CRIEPI REPORT

Deregulation of the Electricity Supply Industry

— International Status of Deregulatory Reforms —

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Synopsis

Deregulation in the power sector has become a world-wide phenomenon. In the US, impetus for competition was provided by PURPA of 1978, which obligated existing electric utilities to purchase surplus power from small scale generators and cogenerators. EPAct of 1992 expedited further liberalization of the power market.

In 1990, the electric utility industry was reshaped in a drastic way in Britain. The current proposal by the EU Commission to unify the European energy market is modeled on the British approach.

In Japan, the Electric Utility Industry Law was amended to liberalize the generation market and wholesale wheeling in 1995.

This paper deals with the global status of deregulation in the electricity supply industry. The objective is to identify typical deregulation models and to evaluate the performance of each model by investigating results in various countries.

From the global analysis of deregulation in the electricity supply industry, the following conclusions can be drawn.

First of all, it should be emphasized that the introduction of competition in the electricity supply industry is possible. Whereas network functions remain natural monopolies, other function -generation and supply- can be reorganized into competitive structures.

Based on this new understanding of the electricity supply industry, reform to introduce competition has been widely introduced in many parts of the world. Along with these reform movements, there is also a growing trend to give customers access rights.

Reflecting this trend, open-access models represented by pool models and retail wheeling models have become more and more common among various deregulation models.

As a result of deregulation, competition has produced significant increases in efficiencies in electric power supply system in some cases, especially under the pool system. But reform results vary significantly among the selected models, which reflects differences in problem analysis and reform goals, as well as organizational and ownership structure.

(Approved on September 12, 1995)

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PREFACE

Economic deregulation has become a global phenomenon. Since the latter half of the 1970's, the United States has liberalized its aviation, land transport and telecommunications sectors through measures such as abolishing price controls and restrictions to market entry. In the electric utility sector, impetus for competition was provided by the Public Utilities Regulatory Policies Act (PURPA) of 1978, which obligated existing electric utilities to purchase surplus power from cogeneration facilities and small scale generators that use renewable energy. The National Energy Policy Act (EPAct) of October 1992 expedited further liberalization of the wholesale power market.

In Britain, Prime Minister Thatcher's administration, upon assuming office in May 1979, pursued a policy of aggressive privatization of state-owned enterprises. In addition to British Aerospace (an aircraft manufacturer), Enterprise Oil (a petroleum development company), Jaguar (an automobile manufacturer) and companies in other industries where private ownership/operation was considered appropriate to a free economy, the Thatcher administration also privatized a number of public utilities, including British Telecom, British Gas, and CEGB (Central Electricity Generating Board: an electric utility). The new deregulated system for the electric utility industry was effectively introduced in April 1990. It is characterized by significant changes in both structure and functioning.

When these utilities were privatized, their markets became open to competition. The current plan proposed by the EU Commission to unify the European electric power market is modeled on the British approach. A consensus on the EU Commission's proposal will not be reached easily, due to widespread opposition from electric utilities on the European continent. However, if the plan is realized, the impact on European countries (other than Britain) promises to be enormous.

In Japan, liberalization of the electric power market has been a subject of controversy for years. In April 1995, the Electric Utility Industry Law was amended to liberalize the generation market and wholesale wheeling. This paper deals with the global status of deregulation in the electricity supply industry.

The objective is to identify typical deregulation models and to evaluate the performance of each model by investigating results in various countries.

This paper consists of two parts. PART(A) reviews the status of reform in 14 countries and analyses deregulation and its results. PART(B) consists of detailed case studies of the reform process in selected countries: England & Wales, the United States, Germany and the European Union.

The investigation was conducted jointly by the Central Research Institute of Electric Power Industry in Japan (CRIEPI) and the Institute for Energy Economics of the University of Cologne (EWI) in Germany. The contributors to this paper are Dr. Ingo Hensing, Thomas Klopfer, Christoph Riechmann, Prof. Dr. Walter Schulz, Oliver Werner (all of EWI) and Masayuki Yajima (CRIEPI).

