7 FORDHAM URB. L.J. 283 (1979). One area in which there has been progress since 1973 has been in conservation. While energy experts agree that America is not the energy spendthrift that it was before the rise of OPEC, they do not agree on the potential for savings through conservation. See generally R. STOBAUGH & D. YERGIN, *ENERGY FUTURE: REPORT OF THE ENERGY PROJECT AT THE HARVARD BUSINESS SCHOOL* 1-13 (1979) [hereinafter cited as *ENERGY FUTURE*].

2. Pub. L. No. 95-617, 92 Stat. 3117 (1978). PURPA is codified in scattered sections of titles 15, 16, 30, 42 and 43 of the United States Code. Title I of PURPA concerns regulatory policies for electric utilities, particularly as reflects rate issues. Title II focuses on cogeneration and small power production facilities, as well as other federal regulatory authority over electric utilities. The remainder of PURPA concerns natural gas utilities, small hydroelectric power projects and crude oil transportation systems.

PURPA was enacted as one of a group of acts collectively known as the National Energy Act of 1978. That legislation constitutes one of the major accomplishments in formulating federal energy policies. Its goal was to adopt a comprehensive set of policies which would allow the United States "to make an orderly transition to an era of expansive energy resources. . . ." H.R. Rep. No. 543, 95th Cong., 2d Sess. 8 reprinted in [1979] U.S. CODE CONG. & AD. NEWS 7673, 7677. In addition to PURPA, the National Energy Act of 1978 includes the Energy Tax Act of 1978, Pub. L. No. 95-618, 92 Stat. 3174 (codified in scattered sections of 26 U.S.C. (Supp. III 1979)); the National Energy Conservation Policy Act of 1978, Pub. L. No. 95-619, 92 Stat. 3206 (codified in scattered sections of 12, 15, 23, 42 U.S.C. (Supp. III 1979)); the Powerplant and Industrial Fuel Use Act of 1978, Pub. L. No. 95-620, 92 Stat. 3289 (codified in scattered sections of 15, 42, 45, 49 U.S.C. (Supp. III 1979)) and the Natural Gas Policy Act of 1978, 15 U.S.C. §§ 3301-3432 (Supp. III 1979).

the distribution of electric energy and to encourage the conservation of resources.³ One of the most interesting aspects of this legislative initiative to foster greater energy efficiency and competition among utilities is the decision to encourage alternative, non-traditional methods of power production and, in particular, a system of energy production commonly known as cogeneration.

Cogeneration exists when there is simultaneous production of both electricity and other useful energy in a single facility by a cascading use of the heat energy.⁴ Cogeneration facilities, which

3. In 16 U.S.C. § 2601 (Supp. III 1979), Congress set forth the five goals of PURPA: 1) to increase conservation of electric energy, 2) to improve the wholesale distribution of electricity, 3) to provide for the expeditious development of hydroelectric potential at existing small dams, 4) to conserve natural gas while insuring that rates to natural gas consumers are equitable, and 5) to encourage the development of crude oil transportation systems.

4. Cogeneration is not a new idea. Cogeneration technologies were widely applied in the early 1900's when the majority of industrial plants generated their own electricity. In 1920, electrical generation at industrial plant sites accounted for about 30% of the total United States electrical generation. Industrial generation of electricity declined, however, until today when it accounts for less than four percent of the United States' electrical energy production. FEDERAL ENERGY REGULATORY COMMISSION, COGENERATION FACT SHEET 1 (Nov. 1, 1979). See Edelman & Bongiorno, *Cogeneration—A Viable Alternative*, PUB. UTIL. FORT., Dec. 6, 1979, at 36.

Interest in production of electricity at industrial plants gradually waned because electricity supplied by public utilities became more available and less expensive. The cost of electricity decreased as new technologies and larger generating stations permitted utilities to produce at continually lower cost. The cost of a kilowatt hour of electricity dropped from 2.7 cents in 1926 to 1.54 cents in 1968. Testimony of John O'Sullivan, FERC Chief Advisory Counsel before the House Subcommittee on Energy Development and Applications of the Committee on Science and Technology, 96th Cong. 2d Sess. (1980). If the reduced value of the dollar is accounted for, the price of electricity per kilowatt hour in 1968 was 28% of the price in 1926. *Id.* The difficulties and costs of self-generation gave industrial consumers added incentives to rely on public utilities to supply electricity.

Since the early 1970's, however, the cost of utility-produced electricity has increased dramatically. In particular, the cost of petroleum-based fuels has increased at a rate well above the inflation rate. In 1969, the price of a barrel of oil in the Persian Gulf ranged from \$1.00 to \$1.20. ENERGY FUTURE, *supra* note 1, at 25. On February 27, 1981, OPEC's official prices for a barrel of oil ranged from \$34.65 for Basrah Gulf Heavy Sour to \$41.00 for Zueitina African High Sweet. PLATT'S OILGRAM PRICE REPORT, Mar. 2, 1981, at 2-A. Moreover, the increasing cost of construction of new generating plants has made the incremental cost of additional kilowatt hours of electricity rise as compared to the average cost. As the economies made possible by the construction of newer plants disappeared, so did the reductions in the real cost of producing electricity.

New York is expected to be prime territory for cogeneration facilities because of its high energy costs and extremely high density. *Con Ed Battles Energy Officials on Cogeneration*, N.Y. Times, Nov. 2, 1980, § 8, at 1, col. 5. At present, four large residential housing complexes in New York City derive their power from on-site cogeneration. According to the manager of one of these plants, it produces 24.4 million kilowatts annually at a cost of 4.5

produce both electric and other useful energy, usually in the form of steam, are distinguishable from traditional power plants which convert heat energy in the oil, gas, coal or uranium fuel into electrical energy only. In almost all instances, traditional conversion involves the creation of steam which turns a turbine. The turbine then powers a generator which produces electricity. The heat energy remaining in the steam after it has been used in the turbine is released to the environment, either into an adjacent body of water or into the air. Cogeneration puts to productive use the surplus heat energy in this discarded steam. This sequential, or cascading use of the fuel's heat energy results in a substantial increase in the overall efficiency of the plant. A traditional thermal generating plant has a maximum theoretical efficiency of between thirty-five and forty percent.⁵ This limit results from the inescapable discharge into the environment of at least sixty percent of the fuel's potential heat energy, causing a number of adverse environmental consequences.⁶ Cogeneration facilities, on the other hand, have efficiencies ranging up to eighty percent.⁷ Section 210⁸ of PURPA

cents per kilowatt compared to the 10.1 cents it would have to pay a utility. *Id.* at 8, col. 1. New York State presently has approximately 450 megawatts of electricity produced from cogeneration. Four industries make up two thirds of the total: Eastman Kodak, Allied Chemical, Bethlehem Steel and Hooker Chemical. Address by Bart Chezar, Research and Development, Power Authority of the State of New York, at the Conference on Economic Development (Mar. 20, 1980).

5. ENERGY FUTURE, *supra* note 1, at 159. See COMBUSTION ENGINEERING: A REFERENCE BOOK ON FUEL BURNING AND STEAM GENERATION 25 (1966).

6. The adverse environmental effects of heat discharge have been recognized by Congress in its enactment of the Clean Water Act of 1977, Pub. L. No. 95-217, 91 Stat. 1566 (amending Federal Water Pollution Control Act, 33 U.S.C. §§ 1251-1376 (1976 & Supp. III 1979)). Section 502(6) of the Act states that the term "pollution" means, *inter alia*, "heat." 33 U.S.C. § 1362 (1976). Section 316 (codified at 33 U.S.C. § 1326 (1976)) assures "the propagation of a balanced, indigenous population of shellfish, fish and wildlife" from the harmful effects of thermal discharge. Section 402 (codified at 33 U.S.C. § 1342 (1976)) authorizes the establishment of a permit program for the discharge of pollution.

7. U.S. GEN. ACC'TING OFFICE, INDUSTRIAL COGENERATION—WHAT IT IS, HOW IT WORKS, ITS POTENTIAL 92 (1980) [hereinafter cited as GAO REPORT]. The GAO Report categorizes cogeneration efficiency by technology. Steam turbine cogeneration is the most efficient, utilizing 78.7% of its fuel, while gas turbine cogeneration utilized 71.2%. Diesel cogeneration is somewhat less efficient at 62.2%. *Id.*

8. Public Utilities Regulatory Policies Act of 1978, Pub. L. No. 95-617, § 210, 92 Stat. 3117 (codified at 16 U.S.C. § 824a-3 (Supp. III 1979)).

The constitutionality of Title I of PURPA and § 210 has been challenged in an action in the United States District Court for the Southern District of Mississippi. In *Mississippi v.*

seeks to encourage expanded adoption of cogeneration technology

Federal Energy Reg. Comm'n, Civil Action No. J79-0212 (C) (S.D. Miss. Feb. 19, 1981), summary judgment was granted plaintiffs declaring portions of PURPA unconstitutional. The Federal Energy Regulatory Commission has announced that it will seek to file an appeal of the declaration of invalidity in the United States Supreme Court.

The court's declaration is based primarily, insofar as the brief order of the district court indicates, on the court's determination that the commerce clause, U.S. CONST. art. 1, § 7, cl. 3, does not provide express confirmation to Congress of power to displace Mississippi's regulation of utilities in the exercise of its intrastate functions and that, as a result, that power is reserved to the states by the tenth amendment. U.S. CONST. amend. X. The court relied upon *Carter v. Carter Coal Co.*, 298 U.S. 238 (1936), for the proposition that Congress' power to regulate commerce is limited. The district court also refers to *National League of Cities v. Usery*, 426 U.S. 833 (1976), to the effect that PURPA's impact on intrastate activities is too intrusive.

The support for the court's determination, however, seems limited. It cannot be doubted that Congress' power under the commerce clause is extensive. The power to regulate commerce excludes only "those [activities] which are completely within a particular state, which do not affect other states, and with which it is not necessary to interfere, for the purpose of executing some of the general powers of the government." *Gibbons v. Ogden*, 22 U.S. (9 Wheat.) 1, 195 (1824). It is now well established that this power extends to intrastate activities affecting interstate or foreign commerce. See, e.g., *Fry v. United States*, 421 U.S. 542, 547 (1975); *Heart of Atlanta Motel, Inc. v. United States*, 379 U.S. 241, 255 (1964); *Wickard v. Filburn*, 317 U.S. 111, 127-28 (1942). In *Fry*, the intrastate action would have injected millions of dollars of purchasing power into the economy with possible consequences in other states.

The business of producing, distributing and selling electricity in the United States has substantial interstate aspects. The flow of electricity is not limited by state boundaries but moves continuously on an interstate transmission network. Similarly, the energy resources supplying electric power are not limited by state boundaries because generators are located according to efficiency and environmental reasons. In particular, the flow of fuels such as oil and coal supplying energy for power generation is not limited by state boundaries. Much of the oil is imported. It is therefore not plausible to claim that a utility's business of generating, distributing and selling electric power is limited to intrastate activities. Conduct by a utility in a particular state will have a real impact on the national market for boiler fuels as increased demand in one state will lead to higher costs generally.

While the federal government has not extensively regulated the retail level of the electric business, this can be said to result from a policy of abstention, not constitutional limits on its power. See generally *Connecticut Light & Power Co. v. Federal Power Comm'n*, 324 U.S. 515 (1945); *Jersey Central Power & Light Co. v. Federal Power Comm'n*, 319 U.S. 61 (1943).

The fact that Congress' enactment of PURPA required FERC to mandate certain standards and requirements for state regulatory agencies, as opposed to private citizens or corporations, does not change the situation. *National League of Cities v. Usery*, 426 U.S. 833, 855 (1976), relied upon by the district court, held that the application of the Fair Labor Standards Act to state employees, although within the reach of Congress' power under the commerce clause, was nevertheless barred because "Congress may not exercise [the commerce] power so as to force directly upon the States its choice as to how essential decisions regarding the conduct of integral governmental functions are to be made." The district court, it should be noted, does not rely on the narrow logic of *National League of Cities* as it determined that Congress had no "power or authority to displace and to usurp the regula-

by solving several of the crucial regulatory and economic problems impeding its growth. This encouragement is provided by requiring

tory power and authority of the State of Mississippi. . . ." *Mississippi v. Federal Energy Reg. Comm'n*, slip op. at 6.

The Supreme Court in *National League of Cities* adopted a balancing test to measure the impacts of the legislation in question. The Court identified the states' power to determine its employees' salaries as an undoubted attribute of state sovereignty. The issue for resolution was whether the states' power to determine wages was a function "essential to separate and independent existence." *National League of Cities v. Usery*, 426 U.S. at 855 (quoting *Coyle v. Oklahoma*, 221 U.S. 559, 580 (1911)). In *National League of Cities*, the Court estimated the substantial costs which would be imposed upon the states as a result of the statute. These increased costs might well lead to the necessity of changing state programs. *Id.* at 846-47. The wage and hour provisions of the statute were determined to "impermissibly interfere with integral governmental functions. . . ." *Id.* at 851. Regardless of the exact level of the statute's impacts, it would "significantly alter or displace the states' abilities to structure employer-employee relationships in such areas as fire prevention, police protection, sanitation, public health, and parks and recreation." *Id.* Justice Blackmun's concurring opinion, which provided the fifth and necessary majority vote, expressly describes the Court's rationale as a balancing test. *Id.* at 856.

Definitive consideration of the relative impacts of PURPA's sections in the context of the 1978 national energy problems must await the Supreme Court's decision on the appeal. Examination of the impacts of § 210 would appear to favor upholding its validity. First, the energy situation in 1978, and continuing to today, presents a major problem that cannot be considered solely on a local level. The dramatic rise in energy prices and the nation's increasing dependence on foreign oil mandated a reappraisal of the existing method of producing and using energy. The flow of energy and energy resources, such as imported oil, is not limited to a single state. Encouragement of conservation and alternative energy sources, the subject of § 210, cannot effectively be done on a state by state basis.

Second, § 210 does not oust the states of regulatory jurisdiction over public utilities or over the appropriate methods of encouraging cogeneration and alternate energy sources. The power to establish conservation policies for utilities remains with the states. Section 210 establishes guidelines and general policies for the state's regulatory implementation of PURPA. Each state is given broad discretion to fashion appropriate standards and procedures for effecting energy conservation. The revised rates are to be set by the states, subject to the guides established in § 210. The section, rather than ousting the states from their respective jurisdiction, reflects creative federalism by giving the states broad authority to select appropriate methods of implementation.

See Special Committee on Energy Law, *Report*, 10 ABA NATURAL RESOURCES LAW SECTION 655, 717-19 (1978). The Special Committee recognized that the eventual allocation of responsibility for energy regulation between the states and the federal government presents "the most fundamental policy problems engendered by the existing energy crisis." *Id.* at 717. Although acknowledging that complete federal takeover may create the most efficient energy regulatory system, the Special Committee argues that important political considerations as well as interest in a vital federalism militate against complete federal takeover and toward allowing the states to continue their regulatory role in areas not necessary to a coherent national energy policy. *Id.* at 719. See also Toll, *Some Legal and Policy Questions Presented by the Public Utilities Regulatory Policies Act*, PUB. UTIL. FORT., Mar. 1, 1979, at 51-53.

amendment of prevailing utility rate structures so as to make cogeneration financially more attractive.⁹

Pursuant to Congress' directive in section 210, the Federal Energy Regulatory Commission ("FERC") has promulgated rules to encourage cogeneration.¹⁰ These federal regulatory developments and the states' regulatory responses¹¹ seem certain to encourage increased use of cogeneration as an alternative to the traditional central-station electric generating plants.¹² Increased cogeneration

9. 16 U.S.C. § 824a-3(b)-(c) (Supp. III 1979).

10. Under § 210(a), FERC was given a congressional mandate to "prescribe, and from time to time thereafter revise, such rules as it determines necessary to encourage cogeneration and small power production which rules require electric utilities to offer to (1) sell electric energy to qualifying cogeneration facilities and (2) purchase electric energy from such facilities." 16 U.S.C. § 824a-3(a) (Supp. III 1979). The regulations took effect on March 20, 1980. Moreover, FERC was to prescribe such rules only after "consultation with representatives of Federal and State regulatory agencies having ratemaking authority for electric utilities. . . ." *Id.* These regulations appeared as FERC Regulations under §§ 201 and 210 of the Public Utility Regulatory Policies Act of 1978 with Regard to Small Power Production and Cogeneration, 18 C.F.R. § 292.101 (1980). These regulations derive from two FERC rulemaking procedures. In Docket No. RM79-55, FERC issued Order No. 69, "Small Power Production and Cogeneration Facilities: Regulations Implementing Section 210 of the Public Utility Regulatory Policies Act of 1978," 45 Fed. Reg. 12,214 (1980) and in Docket No. RM79-54, FERC issued Order No. 70, "Small Power Production and Cogeneration Facilities — Qualifying Status," 45 Fed. Reg. 17,959 (1980).

11. FERC required that no later than one year after its rules took effect, each state regulatory authority implement the rules. 18 C.F.R. § 292.401(a) (1980). According to FERC, implementation may consist of issuance of regulations, an undertaking to resolve disputes between qualifying facilities and electric utilities or any other action reasonably designed to implement the rules. *Id.* In addition, the state regulatory authorities must file within that same year a report specifically describing the manner in which it will implement the sections regarding arrangements between electric utilities and qualifying cogeneration facilities. *Id.* § 292.401(c) (1980). On January 7, 1981, the New York Public Service Commission issued an Order Implementing Sections 201 and 210 of the Public Utilities Regulatory Policies Act of 1978. The Washington Utilities and Transportation Commission, which regulates the State of Washington's three investor-owned utilities, filed its implementation of the cogeneration rules with the FERC on February 6, 1981.

12. Certain institutional changes have the potential to reduce the risks of investing in a cogeneration facility. If cogenerating units are connected to the utility transmission and distribution network, they are more attractive financially and operationally because such interconnection allows the cogenerator to sell excess electricity to the utility and to buy back-up power from the utility. The ability of a cogenerator to rely on the utility for a market for excess electric power provides a significant financial incentive for the cogenerator. Similarly, access to the utility for back-up, or standby power, in the case of peak loads or if the cogenerator's facility is forced out of service by breakdown, reduces the need to purchase redundant generating equipment. Such sales and purchases, however, are only practicable if they can be made at fair and non-discriminatory rates. In the past, many utilities refused to purchase power from cogenerators or charged very high rates for back-up power when a

promises to use scarce resources more efficiently and to encourage competition between traditional utilities and cogenerators.¹³

The federal stimulus to encourage development of cogeneration poses significant energy, regulatory, environmental and policy issues which have not yet been explored thoroughly. In fact, the enactment of section 210 represents a major social experiment involving utilities and their customers, with potentially substantial impacts that have been imperfectly analyzed and considered. This Article will discuss a number of the issues raised, and in large part left unresolved, by this federal policy.¹⁴ Section II will describe the

cogenerator needed to buy electricity. John O'Sullivan, Chief Advisory Counsel for FERC, has stated, "Many electric utilities used their monopoly powers to exclude cogeneration by setting discriminatorily high backup or standby power rates, or they simply refused to buy or sell power to cogenerators. *Con Ed Battles Energy Officials on Cogeneration*, N.Y. Times, Nov. 2, 1980, at A1, col. 5. Utilities either were reluctant or simply refused to allow the cogenerator to connect to the utility transmission and distribution network. As a result, cogenerators were compelled in some cases to choose either to go-it-alone or to suffer discriminatory rates from utilities.

Another barrier to wider use of cogeneration was that under most circumstances, the sale of electric power to a utility subjected a cogenerator to regulation as a public utility. In such a case, a cogenerator's rates for its sale of excess power would be subjected to regulatory approval. In addition to the time and expense of participating in regulatory proceedings, the cogenerator would also have to adhere to utility accounting standards and submit data to regulating agencies as if it were a utility.

The FERC rulemaking proceedings that led to the cogeneration regulations were designed to establish rules and policies for state utility regulatory agencies so that they might eliminate these barriers to increased use of cogeneration.

13. The unrelenting rise in the cost of electricity since the early 1970's, particularly in the increasing cost of the incremental unit of electricity, *see note 4 supra*, has led to a widespread search for more efficient means of providing electricity. The inherent efficiency of cogeneration made it quite attractive in economic theory. This potential was blocked, however, because cogeneration posed a risky investment: first, an investor's anticipation of regular financial reward was stymied by the knowledge that a small cogenerator requiring additional power at peak times might have to pay unreasonable rates from a public utility or, conversely, would have no one to sell its own excess power to in times of excess energy supply; second, an investor could not be sure that operating as a cogenerator would not ensnare him in a complex regulatory web which would reduce the efficiencies allowed by cogeneration. The failure to exploit the conservation potential of cogeneration has been explained as "a near-perfect example of obstacles being not technical, but almost entirely institutional and organizational." *ENERGY FUTURE, supra note 1*, at 160.

14. Small power production facilities, the other set of technologies considered by § 210, involve use of renewable, non-traditional fuel resources. While cogeneration facilities sometimes qualify as small power production facilities, the focus of this Article is on cogeneration. The discussion, therefore, does not pertain to small power production facilities. Also for simplicity of expression, the term cogenerator is used in this Article to refer to both the facility itself and the owner or operator of a cogeneration facility.

attraction of cogeneration in an era of rising energy costs. Section III will discuss the legislative and administrative responses to the prospect of expanded cogeneration. Section IV will explore the impact of cogeneration on utilities while Section V will explore the effects of the policy on regulatory control of utilities.

II. Cogeneration as an Appropriate Response to an Era of Energy Shortages

The appeal of expanded use of cogeneration for the production of electricity stems from two essential facts: 1) at a time of energy shortages and increasing interest in conservation, cogeneration is an inherently more efficient method of producing power; and 2) because cogeneration facilities tend to be smaller than the traditional utilities, decentralization of energy producing facilities would result.

The attraction of cogeneration is the increased efficiency in the use of fuel compared with traditional electric generating stations. A coal burning electric generating station, for example, uses heat energy only to produce steam to turn a turbine and has a maximum efficiency of forty percent.¹⁵ The higher efficiency of a cogeneration facility results from the multiple use of the heat energy, producing both electricity and some other useful form of energy. Cogeneration can be used in both industrial plants and other situations, such as large residential complexes. There is no single cogeneration technology; there are, for example, three significant industrial applications of cogeneration.¹⁶

15. See note 7 *supra* and accompanying text.

16. Examination of the three most significant industrial configurations demonstrates how higher efficiencies are possible through use of cogeneration. The first of these technologies is a diesel cogeneration system. In this system, a diesel engine turns a generator to produce electricity. The otherwise unused, or wasted heat from the diesel, is used to produce hot water or steam for industrial use. See GAO REPORT, *supra* note 5, at 6-7.

The second, and the most widely used, type of cogeneration technology uses a variation of the standard industrial boiler which is traditionally used to produce hot water or low temperature steam for heating or industrial purposes. Such a boiler may be adapted for cogeneration by adding a "topping cycle" to enable multiple use of the heat energy. With the addition of this cycle, the boiler produces steam which is used first for the purpose of turning an electric generator and is subsequently used for industrial applications. Instead of utilizing the steam's heat energy only for producing electricity, steam with a relatively high level of heat energy is made available for industrial purposes after having passed through the turbine generator.

The third cogeneration technology involves combustion turbines, also known as gas tur-

This potential increase in the efficient use of fuel is especially attractive to industries which have a high demand for thermal energy in the form of industrial process steam. One study performed for the federal government estimates that six industries, each of which is a major user of both process steam and electric power, could account for eighty-five percent of the total potential industrial cogeneration.¹⁷

Cogeneration, as a more efficient alternative to the traditional production of energy by existing utilities, must be viewed in the context of the end of the era of cheap energy. Beginning with the oil boycott, the marginal cost of generating electricity has risen sharply.¹⁸ Given the inexorably increasing cost of electricity, the rationale for utilities as natural monopolies is weakened.¹⁹ Con-

bins. These engines, similar to land-based jet engines, produce a flow of hot, high energy gas which turns the electricity-producing turbine. In addition, the hot exhaust gases are used to provide steam which can be used for industrial purposes or to heat residential buildings. These engines can burn natural gas, various types of oil-derived products and, in the future, may be adapted for use with coal. See GAO REPORT, *supra* note 5, at 6. In an alternative approach, known as "bottoming cycle," fuel is burned initially to produce process heat. Waste heat thrown off is then used to generate either electrical or mechanical power. Edelman & Bongiorno, *supra* note 4, at 36. The practicality of the "bottoming cycle" configuration is limited, however, by the difficulty of converting the low temperature industrial process heat to useful energy. *Id.* It is anticipated that improved technology will solve this problem, but the "bottoming cycle" approach will not be a significant one in cogeneration for eight to ten years. GAO REPORT, *supra* note 5, at 6.

In addition to the industrial application of cogeneration discussed in this Article, cogeneration is used in residential situations in district or space heating. See note 4 *supra*. The lower temperature steam, after its use to generate electricity, is used to heat or cool buildings. See ENERGY FUTURE, *supra* note 1, at 157-61.

17. RESOURCE PLANNING ASSOCIATES, INC., THE POTENTIAL FOR COGENERATION DEVELOPMENT IN SIX MAJOR INDUSTRIES BY 1985 1.1 (1977) [hereinafter cited as RPA REPORT]. The six industries are pulp and paper, chemicals, steel, food, textiles, and petroleum refining. The RPA REPORT estimates that without any governmental encouragement, the electrical output from the cogenerators would reach approximately 14,000 megawatts in 1985 as compared to 4,000 megawatts in 1976. *Id.* at Ex. 1. Special government programs to stimulate additional development of cogeneration could increase the electrical output of cogenerators to 21,000 megawatts by 1985. *Id.* at vii. Such projections do not attempt to account for the specific conditions in various regions. In the case of the RPA REPORT, *supra*, for example, the estimate for electrical output is based on estimating the maximum practical market for industrial process steam. This potential was then reduced to take account of technical and economic constraints. Local and particular considerations, such as the appropriate rate of return in an industry, environmental constraints or utility operating matters could change this estimate significantly.

18. FEDERAL ENERGY REGULATORY COMMISSION, COGENERATION FACT SHEET 2 (1979).

19. Utilities have been considered "natural" monopolies because "the unit cost of sup-

gress' encouragement of cogeneration represents its belief that the generation of electricity need no longer be monopolized by a regulated entity.²⁰

It must be noted, however, that the theoretical increase in efficiency available through cogeneration is not free from substantial regulatory and environmental problems. For example, the cogeneration technology most likely to be adopted in heavily urbanized areas is based on the use of diesel engines. Such engines will continue to use petroleum-based fuel and may create serious environmental problems.

Even the anticipated improvement in efficiency is subject to question. The use of petroleum-based fuel by cogenerating facilities in urban areas may actually encourage the use of such fuels, leading to an increase in the amount of petroleum used.²¹

Finally, the adverse impacts resulting from the increased efficiency of cogeneration may fall unevenly on different regions of the country.²² In areas where the demand for electricity is growing, re-

plying utility service is lower when monopoly exists than when competition is attempted." P. GARFIELD & W. LOVEJOY, *PUBLIC UTILITY ECONOMICS* 17 (1964) [hereinafter cited as *PUBLIC UTILITY ECONOMICS*]. Utilities have a heavy investment in fixed assets. These costs are constant and do not fluctuate with production. Average costs for utilities decrease when there is an increase in the number of customers per utility which competition would prevent. Therefore, a "regulated monopoly makes possible a fuller realization of the benefits of decreasing costs than could be achieved when more than one utility strives to serve the same market." *Id.* at 18. This rationale is weakened when the variable costs of utilities, such as the cost of the fuel, increases fast enough to comprise an increasingly larger fraction of total cost. At a certain point, competition in the utility industry may become an attractive alternative to protected monopolization.

20. Testimony of John O'Sullivan before House Subcommittee on Energy Development and Applications of the Committee on Science and Technology, 96th Cong., 2d Sess. (1980).