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PART A International Status of Deregulatory Reforms

I Overview on the Reform Development

Since the late 1970's there is an increasing worldwide trend towards deregulatory reforms in the electricity supply industry (ESI).

The starting point of this development was the introduction of the Public Utilities Regulatory Policy Act (1978) in the United States, which opened the electricity generation market to a limited extent and since 1984 has led to the introduction of competitive bidding in currently more than 30 US-States.

Further important milestones in the reform development were the competitive reforms especially in Chile (1986) and England (1990) which were inspired by new reform ideas of two MIT-groups (Joskow/Schmalensee and Schweppe et al.) and the Chicago School of pure competition economists. In these countries the state-owned ESI was vertically disintegrated into separate generation, transmission and distribution companies and competition was introduced in both generation and the supply (retail sales) of the ESI. The English reform was especially important for two reasons. First it explicitly aimed at a full retail supply competition giving all customers competitive supply opportunities in a stepwise process up to the year 1998. Secondly, it introduced a short-term wholesale spot market for electricity (Pool) open for all market participants. The Norwegian reform (1991) followed the English example with a somewhat different approach. The Norwegian reforms are even more far reaching granting all customers formal access rights to the grid and competitive supply opportunities right from the beginning of the reform.

In the meantime a reform wave spread around the world (dates refer to key years of deregulatory reforms, e.g. years of major legislative acts):

- reforms in progress
  - New Zealand (1990)
  - Argentina (1992)
  - US (Energy Policy Act) (1992)
  - Australia (1993)
  - Finland (1993)

- reform-projects
  - Sweden (1992)
  - European Community /Union (1992)
  - US-States like California (1994)
  - Japan (1994)

In addition to these countries a large number of developing countries especially in Latin America and South East Asia are restructuring their ESI and introducing competitive elements.

Background of the Deregulatory Reform Trend

The following developments seem to be of importance for the deregulatory reform trend in the ESI:

- Liberalization and integration of markets

Growing competition especially in industrial markets causes cost pressure on the industries, increasing their sensitivity with respect to prices for electricity as an important productive input-factor.

- Deregulation of capital markets

Growing competition between all institutions and companies with capital needs in attracting investments causes efficiency pressures on the ESI as a capital intensive industry. Reorganization and privatization (if state owned) allow third-party financing of capital intensive generation or grid infrastructure projects.

- Deregulation of other network industries

Deregulation in other traditionally monopolistic industries with network characteristics such as telecommunications, railways, air traffic and gas supply gave their customers more choice and increased pressure to also reorganize the ESI.

- Trend towards decentralized electricity generation

Environmental concerns increased the public interest in decentralized electricity generation based on renewables and combined heat and power. New technologies especially based on gas also made decentralized generation economically attractive. Both trends pushed decentralized generation and increased problems between their operators and the traditional utility, demanding a competitive reorganization of the electricity industry.

II Synoptical Analysis of Deregulatory Reforms

1 The Degree of Competitive Opening

Deregulatory reforms differ significantly as regards the degree of competitive opening of the ESI.

	Competition in generation	Competition in supply of retail consumers	
		1994/initially	finally
England	yes	> 0.1 MW	all (1998)
Scotland	yes	> 0.1 MW	all (1998)
Northern Ireland	yes, limited	no	all
Norway	yes	all	all
Sweden	yes	all	all
Finland	yes	> 0.5 MW	all
New Zealand	not resolved yet	> 0.5 GWh	all (1994)
Australia	yes	> 10 MW	all (1999)
Chile	yes	> 2 MW	
Argentina	yes	> 5 MW	
US - PURPA[1]	additions only	no competition in supply	
US - EPAct[2]	yes	wholesale competition only	
California (proposal)	yes	> 60 kV	all (2002)
EU - TPA[3]-proposal	yes	> 100 GWh	
France SBS[4]- proposal	additions only	no competition in supply	
Netherlands	yes, to be resolved	> 20 GWh	
Portugal	yes, limited	> 50 kV and limited wholesale (8%)	
Spain	yes, limited	large retail and limited wholesale (eligibility criteria not yet decided)	
Japan	additions only	no competition in supply	

note:1. PURPA : the Public Utility Regulatory Policy Act of 1978

2. EPAct : the National Energy Policy Act of 1992

3. TPA : Third Party Access

4. SBS : Single Buyer System

Recent reforms also tend to introduce retail competition. Examples for this development are Sweden, Finland, Australia and California.

But there are some exceptions from this trend:

- Countries with special interest in nuclear power do not fully trust in competitive mechanisms' ability to attract an optimal investment behavior (e.g. France and Japan). They would prefer to restrict competition to capacity additions to continue the use of central long-term planning of the ESI.
- Small isolated countries fear the unpredictable effects of competitive entry in generation and/or the loss of economies of scale in generation (e.g. Ireland).
- Small interconnected countries fear discriminative competition by outsiders because of a lacking level playing field (e.g. Portugal).
- Developing countries are lacking in basic preconditions for the introduction of far reaching competition: a cost reflective price system, metering and telecommunications infrastructure, etc.

2 The choice of reform model

As shown in the table below the reform models which have been implemented or are presently under discussion can be basically classified into 3 models:

- competitive bidding (for new capacity additions)
- wheeling (wholesale / retail)
- pool (mandatory / voluntary, access for all parties / cooperative generators')

Δ CPI	=	annual rate of inflation, measured by the Consumer Price Index-All Urban
1.4%	=	productivity growth factor for non-generation activities
CGA	=	customer growth allowance equal to $773 (1995$) reflecting the average marginal cost for adding a new customer
Δ Customers	=	annual change in number of SCE's retail customers

Structure of the Cost of Capital Trigger Mechanism

The Cost of Capital Trigger Mechanism will be used to revise the benchmark rate of return to be established in 1995. The trigger mechanism will adjust SCE's return on common equity based on interest rate changes. The major objectives of the mechanism are to: (1) insure that changes in interest rates do not cause large differences between the returns authorized in the rate case and those required to fairly compensate investors, and (2) provide safeguards for shareholders and ratepayers.

Currently, the regulatory Cost of Capital proceeding determines annual levels for SCE's capital structure and embedded cost of debt and preferred stock. The trigger mechanism will prohibit adjustment to revenues if changes occur in these items. Hence, cost risk is borne by the shareholders. The trigger mechanism provides SCE with the incentive to optimize its capital structure by permitting substitution between the lower cost of debt resulting from a high equity ratio and the lower cost of maintaining a less equity.

Structure of the Net Revenue Sharing Mechanism

The Net Revenue Sharing Mechanism is designed to limit shareholder gains or losses - in effect, avoiding extreme outcomes. SCE's mechanism is reasonably similar to revenue sharing mechanisms used in the telecommunications industry where price-cap regulation is in effect. SCE's mechanism has been structured with a balance of risk and reward in line with the CPUC's philosophy. In this regard, the CPUC has ruled that:

"... a regulatory mechanism which provides some self correcting protections is more likely to be sustainable and thus would provide more predictable and longer run incentives to utility management than would a pure price cap model. A regulatory structure which combines the price cap indexing approach with a sharing mechanism can provide protection to both shareholders and ratepayers from the risks that the indexing method may over-or underestimate the revenue changes which are needed to

keep the utility financially healthy--but not too healthy." (CPUC Decision D.89-10-031, p.174)

SCE's Net Revenue Sharing Mechanism is based on its after-tax rate of return on rate base. To maximize the shareholder incentive to improve operating efficiencies, a 1.5% bandwidth would be established both above and below a benchmark return. Within this +/-1.5% bandwidth, shareholders would be at risk for all variations in earned returns. Incremental or decremental returns outside this bandwidth would be shared equally between shareholders and ratepayers. If SCE's calculated returns are = or > 3.0% above/below the benchmark, a formal regulatory review could be initiated.