21. In a proceeding before the New York State Public Service Commission ("PSC") to determine the effect of rates on the development of cogeneration in New York, the Consolidated Edison Company ("Con Ed") has estimated that encouraged cogeneration might result in production of 22 million kilowatt hours of power by oil-fired generation which would otherwise be produced by non-oil-fired generation. *CONSOLIDATED EDISON COMPANY OF NEW YORK, INC., ENVIRONMENTAL ASSESSMENT OF COGENERATION IN NEW YORK CITY* 40-41 (1980) (prepared in connection with N.Y. PUB. SERV. COMM'N Case 27574) [hereinafter cited as *CON ED'S ENVIRONMENTAL ASSESSMENT*].

22. One factor is the region's anticipated growth in demand for power. Con Ed has forecast for itself an average growth at time of summer peak load from 6900 megawatts in 1979 to 7600 in 1990, an increase of only nine percent over 10 years. *REPORT OF MEMBER ELECTRIC SYSTEMS OF THE NEW YORK POWER POOL, LONG RANGE PLAN, 1980* vol. I, at 130. In contrast, the Western States Coordinating Council, which includes the states of Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Washington and Wyoming fore-

quiring expensive additions to utility generating capacity, the growth of cogeneration offers a substitute for the traditional generating station with added potential efficiency. In other areas, however, where demand is essentially constant, encouraged cogeneration may represent a loss of revenue to the utility with no commensurate savings through reduced need to build new generation facilities. This potentially adverse effect is exacerbated in areas where demand is relatively constant and a substantial portion of the existing generating capacity is oil-fired. Such areas have a great need to build non-oil-fired generating capacity which may be effectively blocked by the growth of cogeneration.

In addition to permitting theoretical increases in operating efficiency of energy production facilities, cogeneration permits decentralization of power generating facilities. Generating stations designed to produce only electricity have been built increasingly larger to take advantage of certain economies and efficiencies which are only available in plants that size. The size of these generating stations limits the available sites for construction because of the necessity of adequate cooling water and other environmental constraints. These requirements have frequently led to the construction of plants in remote locations requiring long transmission lines to carry the electricity to populated areas.²³

Construction of large central-station generating units often pose such serious environmental threats that intense public opposition ensues.²⁴ By contrast, cogeneration facilities would be smaller and less likely to cause alarm. The environmental impacts at each site would be limited and the required transmission facilities shorter. While central-station generating plants now being built range upward from 600 megawatts in output capacity, cogeneration plants

casts a peak load increase over a similar period of time of nearly 25%. U.S. DEP'T OF ENERGY, *ELECTRIC POWER MONTHLY*, Oct. 1980, at 36.

23. For example, the New York State Electric & Gas Corporation, whose service territory is scattered throughout central, northern and western New York, owns one-half of a proposed power plant to be located at the eastern end of Long Island, more than 200 miles from the center of its territory.

24. At times, local opposition has resulted in riots during construction. See Freedman, *40 Nuclear-Power Foes Arrested*, *Newsday*, Aug. 13, 1978, at 1; Kifner, *Hundreds Arrested in New Hampshire Atom Protest*, *N.Y. Times*, May 2, 1977, at A1, col. 2; Knight, *1,500 Repulsed at Seabrook Trying to Take Nuclear Site*, *N.Y. Times*, May 25, 1980, at A1, col. 2.

are in the .25 to 40 megawatts range.²⁵ Therefore, to the extent that expanded use of cogeneration will substitute for building traditional central-station generating plants, the encouragement of cogeneration will eliminate the negative environmental effects of a large power-generating station.

Encouragement of cogeneration is consistent with the philosophy of social theorists who call for the use of "appropriate" technologies for supplying energy.²⁶ Review of the social impacts of cogeneration, however, suggests that cogeneration will not develop into as romantic a method of energy supply as the "appropriate" technology theorists seek.²⁷

Moreover, it is not clear whether unacceptable adverse environ-

25. *Con Edison On-Site Cogeneration*, N.Y. PUB. SERV. COMM'N Case 27574 (filed June 22, 1979) Testimony of Michael Hobson at 1128 (Ex. No. 48, A Report on Cogeneration Plant Costs and Performance by Acres America, Inc., prepared for The Cogeneration Task Force of the New York Power Pool (Feb. 1978)).

26. Lovins, *Energy Strategy: The Road Not Taken*, FOREIGN AFFAIRS, Oct. 1976, at 65, 87-92. Use of "appropriate" technology seeks to match the quality of energy produced to the particular need for energy. When a heating system requires hot water, for example, it is wasteful to produce high-pressure/high-temperature steam. Widespread application of "appropriate" energy technology theory will result in the supplying of some energy needs with "lower quality" energy, produced by lower technology methods than otherwise. Widespread application of the appropriate technological principles will also result in fewer — if any — central generating stations being constructed. Energy production facilities would be smaller with simpler technologies and would be dispersed throughout a region. Such a dispersal of the energy supply function would eliminate the concentration of adverse impacts, by spreading these impacts according to the demand for power.

Proponents of decentralization of power supply claim that in addition to reducing the economic and environmental cost of the energy supply, use of appropriate technology will increase planning flexibility by decreasing capital investments and technical complexity and enhance the quality of life by favoring the development of smaller, more human-scale enterprises. *Id.* at 91-94.

The hopes of these social theorists seem to be overstated. There is a pervasive tendency to adopt the most efficient methods economically available. Such motives appear likely to encourage the cogenerator to apply economies of scale to a cogeneration facility in the same manner as in a traditional power plant. The same factors that favor the large scale in designing electricity-only generating stations will similarly militate toward large scale cogeneration facilities. To the extent that there is a trend to increase the size of cogeneration facilities, it will diminish the social dividends that some expect from cogeneration.

27. Excess energy, particularly the non-electric energy that is not consumed by the cogenerator, will be sold to others. To the extent that the supply of such excess energy grows, it seems reasonable to expect that cogenerators will establish marketing directorates and possibly limit the distance different consumers can be from the generator. Thus, an industrial concentration, based on cogeneration, may well result, as opposed to a widely-dispersed set of small generators.

mental impacts will result from encouraged use of cogeneration. The increased use of cogeneration will encourage a decentralized energy system in place of a system based on a few large generating stations. This decentralized system spreads the environmental impacts arising from power production.

The current economics of energy production suggest that many of the existing and expected cogeneration facilities in some regions will be fueled with petroleum-based fuels. In New York, it is expected that most new cogeneration facilities will use diesel engines.²⁸ On a nationwide basis, more than half of the industrial cogeneration plants that do not use waste by-products as a fuel are expected to use coal.²⁹ Both coal and petroleum-based fuels will produce air emissions with adverse environmental impacts, resulting in negative environmental consequences through the encouraged use of cogeneration.³⁰ Because of the nature and size of cogeneration facilities, it is unlikely that the most sophisticated emission control equipment will be used in cogeneration facilities.³¹ Therefore, emissions on a per-unit of energy basis may rise with cogeneration.

An obvious change that will result from encouraged development of cogeneration is the nature of the transmission network. The transmission network permits power to flow from one area to another to accommodate changing conditions of demand and supply. Existing utility networks cannot precisely balance the placement of generation facilities with the location of the customers who demand power. The necessity to locate hydro-electric facilities where topography permits, the need to separate nuclear facilities from high concentrations of population, and the importance of an adequate supply of cooling water for larger plants are all relevant fac-

28. Con Ed On-Site Cogeneration, N.Y. PUB. SERV. COMM'N Case 27574, (testimony of William A. Harkins at 653).

29. Edelman & Bongiorno, *supra* note 4, at 38. Waste by-products refer to materials such as wood chips in the pulp and paper industries or unmarketable petroleum by-products which are burned for their energy value.

30. Questions of the appropriateness of geographic dispersion of energy-producing facilities and the absolute increase in emissions arising from a shift from large central-station generators to smaller, less regulated cogeneration facilities were not discussed in FERC's environmental review.

31. Testimony of Bertram Schwartz, Senior Vice President, Consolidated Edison Co., Con Edison On-Site Generation, N.Y. Pub. Serv. Comm'n Case 27574 at 1328, 1335 (Jan. 24, 1980) [hereinafter cited as Testimony of Schwartz].

tors to be weighed in the placement of generation facilities. Furthermore, transmission links between regions are required because customer demands are uneven throughout a year or even a day. Moreover, the reliability of generating units is such that back-up units are required. A group of generators tied together by a transmission network, therefore, permits adequate reserve generating capacity to be built on a regionwide basis, bridging artificial limitations imposed by utility service territory boundaries, political boundaries or other restrictions. The location of generation units closer to customer demand reduces the need for transmission facilities. Although encouragement of cogeneration may lead to more economical electricity by enabling utilities to avoid the capital cost of new transmission lines and the losses of electricity caused by resistance in the lines, it may also lead to a loss of system operating advantages resulting from the ample supply of transmission capacity.

III. Legislative and Administrative Response to the Promise of Cogeneration

A. Enactment of PURPA Sections 201 and 210

Section 210³² indicates Congress' intention to encourage the expansion of cogeneration based on the belief that it will save energy. As do other sections in PURPA, section 210 represents a compromise between two sharply different legislative views of the appropriate exercise of federal power in the regulation of the generation and distribution of electricity.³³ The Senate sought to establish federal regulatory guidelines prescribing general policies for the states to encourage cogeneration.³⁴ Section 210 as enacted, however, adopted the House's more stringent proposal that requires states and utilities to follow federally-developed rules.³⁵ Congressional enthusiasm for cogeneration was based on the expectation of

32. 16 U.S.C. § 824a-3 (Supp. III 1979).

33. See Toll, *supra* note 8, at 51-53. See generally Note, *The Legislative Evolution of Title I of the Public Utility Regulatory Policies Act of 1978: The Study of Compromise*, 5 J. OF CORP. LAW 105 (1979) [hereinafter cited as *Legislative Evolution*].

34. The Senate proposal is contained in S. 2114, 95th Cong., 2d Sess. (1978).

35. H.R. Conf. Rep. No. 1750, 95th Cong., 2d Sess. 97 (1978), reprinted in [1978] U.S. CODE CONG. & AD. NEWS 7797, 7831 [hereinafter cited as Conf. Report]. See generally *Legislative Evolution*, *supra* note 33.

an improvement in efficiency through increased use of cogeneration. Congress' consideration of PURPA reflects a strong commitment to reduce the United States' use of oil and oil-derived products through improved efficiency in the use of limited energy resources.³⁶

Congress' manifest interest in encouraging conservation of resources through the growth of cogeneration is reflected in section 210 by the provision's emphasis on two crucial economic problems for cogenerators: first, marketing surplus electric power produced by the cogenerator and, second, obtaining at a reasonable and non-discriminatory rate, back-up or stand-by power. These problems arise because practical technology does not now exist to store electric energy in large quantities.³⁷ Any electric generation and distribution system must be designed to meet periodic fluctuations in the demand for electricity. A utility must secure generation sources, either through construction of its own generation facilities or by purchases from other utilities, sufficient to meet the utility's highest demand. Cogenerators, like utilities, may have fluctuations in demand for electricity. When the cogenerator's demand for electricity drops below the level of power produced in conjunction with the production of industrial process steam, the cogenerator has excess electricity. A cogenerator may also purposely design its own facilities with built-in, surplus electric generation capacity to act as a back-up against breakdowns.

Addressing the first economic problem, the need for a market for cogenerators' excess power, section 210 requires utilities, pursuant to FERC's rulemaking and state regulatory authorities' rules, to purchase from cogenerators excess generation at a reasonable price.³⁸ Section 210(b) provides that the electric utility in whose service territory the cogenerator is located may be required to purchase surplus power from the cogenerator, provided the rate 1)

36. H.R. Rep. No. 543, 95th Cong., 2d Sess. 3-10 (1978), *reprinted in* [1978] U.S. CODE CONG. & AD. NEWS 7673-79.

37. Batteries now available cannot economically be constructed to store large amounts of electric energy. Moreover, most batteries have a relatively short life in terms of charge-discharge cycles. It should be noted that electricity can be stored as mechanical energy such as in flywheels or pumped storage projects in which water is pumped uphill to act as hydroelectric power. *Putting Baseload to Work on the Night Shift*, ELECTRIC POWER RESEARCH INST., Apr., 1980, at 6-9.

38. 16 U.S.C. § 824a-3(b) (Supp. III 1979).

is just and reasonable to the utility's other consumers and in the public interest, 2) does not discriminate against the cogenerator and 3) does not exceed the incremental cost to the electric utility of alternative electric energy.³⁹ The application of these principles to the determination of actual rates was left to FERC and, ultimately, to the state regulatory authorities. Although delegation of that responsibility to the states permits local conditions to be taken into account, it also effectively sidesteps the necessity of solving at the federal level the difficult rate-setting problems presented by the statute. Congress' instructions to FERC regarding rates for utility purchases are vague and non-specific. No guidance whatsoever is given concerning the terms "just and reasonable" or "discriminate."⁴⁰ "Incremental cost of alternative energy" is defined in section 210(d) as the cost to a purchasing utility of the electric energy which such utility would otherwise generate or purchase from another source. This cost is often referred to as "avoided cost." This definition of "avoided cost" hardly solves the complex regulatory problems of formulating a working definition.⁴¹ In this provision regarding rates for utility purchases as in many others, the sole philosophy reflected in section 210 was to encourage cogeneration and to reject any procedures contrary to that policy.

In determining the costs avoided by a cogenerator's sales, it is also necessary to distinguish between the various elements which compose a utility's rate to its customers. Utilities traditionally distinguish between fixed costs, such as the capital cost of constructing a generating facility, and the operating cost of running the gen-

39. *Id.*

40. The Conference Report does indicate that the phrase "just and reasonable to the electric consumers of the utility" is intended to protect the interests of the consumer in receiving electricity from cogenerators at equitable rates but that cogenerators shall not have to undergo the searching examinations traditionally conducted by utility regulatory commissions with respect to the same phrase regarding utility rates. Conf. Report, *supra* note 35, at 97-98.

41. This component of the rates cogenerators would pay utilities is intended to be looked at in a broad sense. Such a conceptual view of alternative energy, while acceptable in the abstract, is difficult to apply. For example, the time frame in which to approximate avoided energy costs for determining the price to pay cogenerators is not necessarily instantaneous, but can cover avoided costs that occur over time. The Conference Report does not suggest how to accomplish the difficult accounting process of calculating "incremental costs" when the phrase is given a unique interpretation, peculiar to § 210.

erating facility. Utilities charge for "capacity costs," which parallel the fixed costs, and for "energy costs," which usually reflect operating costs. Rates usually have two components, one reflecting each type of cost. Distinguishing between these two types of costs in calculating avoided costs is exceedingly difficult. Section 210 is silent on the issue, except for the general policy of encouraging cogeneration.

The second economic problem addressed by section 210 is the need of cogenerators for access to back-up power. To allow cogenerators to survive economically, back-up power must be available at a rate low enough so that the cogenerator will not have to maintain both its own power system as well as that of the utility. With respect to such sales of back-up power, section 210 provides that the rate for such sales: 1) "shall be just and reasonable to the electric consumers of the electric utility and in the public interest," and 2) "shall not discriminate against qualifying cogenerators. . . ."42 The "just and reasonable" requirement, when it applies to the sale of electricity by utilities to cogenerators as backup power, is intended to be quite different from the meaning in the case where a utility is buying power from the cogenerator. The Conference Report reasoned:

Here the phrase "just and reasonable" is intended to refer to traditional utility ratemaking concepts. The conferees do not intend that the cogenerator . . . pay any more or any less than is otherwise just and reasonable in terms of the utility receiving the reasonable rate of return for providing service to those kinds of users.⁴³

The clear intent of Congress to encourage cogeneration is demonstrated by the different definitions given to the phrase "just and reasonable rates" depending on whether the utility is buying electricity from a cogenerator or selling electricity to one.⁴⁴

A third important concern of potential cogenerators is the possibility that they might become subject to federal or state utility regulation if they enter into sale arrangements with utilities. If sold to

42. 16 U.S.C. § 824a-3(c) (Supp. III 1979).

43. Conf. Report, *supra* note 35, at 98.

44. Although the Conference Report notes that these provisions are not intended to require the utility rate payers to subsidize cogenerators, *id.*, it is clear that any economic benefit available from the anticipated improvements in efficiency resulting from cogeneration is being allocated to the cogenerators.

a utility, electricity produced by a cogenerator would pass in interstate commerce and would be a sale for resale.⁴⁵ Therefore, cogenerators connected to a utility's transmission network might become subject to the Federal Power Act⁴⁶ and other federal and state utility regulating statutes in the absence of a special exemption. Section 210(e)⁴⁷ requires FERC to prescribe rules which exempt cogenerators from the Federal Power Act, the Public Utility Holding Company Act⁴⁸ and state law and regulations regarding utility rates or organization. These exemption provisions in section 210(e) are viewed as crucial to the future of cogeneration.⁴⁹

Section 201⁵⁰ of PURPA is similarly important in defining the types of facilities which will qualify as cogenerators. Not all facilities which can technically meet a definition of cogeneration facilities produce energy savings sufficient to merit the encouragement called for in section 210. Section 201 requires FERC to determine the minimum size, fuel use and fuel efficiency for qualifying cogenerators.⁵¹ In addition, section 201 reflects a policy to limit utilities from going into the cogeneration business.⁵²

B. FERC Response to Sections 201 and 210

FERC commenced two rulemaking proceedings to establish detailed regulations pursuant to Congress' stated policy of encouraging cogeneration. These proceedings resulted in the publication of regulations in early 1980. While many aspects of these cogeneration regulations raise issues for consideration, certain provisions

45. See *Federal Power Comm'n v. Southern Cal. Edison Co.*, 376 U.S. 205, 207 (1964); *City of Oglesby v. Federal Energy Reg. Comm'n*, 610 F.2d 897, 903 (D.C. Cir. 1980).

46. See Federal Power Act, 16 U.S.C. §§ 791-828(c) (1976).

47. 16 U.S.C. § 824a-3(e) (Supp. III 1979).

48. Public Utility Holding Company Act, 15 U.S.C. § 79 (1976).

49. Although PURPA permits exemption of cogenerators from certain specified federal laws and state statutes, both the constitutionality and wisdom of this provision have been called into question. See *Special Committee on Energy Law, Report*, 10 ABA NATURAL RESOURCES LAW SECTION 655, 717-19 (1978). See also Toll, *supra* note 8, at 51-53. It appears likely, however, that the well-settled broad reach of the commerce clause will support the exercise of congressional power. See note 8 *supra*.

50. 16 U.S.C. § 796(17)-(22) (Supp. III 1979).

51. *Id.*

52. Conf. Report, *supra* note 35, at 89-90. An owner of a qualifying cogeneration facility must be a person not primarily engaged in the generation or sale of electric power. Electric utilities, however, are free to participate in an entity which owns cogeneration facilities. 16 U.S.C. § 796(18)(B)(ii) (Supp. III 1979).

highlight the substantial problems in regulation that result from Congress' enactment of section 210. In particular, provisions meriting discussion include those concerning first, qualifying facilities standards and requirements, second, establishing appropriate rates for utility sales to cogenerators, and third, establishing rates for utility purchases from cogenerators.

1. *Identification of Qualifying Cogeneration Facilities*

In its cogeneration regulations, FERC established the minimum requirements and procedures for a qualifying cogeneration facility and appropriate procedures for obtaining qualifying status.⁵³ Possibly the most difficult decision FERC made regarding qualification of facilities under the regulations was how to treat cogenerators that use oil or gas. During its consideration of the proposed regulations, FERC received numerous comments recommending that oil and natural-gas-fired cogeneration facilities not be considered eligible for qualifying status.⁵⁴ FERC rejected these comments and granted those facilities eligibility for qualifying status based on first, its reading of the legislative history of PURPA,⁵⁵ second, the existence of the 1978 Power Plant and Industrial Fuel Use Act,⁵⁶ which gives the Department of Energy power to restrict the use of gas or oil in cogeneration facilities, thus rendering FERC prohibition unnecessary, and third, the requirement in the qualifying status regulations that cogeneration facilities meet minimum efficiency standards.⁵⁷ Underlying this decision is the perception that a substantial portion of available cogeneration facilities, in at least some regions, involve the use of oil or gas as a fuel. Severe restrictions on the benefits of the cogeneration regulations would have the effect of severely limiting the impact of section 210, thus

53. An interesting aspect of the qualification process, which distinguished the cogeneration regulations from most other federal regulatory efforts, is that potential cogenerators may determine their qualification status as a cogenerator independent of FERC; it is unnecessary even to apply to FERC for designation as a qualifying cogenerator, although one may do so. See 18 C.F.R. § 292.207(a) (1980) (a cogenerator which meets the qualification criteria is a qualifying facility); 18 C.F.R. § 292.207(b) (1980) (optional procedure for obtaining FERC certification of qualifying status).

54. FERC Statement of Considerations, 45 Fed. Reg. 17,963 (1980).

55. See note 2 *supra*.

56. Pub. L. No. 95-620, 92 Stat. 3289 (codified in scattered sections of 15, 42, 45, 49 U.S.C. (Supp. III 1979)).

57. 18 C.F.R. § 292.205 (1980).

impairing the anticipated improvement in the efficiency of existing oil and gas-fueled facilities.⁵⁸

The promulgation of efficiency standards presented FERC with a number of difficult regulatory problems. Unlike other administrative problems which FERC delegated to the states,⁵⁹ efficiency standards go to the heart of the policy of encouraged cogeneration and require centralized consideration. Efficiency of fuel use is the crucial barometer distinguishing bona fide cogenerators from facilities which create only minor efficiency improvements. In addition, FERC relied on efficiency standards as one of its reasons for extending qualified cogenerator status to facilities which use oil or gas.⁶⁰

FERC initially approached the problem by proposing a schedule of minimum heat and electricity outputs from facilities,⁶¹ thus establishing a threshold test of bona fide operation as a cogenerator. During the rulemaking proceeding, however, FERC was persuaded to drop its initial regulatory requirements of establishing minimum amounts of useful heat and power outputs levels. Instead, it provided that a cogenerating facility qualifies for the special regulatory treatment provided by the cogeneration regulations if it meets certain operating⁶² and efficiency⁶³ standards.⁶⁴

FERC required that five percent of a facility's total energy must be in the form of useful thermal energy. This output standard is not particularly restrictive because it serves only to ensure that a

58. FERC made one exception to qualifying status, however, by providing that diesel cogeneration facilities will not be considered qualifying facilities, pending a complete environmental review. Diesel facilities deserve special environmental review because they produce fine particles and gaseous emissions which present serious health risks. See notes 110-11 *infra*.

59. See, e.g., notes 39-40 *supra* and accompanying text.

60. FERC Statement of Considerations, 45 Fed. Reg. 17,959, 17,963 (1980).

61. *Id.* at 17,966.

62. 18 C.F.R. § 292.206 (1980).

63. 18 C.F.R. § 292.205(a)(1). This provision applies only to "topping cycle" facilities, in which the energy is used first to generate electricity. No bona fide requirement is needed for a "bottoming cycle" facility, in which the use of steam to generate electricity follows its industrial use. See 45 Fed. Reg. 17,959, 17,966-67 (1980).

64. In addition to the technology-related requirements, FERC also imposed an ownership test. 18 C.F.R. § 292.206(b) (1980). The ownership test effectively limits the share that an electric utility can own. A cogenerating facility will not be eligible for qualifying status if more than a 50% equity interest in the facility is held by an electric utility, public-utility holding company or any combination thereof.

facility is actually working as a cogeneration facility.

More restrictive efficiency standards were established for facilities using natural gas or oil.⁶⁵ Although the proposed efficiency standards covered a broader range of energy sources, the final rule was narrowed to cover only natural gas and oil-fired facilities.⁶⁶ This standard as finally published was essentially a compromise, but it provides some assurance that the facilities receiving qualifying status are bona fide cogenerators and that the continued use of oil and gas as fuels for cogenerators will produce efficiencies at least over the long term.

One of the issues which created substantial debate prior to the issuance of the final qualification requirements for cogeneration facilities was whether minimum reliability standards should be included in the definition of qualifying facilities. The reliability of any generating facility, including cogeneration, is a crucial factor in assessing its value. This is especially important under section 210 because customers of a utility are entitled to be protected from subsidizing cogenerators.⁶⁷ The possibility of such a subsidy might arise if expensive interconnection arrangements are made which then could not be paid for by an unreliable cogenerator.

The language of section 210 suggests that minimum reliability standards are required. FERC, however, decided that the issue could be resolved through appropriate price mechanisms and did not establish minimum reliability standards. FERC decided against reliability standards because of its awareness of the enormous variety in the range of cogeneration technologies and circumstances and that the policy of encouraging cogeneration would be best served by flexibility. Instead, FERC called for the rates to be charged in sale and purchase transactions between utilities and

65. Because of the variety of cogeneration technologies and the breadth of the theoretical approaches to cogeneration, FERC found it difficult to set a single efficiency standard that promoted cogeneration equitably across the range of technologies; it was necessary to look separately at each of the major cogeneration technologies. For example, in the "topping cycle" type of cogeneration facilities, in which the steam is first used to generate electricity and then used as useful thermal energy, the regulations provide that in all new topping-cycle facilities useful output of electric power energy plus one-half the useful thermal energy must equal no less than 42.5% of the energy input to the facility from natural gas or oil. 18 C.F.R. § 292.205 (a)(2)(i) (1980).

66. FERC Statement of Considerations, 45 Fed. Reg. 17,959, 17,969 (1980).

67. See 16 U.S.C. § 824a-3(c) (Supp. III 1979).

cogenerators to provide for a range of reliability,⁶⁸ with the proviso that in each instance the price will have to be calculated so that it is consistent with the other provisions of section 210,⁶⁹ particularly the principle that utility customers not subsidize cogenerators.

The essential requirement for cogenerators seeking to sell and purchase power to and from a utility is that the cogeneration facility be connected electrically to the utility system. While section 210 requires utilities to buy and sell from cogenerators, it does not explicitly provide authority to FERC to order any needed interconnection. Interconnection of customers or generators to a utility system is covered generally by PURPA sections 202⁷⁰ and 204⁷¹ which expressly refer to cogenerators. Under sections 202 and 204 a cogenerator would have to go through an expensive and extended proceeding simply to obtain interconnection. In enacting section 210, Congress exercised the judgment that cogeneration would optimize the efficient use of resources. In drafting the cogeneration regulations, FERC rejected the argument that there is no authority granted FERC in section 210 to require interconnection on the premise that taking that path would not further Congress' desire to encourage cogeneration.⁷² Following Congress' direction, FERC determined that the power to require interconnection is inherent in section 210. While thus simplifying interconnection procedures, the cogeneration regulations do protect utility customers from subsidizing cogenerators by requiring that they pay any costs associated with the interconnection.

68. 18 C.F.R. § 292.101(b)(8)-(11) (1980). See 18 C.F.R. §§ 292.304(e)(2)(ii) (1980) (purchase rate factors), 292.305(b) (sales rate reliability categories). See also FERC Staff Paper, 44 Fed. Reg. 38,867. "Our analysis thus leads us to the conclusion that every incidence of a [qualifying facility's] reliability (or unreliability) can be accounted for through prices."

69. 16 U.S.C. § 824a-3(a) (Supp. III 1979).

70. *Id.* § 824i (Supp. III 1979). This section gives FERC the authority, *inter alia*, to issue an order requiring the physical connection of any cogeneration facility and any electric facility.

71. *Id.* § 824k (Supp. III 1979). Pursuant to this section, no order may issue under 16 U.S.C. § 824i (Supp. III 1979), unless it is determined by FERC that the parties will not suffer economic loss or undue burden and that the electric utilities involved will have neither their reliability nor ability to render adequate services to their customers impaired.

72. FERC Statement of Considerations, 45 Fed. Reg. 12,214, 12,220-12,221 (1980). Section 210 explicitly empowers FERC to prescribe such rules "as it determines necessary to encourage cogeneration." 16 U.S.C. § 824a-3 (Supp. III 1979). In requiring interconnection, FERC determined that it was a necessary element of successful development of generation.