Structure of "Z-Factors"

No ex ante mechanism can predict the impact on utility performance of factors mostly or entirely out of the control of the utility. The impact of these external factors or externalities must be accounted for so as not to unduly penalize shareholders and ratepayers for negative impacts that the utility has little or no control to mitigate or prevent.

To treat both shareholders and ratepayers fairly with PBR mechanisms based on broad indexing formulae, a common tool used is a "Z-factor". "Z-factors" are designed to allow for exceptional recovery of large unpredictable costs. The major cost uncertainties considered are:

- Major changes in government-mandated fees and taxes
- Major changes in government regulations
- Significant costs associated with claims of exposure to nuclear radiation or EMF resulting from SCE's operations
- Significant accounting changes

To screen the use of "Z-factor" adjustments, a threshold cost criterion has been proposed; i.e., the revenue/cost impact would have to exceed +/-$10 million in revenue requirements.

SCE has proposed a revenue sharing mechanism that integrates both non-generation and generation activities, pending CPUC approval.

Structure of the Service Quality Performance Mechanism

The implementation of a PBR mechanism could raise concerns about deterioration in service quality. To provide concrete assurances that service quality standards will be maintained, a service quality mechanism has been proposed based on measures of customer satisfaction and service reliability. A survey would measure customer satisfaction and the average annual minutes of service interruption would measure service reliability.

SCE proposes a limited deadband below recent performance, with financial penalties for performance below this deadband. There would be a maximum penalty of $5 million per year for each of the two performance measures. This is intended to reduce controversies and streamline application.

Structure of the National Rate/Bill Performance Mechanism

The average rates of SCE and other California utilities are significantly higher than other major utilities across the country. These higher rates are due, in part, to demographic characteristics - low usage per customer compared to the national average - as well as the relatively high-cost mix of electric supply.

SCE's average rates have increased significantly greater than the US average rates. Some of this increase is due to the increasing differential between SCE's average use per customer and the national average use per customer. More importantly, the major cost driver over the last several years has been increasing fixed energy (kWh) payments made to third-party generators for energy (kWh) under long-term standard offer contracts that have been very favorable for the third-party generators.

The National Rate/Bill Performance Mechanism is designed to provide incentives for continual improvements in SCE rates relative to the national average rate and customer bill levels. The inclusion of customer bill performance measure is designed to counterbalance the DSM disincentive created by a rate measure alone.

The mechanism provides rewards or penalties up to $10 million, based on SCE's ability to reduce customer average rates and bills compared to the national average. The performance mechanism would not reward SCE unless it improved at least 1% per year compared to the national average of investor-owned utilities. SCE would incur a penalty if its performance declined relative to the national average.

The formula for the rate/bill comparison is as follows:

$$SARB = 0.5 \times (SAR_{SCE} / SAR_{US} + SAB_{SCE} / SAB_{US})$$

where: SARB = System Average Rate/Bill index for SCE

SAR = System Average Rates (subscripts refer to SCE and US)

SAB = System Average Bills (subscripts refer to SCE and US)

There are important considerations involved in designing this mechanism. First, there are concerns that average rate comparison mechanisms create an incentive for utilities to increase sales. Increasing sales spreads costs over a larger customer base, hence, reducing the average rate charged per kWh. DSM advocates argue that customer bills are the most important economic consideration - not rates. Lower rates induce increased consumption - in the absence of DSM programs. This is the position of DSM advocates but its merit in the long-run has yet to be proven. Conversely, a mechanism based on bill comparison would, in effect, penalize all increases in usage per customer. The integration of rate and bill measures is intended to make the mechanism neutral with respect to load reduction as well as load building.

The second consideration deals with fuel and purchased power costs. The potential volatility of fuel and purchased power costs raises the concern that a national rate/bill comparison could expose SCE to penalties or rewards for events outside their control. To reduce this concern, SCE has proposed an incentive that is based on performance change from year-to-year rather than cumulative performance.