2. Utility Sales to Cogenerators

The cogeneration regulations reflect the requirement of section 210(c) that utilities provide backup service to cogenerators at rates which are 1) just and reasonable, 2) in the public interest and 3) do not discriminate against cogenerators.⁷³ Although the rates must be "just and reasonable,"⁷⁴ the regulations also indicate that the rates be formulated based on traditional ratemaking concepts, which reflect the utility's cost of service.⁷⁵

This regulatory determination of rate-setting leaves open a number of issues concerning the formulation of appropriate rates for utility sales to cogenerators. First, as part of its general policy of encouraging cogeneration, Congress has allowed cogenerators to arbitrage, or sell excess power at a high rate while buying back-up needs at a low rate. Pursuant to section 210, sales by a utility to a

73. 16 U.S.C. § 824a-3(c) (Supp. III 1979). The utility's obligation to sell power to cogenerators covers "capacity" and "energy." Capacity refers to the utility's obligation to sell to the cogenerator a right to call on the utility to supply a known amount of generating capacity. Energy refers to actual electric energy when and if it is taken by the cogenerator. These two quite different utility services have very different values. Setting prices for each involves quite different considerations.

74. 18 C.F.R. § 292.305(a)(1) (1980).

75. 18 C.F.R. § 292.305(a)(2) (1980). See FERC Statement of Considerations, 45 Fed. Reg. 12,214, 12,228 (1980). In essence, this requires the utility to treat the cogenerator as a typical customer and sell to it at rates appropriate to the level of service required by the customer. For example, an industrial cogenerator would be able to purchase power at the same rate as a non-generating industrial customer. Such rates are system-wide costs, not marginal costs unless the system-wide rates are otherwise required to be based on marginal costs.

Other problems that arise in determining the appropriate rate include: first, the reliability of the cogeneration facility equipment; second, the extent to which a cogenerator will call on the utility to make up deficiencies; third, the coincidence between the cogenerators' calls for back-up service and the utility's peak demands; and, fourth, the difference in rates for sales of capacity and energy. Each question poses difficult regulatory issues. The cogeneration regulations, however, do not even attempt to resolve completely any of these issues; they are left to the state utility regulatory agencies which must implement PURPA. The cogeneration regulations do provide some indication of federal policy with respect to two issues. The FERC policy regarding reliability appears to be to allow utilities to establish different rates for sales to cogenerators, depending on the reliability of the cogenerator. The level of reliability in each case will have to be decided on the basis of the particular facts because the degree to which the cogenerator will call on the utility for back-up power will vary.

In the case of coincidence of cogenerators' demands with the system peak demand, 18 C.F.R. § 292.305(c)(1) (1980) prevents utilities from asserting, absent actual data, that the cogenerators' calls for back-up service will come simultaneously or at the time of the utility's peak demand. This provision does allow a utility to establish its coincidence claim if supported by sufficient facts.

cogenerator must be made at rates which are just and reasonable and which do not discriminate against cogenerators.⁷⁶ This rate reflects the utility's average costs, or such other costs mandated by state regulatory agencies as an aspect of rate-setting policy generally and will prevail unless the utility can provide cost-of-service data to establish otherwise.⁷⁷ In contrast, the rate at which utilities must purchase electricity from cogenerators is based on the utility's avoided cost.⁷⁸ In an era of rising energy costs, the avoided costs will always be the highest. These different rates for sales and purchases compel utilities to sell at a low rate and buy at a high rate. The differences in the two rates permit interconnected cogenerators to profit simply by selling their output at the high, avoided cost rate, and buying their requirements at the utility's lower average cost.⁷⁹ This difference in rates, while financially injurious to utilities, is justifiable as meeting PURPA's general policy of encouraging cogeneration.

It can be argued that if viewed separately, both the selling rate and the buying rate are appropriately non-discriminatory to the utility's non-cogenerating customers. To equate the utility's sales rate to its average cost reflects the policy of treating cogenerators as other customers. Similarly, purchases by the utility at the higher, avoided cost rate do not penalize the utility's other customers because the utility would have had to incur this cost anyway if the cogenerator's demand for power had to be satisfied through traditional means. If each rate is analyzed separately, there will be no discrimination against the utility's other customers. When the two are taken together, leading to the arbitrage possibility, the situation is equally non-discriminatory; it is simply a matter of the entire savings arising from the fact of cogeneration going to the cogenerator.

A second significant issue concerns the nature of the required interconnection between utilities and cogenerators. This issue

76. 16 U.S.C. § 824a-3(c) (Supp. III 1979).

77. 18 C.F.R. § 292.305 (1980). See FERC Statement of Considerations, 45 Fed. Reg. 12,214, 12,228 (1980).

78. 18 C.F.R. § 292.304(b)(2) (1980).

79. Cogenerators which are connected to a utility system and operate as an integral part of that system can sell all their output and buy all their requirements in this fashion. This relationship is commonly described as operating in parallel.

prompted substantial comment during the rulemaking proceedings leading to the cogeneration regulations. It is possible as a matter of electrical technology to operate a cogeneration facility so that it is either integrated with or independent of a utility system. Integrated operation is commonly referred to as operating electrically "in parallel" with the utility system.⁸⁰

In the past, utilities often refused to interconnect with cogenerators on an "in parallel" basis. Interconnection and operation of the cogenerating facility in parallel with the utility poses extra costs to the utility, possible interference with the utility system and safety problems. Although the purported basis for this refusal was to avoid system operating problems, it more likely was a tactical aspect of utility hostility to cogenerators.⁸¹

FERC resolved these problems by requiring utilities to permit interconnection.⁸² FERC determined that certain problems cited by the utilities in regard to interconnection, including those mentioned above, were susceptible to resolution by technological means and that, therefore, the only true question was one of cost. Under the cogeneration regulations, the cogenerator has the obligation of paying these costs, lest the utility's customers be forced to subsidize the cogenerator.⁸³ With respect to large cogenerator customers, costs of interconnection are often established by negotiation between the cogenerator and the utility. In the case of small cogenerator customers, when case-by-case negotiations would be unlikely, it may be necessary to allow the utility to set a minimum charge that must be paid irrespective of the actual amount of power drawn, to ensure that the utility will recover the cost of interconnection.⁸⁴

Finally, the question remains whether the cogenerators should be considered a distinct class of customers for purposes of setting a rate for utility sales. The universal practice in setting utility

80. Cogeneration facilities operated in parallel become an integral part of the utility system so that a cogenerator's load can be instantaneously served from the utility system.

81. See note 12 *supra*.

82. 18 C.F.R. § 292.303(c) (1980). The section provides "Each qualifying facility shall be obligated to pay any interconnection costs which the State regulatory authority . . . or non-regulated electric utility may assess against the qualifying facility on a nondiscriminatory basis with respect to other customers with similar load characteristics."

83. *Id.* See FERC Statement of Considerations, 45 Fed. Reg. 12,214, 12,229-30 (1980).

84. *Id.* at 12,230.

rates is to classify customers according to size of demand for electricity and the cost of providing that service.⁸⁵ The decision whether to consider cogenerators as a single class for rate-setting purposes raises a number of questions. If cogenerators were considered a separate class, they might become a target — favorable or unfavorable — of an allocation of costs of service to particular service classes.⁸⁶

The question of assigning cogenerators to a separate class of customers may well turn on the specific nature of services requested of the utility.⁸⁷ The nature of the services required influences the utility's cost of providing power. Unfortunately, as a new type of consumer, cogenerators may require months or even years following transition to cogenerator status to know the precise level of service required. FERC's response to this problem was to require the utility to provide certain specified levels of service on request of the cogenerator.⁸⁸ If, however, a request from a cogenerator impairs a utility's ability to render adequate service or places an undue burden on a utility, the proper regulatory agency may waive the rule giving the cogenerators power to select the level of service it desires to purchase.⁸⁹

Although the cogeneration regulations governing utility sales of back-up power reflect the policy explicit in section 210 of encouraging the development of cogeneration, a number of particular regulatory decisions are left to the states to regulate and to cogenerators and utilities for development on a case-by-case basis. This policy demonstrates a sensible restraint on the part of the federal agency as to its ability to prescribe adequate rules for complex and varied sets of relationships.

85. PUBLIC UTILITY ECONOMICS, *supra* note 19, at 135-38.

86. For a discussion of the potential for allocating costs because of non-economic policy considerations, see *In re Lifeline Concept & Electric Rate Structures*, 18 N.Y. PUB. SERV. COMM'N DEC. 1,223 (1978). Discrimination by utilities, concerning a cogenerator's loss of any interclass or intraclass subsidies to which it otherwise would be entitled, is not permitted. FERC Statement of Considerations, 45 Fed. Reg. 12,214, 12,228 (1980).

87. See FERC Staff Paper, 44 Fed. Reg. 38,863, 38,868 (1979).

88. 18 C.F.R. § 292.305(b) (1980). See FERC Statement of Considerations, 45 Fed. Reg. 12,214, 12,228-29 (1980).

89. 18 C.F.R. § 292.305(b)(2) (1980).

3. *Utility Purchases from Cogenerators*

The FERC regulations pertaining to purchases by utilities of cogenerators' excess power state that the rates for such purchases should be just and reasonable to the utility's customers, not discriminatory against cogenerators and not in excess of the incremental cost to the electric utility of alternative energy.⁹⁰ The FERC regulations leave open three difficult regulatory issues: first, the precise method for establishing the rate applicable to such purchases; second, the extent of the utility obligation to reimburse a cogenerator for capital costs; and third, how a cogenerator should avoid discriminatory situations.

First, in establishing the rates for utility purchases from cogenerators, the interpretation of the term "incremental cost" is crucial. FERC has interpreted the term in a way that favors cogenerators. Section 210(b) provides that "just and reasonable rates" could never exceed the "incremental cost of alternative energy." Although the phrase "just and reasonable" rate, as applied to a utility's sales, requires an analysis of the cost of providing the service, in the case of a utility purchasing surplus power from a cogenerator, FERC determined that a just and reasonable rate for the utility's customers would be to pay the cogenerator the full cost of alternative, avoided utility generation.⁹¹ This interpretation removed the possibility that the price of cogenerators' power would be limited to their own cost of providing the service.

The disposition of any savings produced by requiring utilities to purchase the lower cost excess generation of cogenerators was a subject of intense interest in the period of comment on the proposed cogeneration regulations. Generally, when two utilities cooperate on an exchange of power that saves one of the utilities money, they will exchange the power on a "split-the-savings" ba-

90. 18 C.F.R. § 292.304 (1980). A theoretical problem inherent in the encouragement of cogeneration is the confusion of policy with results. The basic philosophy of the cogeneration regulations is to allow the economic marketplace to control the mixture of generating type plants. This theory is threatened, however, by the fact that the rates for utility purchases of a cogenerator's power, set high to encourage cogeneration, are themselves influencing the determination of persons considering a switch to cogeneration. While the generous rates are set to persuade persons to use cogeneration, the high purchase rates undercut the independence of the marketplace theory. The encouragement-level rates thus become something of a self-fulfilling prophecy.

91. 18 C.F.R. § 292.304(a)(2) (1980).

sis.⁹² If cogenerators are treated as simply another utility, the practice of splitting the savings, as in an inter-utility transaction, would probably be followed. The cost avoided by the utility by purchasing less expensive power more economically than it could produce it is split between the seller and the buyer. It was suggested to FERC that even if it were not to permit an equal sharing of the cost savings, the purchasing utility's customers ought to benefit in some manner from the purchase by gaining a percentage of the savings.⁹³ FERC rejected this notion and determined that all of the savings should be allocated to the cogenerator in order to comply with Congress' intent to encourage cogeneration. Implicit in that intent, is FERC's belief that electric consumers will benefit in the long run by the increased efficiency resulting from cogeneration.

In avoiding the "split-the-savings" approach, FERC was also concerned that that approach might require cogenerators to undertake a cost-of-service analysis. FERC's final decision to allow all of the savings to go to the cogenerators frees them from the burden of maintaining detailed records, like utilities, to establish the cost of service.⁹⁴

FERC's statement of consideration for the cogeneration regulations indicated that its thinking concerning rates based on avoided costs is evolving. Determination of the avoided cost can be very difficult. A utility's avoided costs are not just the marginal operating costs that are avoided by a purchase of power from a cogenerator. If a utility can cut back on its need to construct new power

92. FERC Statement of Considerations, 45 Fed. Reg. 12,214, 12,222 (1980).

93. *Id.*

94. *Id.* The cogeneration regulations respond to these problems by giving a great deal of discretion to the states in applying the basic standards for setting rates. The states, therefore, are left flexibility for experimentation and accommodation of special circumstances with regard to rates for utility purchases. Therefore, to the extent that a method of calculating the value of capacity reasonably accounts for the utility's avoided costs and does not fail to encourage cogeneration, it will be considered to satisfactorily implement the cogeneration regulations. This simple prescription for solving difficult regulatory problems hardly seems calculated to produce equitable results. FERC has essentially transferred to the states a series of regulatory problems it found too difficult to solve at the federal level. There is no assurance that the states will be better able to solve these matters than FERC. The complexity and potential for administrative and regulatory arbitrariness in the determination of avoided costs in the utility purchase situation seem to be an aspect of the PURPA-inspired policy of encouraging cogeneration that is less than satisfactory.

plants or to buy capacity from other utilities, avoided costs include the capital costs thus saved or deferred. Calculation of these deferred capital costs is not easy, however. It would require many existing utility customers to convert to cogeneration in order to delay building one large traditional generating station. While the last customer to convert to cogeneration might argue that it alone caused the deferral of construction and should therefore receive the entire benefit of the utility's savings, this is clearly inequitable. Alternatively, allocating the avoided capital cost to all the participating cogenerators would be an administrative nightmare.

The second issue is the extent of the utility's obligation to reimburse a cogenerator for capital costs. Congress' intent in enacting section 210 was clearly based on the assumption that encouragement of cogeneration will lead to more efficient use of energy and reduced demand for power produced by electric utilities. The Conference Report reflects this policy in its expectation that cogeneration will replace power which the utility would otherwise have had to generate itself.⁹⁵ To maximize the effects of this policy, this replacement must involve not only intermittent cogeneration sales of excess energy but also reliable sales of firm or contracted power to the utility so that the utility may rely on the cogenerator as a part of its capacity.⁹⁶

Recognizing this need, FERC required the rates for utility purchases to reflect the capacity availability of cogenerators.⁹⁷ The cogeneration regulations contain special rules to establish the value of the cogenerator's contribution to the utility's capacity requirements. The regulations also detail a number of other factors affecting the rates for utility purchases from cogenerators.⁹⁸

The third issue involving utility purchases concerns the directive in section 210 that the rates for surplus power purchases not discriminate against cogenerators. Because cogenerators will come into existence over time and the avoided cost of the utility's alter-

95. Conf. Report, *supra* note 35, at 98-99.

96. In a firm sale, the seller is obligated to provide power in accordance with a schedule. In a non-firm sale, the seller, as opposed to the customer, makes the decision whether or not power is to be available. FERC Statement of Considerations, 45 Fed. Reg. 12,214, 12,225 (1980).

97. 18 C.F.R. § 292.304(e)(2) (1980).

98. *Id.* § 292.304(e).

native power will vary over time, the rates available to one set of cogenerators may not be available to all. This may put a premium on speed of application because the first to convert to cogeneration will be the first to take advantage of a high avoided cost. This situation also opens up the possibility of favoritism and difficulty of administration. In fact, if a large number of cogenerators commence operation contemporaneously, it may be necessary to assign priorities among them because the utility's avoided cost will not be the same with respect to the entire cogenerator output.

With respect to already existing cogenerators, permitting a cogenerator to sell to a utility at its avoided cost and simultaneously buy back the same power at the utility's average embedded cost would drive up the costs to the utility's other customers without doing anything to encourage new cogeneration. Therefore, the FERC regulations regarding purchases at avoided costs only apply to new plants.⁹⁹

C. Consideration of Environmental Impacts of Cogeneration

Consideration of the environmental impacts of encouraged use of cogeneration is one of the most important issues raised by section 210, but also one of the most difficult to resolve. The impact of cogeneration on the environment¹⁰⁰ is being examined on two distinct regulatory levels: first, on the federal level, FERC has undertaken a programmatic environmental review of the effect of the cogeneration regulations¹⁰¹ and, second, the states have conducted

99. *Id.* § 292.304(b).

100. While the environmental effects of cogeneration will depend on the region and the particular cogeneration technologies, these environmental reviews are instructive of the potential environmental problems that may result from encouraged cogeneration.

101. First, FERC based its assessment on a review which did not look at the particular application of cogeneration facilities but at the program of encouraging cogeneration. FERC, therefore, prepared its assessment in a highly generalized manner. While programmatic environmental reviews are common, FERC's review of the consequences of the cogeneration regulations differs from other programmatic reviews in that there will be no other federal environmental review of many of the individual cogeneration projects because of their small size.

Second, FERC's environmental assessment of cogeneration also covered another type of generation activity, namely, small power facilities. Such small power facilities are quite different, environmentally, from cogeneration facilities. Most of the generators in the small power producers group are based on renewable resource technologies, such as solar power, hydroelectronics and biomass. By contrast, many cogeneration facilities, particularly in ur-

environmental reviews as part of their regulatory response to the cogeneration regulations.¹⁰²

1. FERC's Environmental Review of Encouraged Cogeneration

FERC's environmental review was made in two stages: first, an assessment of the entire range of potential effects¹⁰³ and, second, a more detailed review of the impact of increased use of diesel

ban regions, will use traditional fuel sources such as oil or natural gas.

Although small power facilities have a similar role from an energy point of view, namely, the reduction of use of imported oil, the two types of facilities are quite different from an environmental point of view. FERC's environmental assessment categorized cogeneration as having significant adverse environmental impacts, while most of the renewable resource technologies have minimal or moderate environmental effects. Notwithstanding the distinct environmental consequences of the two types of projects, FERC did not consider them separately. Thus, the increased air emissions from oil or natural gas fired cogeneration facilities are balanced by reduced emissions as a result of the encouragement of power production facilities. This environmental offsetting tends to hide the environmental impacts that would otherwise be produced by cogeneration and make the environmental consequences seem less severe than actually will be the case.

Third, FERC made a rough balance between the perceived adverse increased air emissions and several not-overly-detailed benefits that would ensue from cogeneration. It was believed that cogeneration would result in the cancellation or deferment of construction of coal and nuclear units and saving of substantial amounts of oil, natural gas and coal by 1995. This rough balancing process does not reflect rational analysis so much as an *a priori* decision. The dispersion of generating facilities, for example, is not obviously better from an environmental point of view. The transport of fuel, whether oil or coal, will not be made to a few concentrated points but to a number of dispersed generating stations. While many of the cogenerators will be located in industrial areas, those in residential and commercial sectors will introduce added impacts of industrialization into non-industrial areas.

These problems in FERC's environmental analyses reveal an underlying policy problem when an agency confronts a decision already made, in this case already made by the legislature, and proceeds nevertheless to perform an environmental analysis. Environmental analyses in such cases are likely to overlook or downplay issues that are important which, in the case of a project proposed by a non-governmental applicant, would receive critical analysis.

102. See, e.g., N.Y. DEP'T PUB. SERV., ENVIRONMENTAL ASSESSMENT OF COGENERATION IN NEW YORK CITY (1980) (report compiled pursuant to New York Environmental Quality Review Act, N.Y. ENVIR. CONSERV. LAW §§ 8-0101-0115 (McKinney Supp. 1980).

103. FERC published four significant documents in the course of reviewing the environmental impacts of cogeneration facilities: 1) FERC Preliminary Environmental Assessment for RM79-54 and RM79-55 (Oct. 19, 1979); 2) FERC Environmental Assessment for Rulemaking, Docket Nos. RM79-54 and RM79-55 (Mar. 1980); 3) FERC Notice of Finding No Significant Impact and Notice of Intent to Prepare Environmental Impact Statement (Mar. 31, 1980); and 4) Draft Environmental Impact Statement (concerning diesel generators). These four environmental reviews of the anticipated impacts of increased cogeneration summarize what appear to be the important impacts of both small power production and cogeneration facilities on the environment.

cogenerators.¹⁰⁴ FERC's environmental assessment distinguished between the environmental impacts resulting from cogeneration facilities existing prior to enactment of section 210 and the increased level of impacts from government encouraged cogeneration.¹⁰⁵ Evaluation of environmental impacts in this manner required a valid and accurate estimate of the impact of government encouraged cogeneration. The accuracy of this estimate of the growth potential of cogeneration, however, is not free from controversy. FERC estimated the penetration of the various cogeneration technologies to be 5,900 megawatts of new power production capacity by qualifying cogeneration facilities by 1995.¹⁰⁶ These new cogeneration facilities were assumed to lead to the deferral or cancellation of substantial central power station plant construction. Based on these estimates, FERC's environmental assessment determined that the encouragement of cogeneration will not produce significant environmental consequences in the near term. Excepted from this positive assessment was diesel cogeneration, which could have a significant adverse environmental impact in some areas.¹⁰⁷ It must be noted, however, that the statement plays down the environmental impact of cogeneration in two ways: first, it combines its analysis of cogeneration with that of small power production, and, second, it looks primarily at the long term impact of diesel cogeneration.

FERC has undertaken a separate detailed environmental examination of diesel cogeneration. A draft environmental impact statement concerning diesel generator impacts has already been issued.¹⁰⁸ This draft statement does not find the encouraged use of diesel cogeneration unacceptable.

104. The Final Environmental Impact Statement concerning diesel cogenerators has not been published by FERC at the time this study was prepared. It is expected to permit use of diesel-electric cogeneration under certain circumstances.

105. FERC Environmental Assessment for Small Power Production and Cogeneration Facilities Rulemakings, 45 Fed. Reg. 23,662 (1980). "The environmental effects are not related to the total environmental impacts of the numerous technologies and facilities covered by PURPA, but only that increment of those effects that results from the incentives provided by those rules." *Id.* at 23,663.

106. *Id.* at 23,683 (1980).

107. *Id.* Although the final statement has not yet been published, it may endorse the encouragement of diesel-based cogeneration while requiring the installation of control equipment on generators larger than a minimum size.

108. See note 106 *supra*.

2. *Consideration of Environmental Impacts at the State Level*

The states have also conducted environmental reviews as part of their implementation of the cogeneration regulations, where the state environmental laws so required. This delegation of responsibility to the states permits a review more detailed and more sensitive to the particular environmental considerations of the locality. Such a review is necessary because the impact of implementation of the cogeneration regulations will vary sharply from one area to another.¹⁰⁹

Illustrative of what may eventually emerge from the New York State environmental report is some of the evidence which has been brought forth in the course of the Public Service Commission's investigation of Consolidated Edison's rates with respect to cogeneration.¹¹⁰ This investigation involves a detailed exploration of the environmental impact of encouraged cogeneration in a densely populated area such as the New York metropolitan region. As in many instances involving controversial environmental issues, the parties produced different facts from which they drew widely divergent conclusions, thus rendering an objective resolution of the environmental impact extremely difficult.

In early 1979, Con Ed submitted extensive written testimony and studies concerning the environmental impact of increased cogeneration. At the hearings, Con Ed presented studies indicating that nitrogen oxide levels in the air would rise as a result of likely new cogeneration facilities but claimed that increases from any single on-site cogeneration facility would not violate ambient air quality standards.¹¹¹ In addition, the testimony indicated that state environmental permits would not be required for installation of cogeneration units.¹¹²

Con Ed also reviewed the cumulative effects of broad-scale conversion to cogeneration. Based on a three-part assumption regard-

109. See note 22 *supra* and accompanying text.

110. Con Edison On-Site Generation, Case 27574, N.Y. PUB. SERV. COMM'N (filed June 22, 1979).

111. Testimony of Peter Freudenthal, Director of Air-Noise Programs for Consolidated Edison Co., Con Edison On-Site Generation Case 27574, N.Y. PUB. SERV. COMM'N at 160-63 (Nov. 14, 1979) [hereinafter cited as Testimony of Freudenthal]. Con Ed's study did find, however, that the air quality standard for nitrogen oxide will be exceeded in Manhattan after approximately 200 megawatts of Con Ed's load is replaced by diesel generation.

112. *Id.* at 162.

ing their customers' reaction to encouraged cogeneration,¹¹³ Con Ed asserted that the primary annual ambient air quality standards for sulfur and nitrogen oxides would be violated.¹¹⁴ The testimony also indicated that the projected increases in sulfur and nitrogen oxide levels would hinder, if not prevent, the company's response to a federal order to convert several oil burning power plants into coal burning plants.¹¹⁵

A subsequent filing of environmental effects by Con Ed reiterated these environmental findings.¹¹⁶ This environmental assessment pointed out that nearfield air quality impacts¹¹⁷ from increased cogeneration without moderately tall exhaust stacks would lead to locally increased concentrations of nitrogen, sulfur and carbon dioxide, as well as particulates.¹¹⁸ Although these concentrations would rise, especially if the exhaust stacks were short, the study did not expect violations of ambient air quality standards.¹¹⁹ Because the effects would vary from one project to another, the utility recommended that a case-by-case environmental review be performed to insure that unacceptable air pollution not occur.¹²⁰

113. Con Ed assumed 1) that customers representing approximately 1,100 megawatts of demand would choose to switch to cogeneration, 2) that most or all of these potential cogenerators would install diesel cogeneration equipment, and 3) that these new generation facilities would be concentrated in Manhattan. Testimony of Freudenthal, *supra* note 111, at 161-63.

114. *Id.* at 171. This testimony assumed that all new cogeneration would use diesel engines. Although this assumption was not unreasonable based on Con Ed's experience and the suitability of diesel generating equipment, it did produce the worst results.

115. Testimony of Schwartz, *supra* note 31, at 1344-46.

116. CON ED'S ENVIRONMENTAL ASSESSMENT, *supra* note 21.

117. Nearfield air quality refers to the effect of a cogeneration facility on the air quality of nearby buildings and streets, with consideration of the aerodynamic building effects and enhanced turbulence caused by the urban area. See CON ED'S ENVIRONMENTAL ASSESSMENT, *supra* note 21, Appendix C, at 1 ("Air quality impact of diesel cogeneration in New York City").

118. CON ED'S ENVIRONMENTAL ASSESSMENT, *supra* note 21, at 27-29.

119. *Id.* at 28. The combined effects of several cogeneration facilities in close proximity, however, would be substantially greater than any single facility. *Id.*

120. *Id.* at 45. In addition, Con Ed recommended that 1) rural and urban cogeneration facilities be distinguished; 2) cogenerators be subject to the same regulations as utilities; 3) cogenerators be subject to Clean Air Act, § 123 regarding height of exhaust stacks; 4) cogeneration noise pollution be examined; and 5) allocation of available "prevention of significant deterioration" ("PSD") increment in urban areas for specific uses. PSD increment refers to the extent to which areas considered "clean" under the Clean Air Act may be further polluted legally. See *Sierra Club v. Ruckelshaus*, 4 E.R.C. 1205 (1972). See also Stern, *Prevention of Significant Deterioration — A Critical Review*, 27 J. AIR POLL. CON-

Con Ed's environmental assessment also addressed the question of fuel usage.¹²¹ The study noted that quite different results were obtained depending on whether a short term or a long term effect was analyzed. In the short term, Con Ed calculated that 240,000 barrels of oil per year would be saved for each switch of 100 megawatts of customer demand to cogeneration.¹²² This saving arises from the greater efficiency of cogeneration units compared to separate traditional generating and space heating facilities. In the long term, however, the utility determined that cogeneration would result in increased oil consumption.¹²³ This surprising anomaly results, according to Con Ed, because a significant move to cogeneration will reduce the demand for Con Ed power with a resulting reduction in construction of new non-oil fired generators. This un-built, non-oil-fired generation would have produced more electric energy annually than the reduction in demand resulting from the shift to cogeneration. Thus, measured in terms of annual hours of electric energy, more displacement of oil-fired generation would result from new non-oil-fired units than from the same sized cogeneration facility.¹²⁴

In its response, the PSC Staff took issue with Con Ed's prediction of the extent of the shift to cogeneration.¹²⁵ The PSC Staff does not consider that conversion to cogeneration in the New York City area is nearly as likely as Con Ed predicts.¹²⁶ Even accepting

TROL Ass'n No. 5 (May, 1977).

121. CON ED'S ENVIRONMENTAL ASSESSMENT, *supra* note 21, at 40.

122. *Id.*

123. *Id.* at 42.

124. *Id.*

125. Testimony of A. Craig Jones, Associate Environmental Program Analyst, N.Y. Dep't of Public Services, Con Edison On-Site Generation, Case 27574, N.Y. PUB. SERV. COMM'N at 4972 (Dec. 15, 1980) [hereinafter cited as Testimony of Jones].