Evaluation of Risks from SCE's PBR Mechanism

The overall impact of the components of SCE's PBR Mechanism is to shift the risks of revenue shortfall and cost variations from ratepayers to shareholders. Also, ratepayers will bear less risk of cost increases due to external factors and shareholder will bear more risk. To the degree that SCE shareholders are not compensated for their increased risk burdens through the cost of capital proceedings, the balance of net benefits shifts to the ratepayers.

Although the Net Revenue Sharing Mechanism increases the potential gain for shareholders of costs are reduced below a target level, it also increases the potential for losses from external events outside the control of the utility. This causes increased variability of SCE's earnings.

Increased variability of earnings is a negative from the standpoint of investors who have traditionally valued the electric utility industry for its stable cash flows. However, in the evolving environment of competition in the US electric power industry, the ability to earn profits related to performance also includes the risks of loss due to non-competitive performance. This translates into a riskier profile for the utility from the perspective of potential investors.

The Revenue Indexing Formula also increases the variability of earnings. Since the mechanism uses a consumer price index (CPI), to the benefit of the consumer, it may not accurately reflect the cost inflation for inputs, labor, etc. faced by SCE. Also, SCE may not be able to attain the productivity factor specified in the formula, subsequently lowering earnings potential relative to expectations.

The adjustment for customer growth can contribute to lower earnings as the actual costs for adding a new customer may vary over time and across customers. Also, the extended time period between general rate cases adds to the risks of imbalances between costs and revenues.

As discussed earlier, there will be increased risk from the Cost of Capital Trigger Mechanism arising from interest rate variations and changing capital structure. The mechanism is designed to only adjust for major changes in costs considered beyond the reasonable control of SCE management. It will not adjust for changes in the cost of long-term debt, preferred stock, or capital structure. Normal returns required by investors may be at risk as the mechanism may not adjust adequately for changes in interest rates and optimal capital structure since it is designed only to prevent large impacts. The impact of only moderate increases in interest rates on required returns on common equity as well as the embedded costs of debt will be substantial losses.

Changing capital structure requirements can also reduce shareholder earnings. If regulations that previously allowed utilities to have significantly lower equity ratios than other industries are changed to require utilities to maintain higher equity ratios, shareholders will bear the costs. Shareholders would bear the cost difference between debt and higher cost equity as well as any tax impacts. SCE estimates that for each 1% increase in equity, there would be a resulting decrease in shareholders' return on equity of 0.13%. If SCE were to align its capital structure with that of the telecommunications industry, it could require an increase in equity of up to 5%, resulting in a shareholder cost of a decrease in return on equity of 0.65%.

Transitional Issues

The current uncertainty in California regarding restructuring of the electric utility industry has been reflected in SCE's phased approach to PBR mechanisms for both the non-generating business activities and the generating business. The main focus of the CPUC's restructuring proceedings appears likely to be power supply markets. In the CPUC's Phase 1 of industry restructuring proceedings, SCE has filed its Non-Generation PBR Mechanism. In Phase 2, when SCE plans to submit its Generation PBR, additional structural changes may have occurred, necessitating modifications to their Generation PBR.

The separation between generation and non-generation base rate revenues will be a major consideration in the transition. SCE proposes a separate PBR formula for base rate revenues for generation and non-generation activities. If direct access ultimately results from the CPUC industry restructuring proceedings, concerns about cross-subsidy between generation and non-generation sectors will likely develop. This probably will necessitate separation of costs as well as revenues.

5.4 Pacific Gas & Electric (PG&E)

PG&E submitted its proposal for PBR in mid-1994 to the CPUC. PG&E has since withdrawn its proposal and is in the process of revising it. It is not likely that the revisions will significantly alter their original proposal. The basic components of PGE's PBR framework are: (1) a revenue indexing mechanism, (2) a shared earnings mechanism, and (3) performance incentives.