126. The reasoning behind the Staff's differing expectation of the potential for conversion to cogeneration revealed, however, some practical restrictions on switching to cogeneration. First, the PSC Staff believes that the region's air quality state implementation plan would necessarily be revised to reflect any widespread shift to diesel cogeneration. *Id.* at 4992-93. Such a revision might restrict or prevent substantial unregulated diesel generations. Such regulation will restrict the possibility of switching to cogeneration and will increase the cost for customers who are able to make the switch. In fact, the bulk of the customers whom Con Ed predicts to be potential converts to cogeneration would have to obtain a prevention of significant deterioration permit. *Id.* at 4992. *See* note 120 *supra*. Such a permit, which cannot be issued for a facility if the predicted impact will cause air quality standards to be exceeded, is arduous and expensive to obtain. In other words, the

Con Ed's figures regarding customer conversion to cogeneration, the PSC Staff still envisioned less serious environmental impacts.¹²⁷

Turning to oil consumption, the PSC Staff disagreed with Con Ed's predictions that encouragement of cogeneration will not lead to oil savings.¹²⁸ In large part this disagreement stems from sharply differing estimates of the rate at which consumers will switch to cogeneration. The PSC Staff admitted, however, that over a fifteen- or twenty-year period encouragement of cogeneration may produce increases in oil consumption. The Staff disposes of this anomaly by focusing on the short term rather than the long term.¹²⁹

IV. Impact of Cogeneration on Utilities and Their Customers

Section 210 and the cogeneration regulations assume that encouragement of cogeneration will result in benefits not only to the nation generally but also to utilities and their customers. These benefits result from savings in oil consumption and, eventually, in reduced charges to customers. The fact that the cogeneration regulations were promulgated early in 1980 and that the state regulatory actions are not to be completed until spring 1981 prevents a thorough analysis at this time of what the impact will be.¹³⁰ The states' own regulatory actions implementing the Congressional policies of PURPA are crucial to the encouragement of cogeneration; until the states' regulations are known, it is difficult to plot the future effects of cogeneration.

Illustrative of the complexities underlying the hopes of the proponents of cogeneration, and the fears of utilities as the state regulations are formulated, is the battle currently raging in New York between the PSC and the electric utility serving New York City, Consolidated Edison. In its papers and testimony before the PSC Con Ed has raised several potentially adverse consequences of en-

customers seeking to switch to cogeneration will not be unregulated, but rather will be subject, either directly or indirectly, to environmental regulatory processes which will ensure the continued attainment and maintenance of air quality standards. *Id.* at 4992-95.

127. Testimony of Jones, *supra* note 125, at 4987-94.

128. *Id.* at 4996.

129. *Id.*

130. See note 11 *supra* and accompanying text.

couraged cogeneration: 1) widespread customer defections; 2) adverse impact on rates and capacity costs; and 3) adverse impacts on its distribution system caused by the interconnection of cogenerating units and the utility.

A. Exposure of Utilities to Widespread Customer Defection to Cogeneration

Con Ed's greatest concern is the extent of defections of its present customers. A decrease in revenues caused by a large shift of customers to cogeneration, without any consequent savings in generating costs, may force Con Ed to raise rates to its remaining customers in order to meet its revenue requirements.¹³¹ Moreover, the existing mix of customers may be upset by extensive defections. Utility rates are established by classes, usually based on the size of the demand for power and the cost of providing service. The cost of service is allocated among these classes by the PSC with the possibility of some classes of customers subsidizing others.¹³² A drop in customers of a particular class might have a significant impact on rate-setting.

Determination of a utility's exposure to customer defections requires resolution of many variables, and it is therefore, not surprising that it is possible to arrive at a variety of answers. Con Ed and the staff of the PSC have each made two estimates of possible defections. Con Ed's initial study indicated that 395 customers, consisting of 234 commercial, 155 industrial and six residential customers, would have the economic potential to leave its system in favor of cogeneration. These customers represent 1086.3 megawatts of coincident peak load and \$429.3 million of annual revenue.¹³³

131. Testimony of Schwartz, *supra* note 31, at 1343.

132. PUBLIC UTILITY ECONOMICS, *supra* note 19, at 159-64. See also FERC Statement of Considerations, 45 Fed. Reg. 12,214, 12,218. "The utility may only charge such rates on a nondiscriminatory basis, however, so that a cogenerator will not be singled out to lose any interclass or intraclass subsidies to which it might have been entitled had it not generated part of its electric energy needs itself." *Id.*

133. This estimate was based on the assumption that most of the potential cogeneration in its service territory will use small, oil-fueled diesel generators and the absence of many large industrial customers. Con Ed initially established its exposure estimate by taking all commercial, industrial and large residential customers with a peak demand over 100 kilowatts. For these customers, Con Ed compared the projected savings resulting from switching to cogeneration to the assumed capital investment required to undertake cogeneration. This comparison resulted in a rate of return that an investment in cogeneration might yield to

The PSC Staff's estimate sharply downplayed the importance of cogeneration and, consequently, the risk of customer defections.¹³⁴ Although it adopted Con Ed's basic conceptual approach of comparing the sum of a potential cogenerator's future annual net savings from cogeneration to its alternative uses of the capital, the PSC Staff determined that the switch to cogeneration would be more expensive than did Con Ed. The PSC Staff's conclusion was that these added costs would discourage the shift to cogeneration.¹³⁵ Its estimate also highlighted the fact that these exposure estimates are quite sensitive to prevailing interest rates and Con Ed's likely future rate increases. The PSC Staff calculated Con Ed's exposure to cogeneration defections at approximately thirty, more than ninety percent lower than the 395 estimated by Con Ed.¹³⁶ In addition to these economic factors, the PSC Staff asserted that Con Ed's actual exposure will be even less, because the PSC Staff's estimate did not take into account such factors as air quality restrictions, other tariff provisions (buy-back rates), possible restrictions to parallel operation with the utility grid and the financial condition of the customers.¹³⁷

In its revised exposure estimate, Con Ed sharply reduced the

the customer. Fifteen percent was deemed an acceptable return on this type of investment. When the projected return for a customer exceeded that figure, it was assumed that the customer had an economic reason to switch to cogeneration. The PSC Staff's conclusion of limited cogeneration defections is based on four factors: 1) the limitation on interconnection and resulting sale back of power through the Con Ed secondary network system, 2) the comprehensive air quality review that new on-site generators will have to undergo, 3) the present rate of departure of existing customers to on-site generation within the service territory, 4) the increased tax assessment that New York City is imposing on on-site generation, and 5) the physical space limitations that may prevent customers from shifting to on-site generation.

134. Testimony of Joseph Grillo, Senior Valuation Engineer in the Rates and Valuation Section of the Power Division, Public Service Commission, Con Edison On-Site Generation, Case 27574, N.Y. PUB. SERV. COMM'N at 3210 (Oct. 1, 1980) [hereinafter cited as Testimony of Grillo].

135. *Id.* at 3211-12. Among other reasons, the PSC Staff relied quite heavily on the historical record of shifts from Con Ed's system to cogeneration which revealed very few conversions. *Id.* at 3243-44. Con Ed dismissed this history as irrelevant because it predated § 210 and cogeneration technology which had evolved making cogeneration cheaper and more available.

136. *Id.* at 3213. These 30 defectors were considered to represent a total demand of 140 megawatts as compared to Con Ed's estimate of 1086.3 megawatts. *Id.*

137. *Id.* at 3214-15.

number of customers it believed to be potential defectors.¹³⁸ Although the conceptual approach remained the same, Con Ed's second estimate increased the costs of becoming a cogenerator because of inflation and added installation costs.¹³⁹ In addition, Con Ed added to the assumed tax burden on cogenerators because investigation during 1980 showed that New York City is planning to assess cogenerators as if they were utilities.¹⁴⁰ The second Con Ed study indicated that 159 customers, representing 562 megawatts of coincident peak load and \$300 million annual revenue, have the economic potential to leave the system to convert to cogeneration.¹⁴¹ The PSC Staff also revised its exposure estimate but still concluded that very few customers would desire to switch.¹⁴²

Despite the downward revision in Con Ed's estimate, its estimate of the exposure risk it faces remains distinctly larger than the exposure estimates arising from the PSC.¹⁴³ This gap between the two estimates underlines the difficulty in determining the extent to which cogeneration will have an effect on particular utilities. In contrast with the typical utility forecast, which is based on economic analysis of the likely action of a large number of customers, each of which has a relatively small demand for power, cogeneration impact analyses focus on relatively fewer customers, each of which has a significant demand for power.

B. Impact on Utility Rates of Encouraged Cogeneration

The electric utility industry has generally opposed the expansion of cogeneration.¹⁴⁴ One of the utilities' principal arguments in op-

138. Additional testimony of William Harkins, Con Edison On-Site Generation, Case 27574, N.Y. PUB. SERV. COMM'N at 5110 (Dec. 16, 1980) [hereinafter cited as Testimony of Harkins II].

139. *Id.* at 5110-13.

140. *Id.* at 5119-20.

141. *Id.* at 5121.

142. *Id.* at 5121-24.

143. The low estimates of Con Ed's exposure to cogeneration by the PSC Staff raises an interesting question about the legislative assumptions of the promise of cogeneration. Congress' enactment of § 210 and FERC's issuance of the cogeneration regulations was based on the assumption that a number of present utility customers would become cogenerators if encouraged. The PSC Staff's estimates of potential customer defections suggests strong resistance not only from utilities but also from their customers.

144. See *American Elec. Power Serv. Corp. v. Federal Energy Reg. Comm'n*, Doc. No. 80-1789 (D.C. Cir. filed Jan. 30, 1981); *Mississippi v. Federal Energy Reg. Comm'n*, No. J79-0212(C) (S.D. Miss., Feb. 19, 1981). See also Alexander, *The Little Engine that Scares Con*

position is that cogeneration will lead to high rates for the utilities' remaining customers; this in turn would threaten the existence of utilities in their present form. Con Ed has argued that the switching of a large number of its customers to cogeneration would force the remaining customers to bear substantially unchanged fixed costs, thus increasing their rates.¹⁴⁵ A utility's requirement for revenues, which pay for the cost of service, much of which is fixed, is then apportioned to the utility's customers by establishing rates for particular classes of customers. The withdrawal of a portion of a utility's customers, through the encouragement of cogeneration, would not materially affect the rate base or the rate of return. The rate base is independent of the number of customers and cannot be reduced simply by shrinking the customer base. The net result of reducing a utility's customer base is that the fixed cost, that is, the rate base, must be spread over a smaller number of customers, each remaining customer bearing an increased share.¹⁴⁶ This argument is particularly convincing in Con Ed's case because the growth of demand in the territory which it serves is relatively flat.¹⁴⁷ So far as supplying new customers, there is little immediate need for new generating capacity. Although cogeneration proponents argue that it will generate savings through the deferral of new generating construction, these savings are minimal in areas such as New York with limited anticipated growth in demand.

Nevertheless, the PSC Staff has argued that increased diesel cogeneration will reduce overall costs because Con Ed's long term marginal cost exceeds its average cost. In the absence of cogeneration, as Con Ed's customers' demand for electricity grows (thereby requiring generation of increasingly more expensive units of power) Con Ed's costs will necessarily increase. By reducing the rate of growth of the utility's load, but not its absolute growth, cogeneration would assist the company in holding down increases and would not lend itself to greater increases.¹⁴⁸

Ed, *Fortune*, Dec. 31, 1978 at 81-84.

145. Testimony of Schwartz, *supra* note 31, at 1343.

146. See generally PUBLIC UTILITY ECONOMICS, *supra* note 19, 116-34.

147. See note 22 *supra* and accompanying text.

148. This conclusion, however, will vary depending on the specific facts. PSC Staff claims that the marginal cost of serving office buildings is higher than the marginal cost of serving apartment buildings because the fluctuations in the demand for electricity in apartment buildings is less pronounced and more uniform resulting in a lower marginal cost.

It is not possible to articulate the impact on rates that increased cogeneration would have. Growth in cogeneration will effectively defer for the near term new construction of large central-station generating plants, leading to savings in capital costs. Although both the utility's stand-by rate for sales of power to a cogenerator and the excess power, buy-back rate would appear to protect the utilities' other customers from subsidizing cogenerators, the possibility of cogeneration producing an absolute decline in a utility's sales of electricity might lead to increased customer costs. Moreover, expanded cogeneration based on petroleum-based fuels would not insulate the region from catastrophic increases in oil costs.

If the introduction of cogenerators in the utility system requires major system-wide modifications, the cost of those modifications may be too great to impose on the cogenerators. Moreover, if the changes are not at the point of interconnection, it may seem inequitable to require the cogenerator to pay for them. If the cogenerator does not pay these costs, however, they will have to be borne by the utilities' customers.

Finally, the determination of the load patterns of the cogenerators will be critical. To the extent that the demand by cogenerators for backup power coincides with the utility system's time of peak demand, the utility will have to build sufficient capacity to serve this load. The timing of the cogenerator's demand for backup power may not be known immediately.

The intricacies of operating a generation, transmission and distribution network also prevents even certain inefficient generators from being retired simply because of reason of economics. For example, Con Ed must generate a portion of its power from plants located in New York City to ensure a reliable source of power.¹⁴⁹

Similarly, the impact of cogeneration varies substantially between apartment and office buildings because of cogenerators' different load patterns and consequent different cost considerations. Cogenerators which will produce power at the time of the Company's peak demand will displace the most expensive generators and thus produce savings. Cogenerators, on the other hand, which produce excess power only during periods of low system demand for power displace less expensive power.

149. See New York State Energy Master Plan and Long Range Electric and Gas Report-State Energy Office, Final Report, 161 (1980) [hereinafter cited as Energy Master Plan]. State of New York Board on Electric Generation Siting and the Environment, Case 80004 Power Authority of the State of New York-Arthur Kill Station, *Opinion and Order Granting Certificate of Environmental Compatibility and Public Need* 3-15 (Feb. 26, 1981) "The examiners concluded . . . that locating the proposed facility close to its load center would

Generation out of the city cannot completely satisfy the requirements of system reliability which seeks to locate a substantial portion of the generation in the area of the customer demand.¹⁵⁰ Consequently, some inefficient generators would have to be maintained on active status, irrespective of the reduced customer demand resulting from cogeneration.

Con Ed's concern over substantial financial impacts is similarly not shared by the PSC Staff. For reasons including 1) the actual costs of conversion to cogeneration, 2) the more equitable tax treatment of cogenerators, that is, increased assessments, and 3) the rate of return on investment that customers which are potential cogenerators will require, the PSC Staff asserts that the exposure that Con Ed faces will be less than it projects.¹⁵¹

It is not possible to predict confidently the impact on rates that increased cogenerators will have. The uncertainty of each of these material factors makes precise estimate of the cost to utilities of encouraged cogeneration impossible. There appears, however, to be a real possibility of a substantial financial impact on utilities. Utilities, therefore, must face an uncertain future regarding the effect of cogeneration.

C. Cogeneration's Impact on Utility System Operations

Aside from the financial effects, cogeneration poses a number of significant operating problems. These problems, while not insurmountable, may require special operating and administrative techniques or facilities to avoid adversely affecting service to the remaining customers. The cost of the equipment to cure these operating problems should be borne by the cogenerator as an interconnection cost.¹⁵²

One problem introduced by new cogeneration facilities is that it is a new source of faults, or electrical short circuits. Each system contains protective devices whose prime purpose is to limit the

improve reliability of power available to New York City and diminish the City's reliance on a transmission corridor that is already heavily used and that can be disabled or impaired by adverse weather conditions." *Id.* at 7.

150. Energy Master Plan, *supra* note 149, at 161.

151. See notes 131-33 *supra* and accompanying text.

152. 18 C.F.R. § 292.306 (1980) requires a cogenerator to pay any interconnection costs on a non-discriminatory basis with respect to other customers with similar load characteristics.

area affected by a fault. The introduction of cogeneration facilities into the system will require changes in the operation of this type of equipment; in some cases additional equipment will have to be added to provide the same level of protection. This new equipment is necessary to protect not only the utility against faults in the cogenerator facility, but also to protect the cogenerator against system faults.¹⁵³

V. Impact on Regulatory Control of Utilities

Section 210 and the cogeneration regulations promise to have substantial impact not only on energy production but also on the regulation of the utility business as well. Traditionally, regulation of the rates and conduct of business of utilities has been a matter subject to state regulation.¹⁵⁴ Sales of electricity for resale, however, have been regulated by a federal agency, now the Federal Energy Regulatory Commission.¹⁵⁵ PURPA envisages both a substantial assertion of federal control over state utility regulatory matters and an innovative attempt to resolve the knotty problems of joint federal-state regulatory responsibility.¹⁵⁶ These matters may be examined by looking at the impact of section 210 on federal and state regulation of utilities.

A. Federal Regulation of Utilities

Federal regulation of utilities has been limited to sales for resale of power in interstate commerce.¹⁵⁷ This limitation reflects a balance between state and federal regulatory jurisdiction over utilities. In 1964, the Supreme Court in *Federal Power Commission v. Southern California Edison Co.*,¹⁵⁸ ("Colton") established the present balance between state and federal jurisdictions. In *Colton*, a

153. Maintaining a safe distribution system is a different type of problem raised by the increased number of cogeneration facilities. Most utilities' switching systems are designed so that opening the circuit, or section of line being controlled, deenergizes the line. If, for any reason, the circuit is opened and the cogeneration facility continues to generate, the line remains energized and an unsafe condition occurs. The need to eliminate such safety problems will necessitate the installation of special automatic control equipment, usually at the cogeneration facility.

154. See *Federal Power Comm'n v. Southern Cal. Edison Co.*, 376 U.S. 205 (1964).

155. 42 U.S.C. § 7171 (Supp. III 1979).

156. 16 U.S.C. § 824a-3(a) (Supp. III 1979).

157. Federal Power Act, 16 U.S.C. § 824b (1976).

158. 376 U.S. 205 (1964).

municipal utility, dissatisfied with both its supplier's wholesale rates and the failure of the California Public Utilities Commission to grant rate relief, sought to have its rate dispute resolved before FERC's predecessor, the Federal Power Commission ("FPC").¹⁵⁹ The FPC found that out-of-state power from the Hoover Dam was included in the energy delivered by the defendant utility to Colton and asserted jurisdiction. The Ninth Circuit reversed this determination,¹⁶⁰ ruling that section 201(a) of the Federal Power Act confined FPC jurisdiction to those interstate wholesale transactions constitutionally beyond the power of state regulation.¹⁶¹

The Supreme Court reversed and upheld the FPC's assertion of broader jurisdiction.¹⁶² Relying on a line of authority which ruled out case-by-case analyses in locating the line between federal and state jurisdiction,¹⁶³ the Court stated that the Federal Power Act called for a simple jurisdictional demarcation based on the wholesale-retail distinction.¹⁶⁴ According to *Colton*, FPC jurisdiction extends to all wholesale sales, while state jurisdiction is restricted to sales to the ultimate consumer, that is, retail sales.¹⁶⁵

This jurisdictional demarcation was altered by Congress in enacting section 210. PURPA does not restrict federal regulation to sales for resale because it empowers FERC to regulate retail sales. Section 210 specifically provides for FERC rules governing both resale and retail sales.¹⁶⁶ While state regulatory authorities will continue to exercise day-to-day regulatory control over retail transactions concerning cogenerators, they will no longer look to state law but to section 210. This expansion of federal regulatory power is at the expense of the states' freedom to regulate. Moreover, FERC now has the authority to exempt cogenerators from state law in order to accomplish federal regulatory purposes. This exercise of jurisdiction will result in a delegation-by-exemption to the states

159. *Id.* at 208-10. See also note 155 *supra*.

160. 310 F.2d 784 (9th Cir. 1962). The section provides, in part, that "Federal regulation . . . extend[s] only to those matters which are not subject to regulation by the states." 16 U.S.C. § 824 (1976).

161. 310 F.2d at 794.

162. 376 U.S. at 210.

163. *Id.* at 212.

164. *Id.* at 215.

165. *Id.* at 220.

166. 16 U.S.C. § 824a-3(a) (Supp. III 1979).

of both old and new FERC regulatory responsibilities.

The expansion of federal power to encourage cogeneration is an innovative approach to fashioning a regulatory method to implement a federal policy on the local level. A simple extension of federal regulatory power under the commerce clause would have produced an awkward enlargement of the federal bureaucracy with, quite possibly, no productive result. Conditions of electrical demand and supply vary from region to region and consequently the usefulness of cogeneration and the necessity for it. Moreover, public attitudes toward regulation vary; public opinion and the regulatory practice in some regions call for detailed, explicit regulation while in other regions no more regulation than loose guidelines is appropriate. The approach reflected in section 210 permits the states to oversee the regulation of cogeneration, subject to the Congressional policy of encouraging cogeneration.

B. State Regulation of Utilities under Section 210

Section 210 will have a great effect on state regulation of utilities. First, it places a heavy burden on the state regulatory agencies. In states where cogeneration is successful, they will be involved in a complex, quickly changing regulatory area with unforeseeable consequences. One of their most crucial tasks will be the setting of rates for stand-by and back-up power, pursuant to the cogeneration regulations.¹⁶⁷ If those rates do not accurately reflect the true costs to cogenerators or utilities, they both may suffer financially.¹⁶⁸ If rates for utility purchases from cogenerators are too generous, the utility's customers may end up subsidizing the cogenerators, contrary to the intent of section 210.

Second, substantial growth of cogeneration with a matching decline in utility service will reduce the power of the state regulatory agencies to control the business of providing utility services. Reduced regulatory control will limit the regulatory power to encourage policies that are environmentally¹⁶⁹ and socially¹⁷⁰ benefi-

167. 18 C.F.R. § 292.401 (1980).

168. This financial risk comes when the financial health of many utilities is not robust. If state regulatory agencies do not accurately establish appropriate rates against such a financial backdrop, the result may be insolvencies of utilities.

169. For example, the environmental effects of small cogeneration equipment will be outside the regulatory control of many state's public utility regulatory agencies. By contrast, many states including New York require a utility proposing a new power plant to make a

cial. In addition, the regulatory control exercised over utilities with respect to system planning will be diluted. Location of all new generation will not be influenced by considerations of providing a system-wide balance of generation and transmission. A new cogeneration facility will be built at an existing industrial plant, or an existing residential complex without regard for balanced system planning. Utility planning will change, at least in part, so that it reacts to the new condition imposed on the utility system by cogenerators.

Third, the role of the state regulatory agencies in rate regulation will be diminished by the fact that section 210 and the cogeneration regulations allow utilities, cogenerators and their customers to contract privately among themselves.¹⁷¹ Although it is difficult to predict accurately how important these contracts will be in the growth of cogeneration, it seems likely that many large cogenerators will not rely on published rates, which will do little more than meet the requirements of section 210, but rather will contract with the utilities for their particular service needs.¹⁷²

Encouraged cogeneration will alter the basic premise of utility regulation, namely, that utilities are monopolies which must be closely monitored and regulated.¹⁷³ Cogeneration will enable certain utility customers to compete with the utilities. Whether such competition will improve service or restrain cost increases awaits the test of experience. It seems likely, however, that substantial cogeneration will change the posture of participants in utility rate proceedings. A utility will not necessarily be aligned in opposition

detailed showing of the expected environmental impacts. The siting laws often require that the utility select the site and technology that produces the least adverse environmental impact. While the environmental impact from numerous small generating stations is still subject to sharp dispute, it seems clear that some impacts will occur and that they will be largely unregulated.

170. At present, the rate structure of a utility is closely examined to measure the effects on certain customer classes. PUBLIC UTILITY ECONOMICS, *supra* note 19, at 135-38. The withdrawal of a substantial portion of a utility's load, as a result of encouraged cogeneration, will limit the revenue available for social policy experiments. Similarly, the regulatory power over the management of utilities will be diluted by the growth of an unregulated section, the cogenerator.

171. 18 C.F.R. § 292.301(b) (1980).

172. Some states do not plan to do more than monitor these contracts to ascertain that they meet the requirements of the cogeneration regulations. Other states, including New York, will require that each such contract be submitted to the agency for review.

173. See generally PUBLIC UTILITY ECONOMICS, *supra* note 19, at 16.

to consumers. Some rate proceedings may see more complex alliances of interests emerging.

VI. Expectations for the Future

The enactment of section 210 represents an imaginative response to the undeniable requirement in an era of rising energy costs that the nation use energy more efficiently. This effort to encourage the use of cogeneration is an innovative attempt to translate economic policy considerations supporting energy conservation into regulatory statements. While the development and expansion of cogeneration appears very likely to occur, in part as a result of section 210, it is not possible at present to predict the exact extent or course of this development. This federally-imposed program, therefore, may have substantial impacts, economic and environmental, which have been insufficiently studied and considered.

The growth of the use of cogeneration, while premised on savings from the increased efficiency promised by cogeneration, may well be closely tied to factors that are distinct from the economic encouragement in section 210, namely, the ability of cogenerators to receive favorable tax treatment not available to utilities, the developing resolution of any environmental problems resulting from encouraged cogeneration and the future use of cogeneration technologies based on oil and natural gas fuels.¹⁷⁴

The resolution of environmental issues seems closely tied to the extent to which oil will be used to fuel cogeneration facilities. The impacts of diesel facilities, in particular, seem likely to cause environmental impacts. Measurement of the impacts, however, will be difficult because of the small size of each facility.

With respect to the continued use of oil to fuel cogeneration

174. A precise understanding of the exact impact on cogenerators of federal, state and local tax policy is impossible because of ambiguous and incomplete regulations. It seems clear, however, that cogenerators receive favorable tax treatment compared to the traditional utilities. Cogeneration equipment, for example, generally qualifies for an energy tax credit pursuant to the Windfall Profits Tax Act of 1980. Pub. L. No. 96-223, 94 Stat. 229 (1980). With respect to real estate taxes and other local taxes cogenerators escape some of the heaviest taxes imposed on public utilities. Public utilities have traditionally been subjected to heavy taxation by state and local governments, both through imposition of taxes particular to utilities and assessment of utility property at high rates. Such tax treatment is not generally imposed with respect to cogeneration facilities. Testimony of Frederick J. Hunziker, Jr., General Tax Counsel, Consolidated Edison Co., Con Edison On-Site Generation, Case 27574 N.Y. PUB. SERV. COMM'N at 1214 (Jan. 1, 1980).

units, it is hardly clear that such use meets the policy of reducing the use of oil as a source of energy. Although the use of oil may be limited on a nationwide basis because of the use of industrial waste by-products as a fuel for cogeneration facilities, in some regions such as New York it appears certain that oil will be a continuing source of energy in cogeneration facilities. While the available evidence does not resolve the matter there appears to be a reasonable basis for asserting that the encouragement of cogeneration based on oil will not further the displacement of oil over the long term.¹⁷⁵ This continued use of oil in cogeneration facilities will effectively block the construction of non-oil fired generation which might save even more oil. This potential barrier to reduced use of oil hardly reflects the hopes that stimulated the enactment of section 210.

While impetus to encourage cogeneration is a positive response to the dramatic changes in the United States' use and supply of energy, the absence of a clear understanding of the likely consequences of section 210 and the cogeneration regulations, raises doubts about the success of this federal energy program. Experience under the cogeneration regulations and the states' regulatory response will provide an excellent case study for measuring the success of an innovative application of economic policy-making to a critical energy problem on a national level.

175. Important taxes collected from public utilities in New York include: the gross receipts taxes, sales taxes, sales tax on fuels and real estate taxes on production-related equipment. Con Ed, for example, pays New York City a six percent tax on its gross receipts. This tax is passed on to the consumers and represents an important part of the company's rates.

This distinction in taxation is not immaterial. Con Ed has calculated that the tax treatment it receives, comparing present taxes and the taxes it would pay if it were a cogenerator, would result in a difference of at least \$280 million yearly. Testimony of Hunziker, *supra* note 174, at 1217. This advantage alone makes cogeneration considerably more attractive than traditional electric generation. If these tax policies remain as sharply discriminatory as they are now, there will be a great, non-economic stimulus to shifting to cogeneration, wholly apart from any consideration of energy efficiency.