The approach proposed by PG&E for determining electric and gas base revenue requirements is very similar in structure to the SDG&E and SCE mechanisms. Basically, there is a link between authorized revenue and the cost of service. However, in this case, PG&E's costs are not subject to detailed review by the CPUC. PG&E must manage its costs consistent with the revenue determined by its indexing formula. The shared earnings mechanism is designed to keep their base revenue requirement in line with costs. The performance incentives are designed to motivate PG&E to operate more efficiently and productively and maintain service quality.

It is important to note that in PG&E's initial proposal the same formula is applied to both electric and gas activities whereas with SCE's electric activities, it has specific PBR mechanism for generation and non-generation activities.

Structure of the Revenue Indexing Mechanism

Most of PG&E's base revenue requirement will be determined by a revenue indexing mechanism applied independently to gas and electric operations. The formula for indexing PG&E's base revenue for both gas and electric activities is as follows:

$$IBR_t = IBR_{t-1} \times (1 + i + c - p) \pm SE$$

where:

IBR = indexed base revenue to be authorized (subscript t annual time period)

i = recorded inflation for the 12 months ending June 30 of year $_{t-1}$

c = recorded customer growth for the 36 months ending June 30 of year $_{t-1}$

p = productivity factor

SE = amount of shared earnings (savings), if any

PG&E had proposed starting its PBR mechanism in 1995, however, given the recent withdrawal of their proposal, the start will most likely be delayed. PG&E has proposed that the determination of base revenue in the PBR framework exclude the revenue contributions of three components: (1) funding for the Customer Energy Efficiency program, (2) the Large Electric Manufacturing Class (LEMC), and (3) the Diablo Canyon Nuclear Plant. It has been proposed that the CPUC continue a detailed review these components independent of the proposed PBR mechanism.

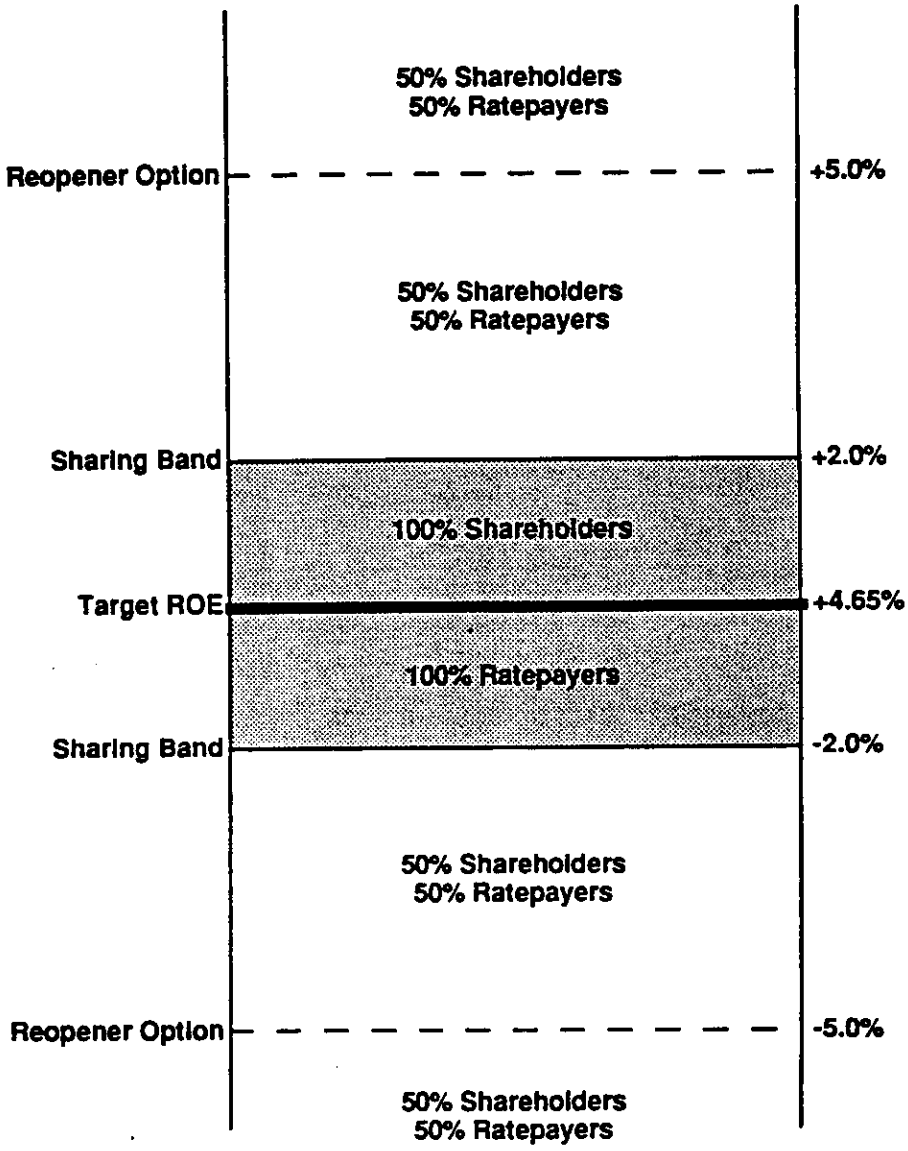
Structure of the Shared Earnings Mechanism

The shared earnings component is designed to act as an incentive for PG&E to enhance operating efficiency and productivity while maintaining its costs in line with the revenues determined by the PBR mechanism as well the components determined by the CPUC. The basic structure of PG&E's shared earnings mechanism is very similar to the mechanisms of SCE and SDG&E.

The target return measure is utility operating return on equity (ROE). The same target ROE will be used for both the gas and electric mechanisms. The shared earnings will be calculated separately for gas and electric operations. The basic components of the sharing mechanism are represented in Fig.V-5 and summarized below:

- utility ROE up to and equal to 2% above and below the target ROE will be allocated 100% to the shareholders and will have no impact on base revenue
- utility ROE >2% above or below the target ROE will be allocated 50%/50% between shareholders and ratepayers. In this case, base revenue will change by ±50% of the amount ROE is above or below the target

Fig.V-5 Pacific Gas and Electric company diagram of shared earnings mechanism



As with the other utility shared earnings mechanisms, the risks for revenue shortfalls are shifted from the ratepayers to the shareholders.

PG&E proposed to use ROE instead of return on rate base (ROR) for two mains reasons:

- using a risk premium approach to estimate target ROR is less efficient because embedded costs of debt and preferred stock don't move in a one-to-one correlation with the Treasury Bond market, a prime indicator of financial risk

- ROE measures the return earned for common shareholders after the utility has met its financial responsibilities to creditors and preferred shareholders while ROR measures the return earned for all investors - including common shareholders

A simplified formula for the shared earnings is as follows:

$$SE_t = [(\text{PG\&E ROE}_{t-1} - \text{Target ROE}_{t-1}) \times (\text{Rate Base}_{t-1} \times \text{Equity Ratio})] \times 50\% \times \text{Income Tax Adjustment}$$

where:

SE	=	shared earnings (subscript t refers to year)
Rate Base	=	rate base for 12 months ending June 30 of year $_{t-1}$
Equity Ratio	=	authorized equity ratio

The target ROE is a proxy for the competitive return required by market investors. The target ROE will approximate the competitive market ROE only if the proposed risk/reward structure is symmetrical. Symmetry reduces the chances that PG&E's returns would be consistently above or below competitive market returns.

The range of the deadband $\pm 2\%$ is designed to place a significant level of risk upon shareholders. The purpose is to provide a strong incentive for management maximize efficiency and productivity. PG&E returns >5% above/below the target ROE will trigger an option, implementable either by PG&E or the CPUC, for review of indexing and performance standards. This threshold should place significant risk upon shareholders and yet not allow a significant difference between base revenue and base costs that could jeopardize PG&E's financial position.

Structure of the Performance Incentives

PG&E proposed rewards and penalties for performance standards in three areas: (1) energy bills, (2) customer satisfaction, and (3) electric service reliability. The existing Customer Energy Efficiency standard will be retained as a performance incentive.

The Energy Bills performance standard has been proposed to spur PG&E to lower its residential electric and gas bills relative to the national average bills. PG&E has focused on customer bills rather than rates simply because customers are more familiar with bills than rates and respond more readily to significant changes in their monthly bills.

A 5-year moving average reference ratio of residential average revenue per customer in PG&E's service territory to the national average will be used as the benchmark. After the reference year, annual ratios will be compared to the benchmark. If a ratio for a given year is lower than the reference ratio, PG&E will be rewarded and vice versa. The maximum award/penalty is $25 million allocated $19 million for electric and $6 million for gas.

The Customer Satisfaction performance standard will utilize an existing customer survey called Quality of Service Evaluation Plus to measure residential customers' satisfaction with electric and gas service transactions. The 1994 survey results would serve as the benchmark. Again, performance above/below the benchmark will be subject to a reward/penalty. The maximum award/penalty is $25 million allocated $19 million for electric and $6 million for gas.

The Electric Reliability standard has been designed to induce PG&E to maintain or improve its quality of service in terms of reliability. PG&E tracks three key measures for sustained and momentary electric service outages: (1) the total number of sustained and momentary outages, (2) the total number of customers affected by outages, and (3) the average number of customer minutes taken to restore service from a sustained outage. A 5-year moving average mechanism like that used in the Energy Bills performance standard would be employed.

Flexible Pricing

In response to the increasing competition for electricity supply to large manufacturing customers, PG&E has proposed a pricing mechanism independent of the existing tariff rates. Currently, PG&E's only tool to respond to competitive threats is a cogeneration

deferral contract. This contracting process is time-consuming and potentially costly. It is also somewhat of a blunt instrument where a precision tool is required.

PG&E has proposed to offer flexible pricing options to manufacturing customer accounts with over 2,000 kW average hourly electricity usage (approximately 17.5 million kWh per year). PG&E has proposed that standard rates for the large electric manufacturing class (LEMC) be determined by a formula which indexes rates for firm and interruptible tariffs to the Producer Price Index for Industrial Power (PPI-IP). The proposed LEMC tariffs offer enhanced pricing flexibility by combining short-and long-term contract options with a portfolio of firm and non-firm service options.

The standard firm service tariff would be modified to incorporate PG&E's Economic Stimulus Rate (0.4 ¢ /kWh energy charge credit) plus an additional off-peak energy charge credit of 1.0 ¢ /kWh. This would provide downward price flexibility. The objective would be to stimulate increased manufacturing capacity utilization during off-peak hours. Currently, PG&E's non-firm service rate level is competitive with energy rates in other states.

PG&E has proposed several long-term tariff options: (1) the Extended Service Option, (2) the Cogeneration Deferral Option, (3) the Business Retention Option, and (4) the Business Attraction Option.

The Extended Service Option would give a 5% discount to the applicable rate for a 10-year contract for firm and interruptible service. The Cogeneration Deferral Option would be available to customers where cogeneration is technically feasible and who are willing to invest in cogeneration. This would require a 10-year commitment and escalation would be based on an index weighted 40% natural gas costs and 60% appropriate capital costs.

The Business Retention Option would be offered to manufacturing customers at risk for relocating out-of-state. The starting point and escalation of the this 10-year contract rate would be based on the average industrial electricity prices in the competing state location. The Business Attraction Option is designed to attract firms expected to qualify as an LEMC customer or induce an existing customer to add at least 4.38 million kWh per year. There are two contract options of six-and 10-year lengths with compatible escalation provisions.

These proposed options would allow PG&E increased flexibility in pricing and administration to meet competitive challenges in its service territory with the context of the overall regulatory framework.

6 Outlook

Wholesale Competition

Governmental and regulatory authorities will foster the development of competitive wholesale markets in the future, as they did in the past through the enactment of PURPA and EPAct. With the PURPA provisions the Qualifying Facility, based on environmental friendly technologies, were introduced as a new class of generators. While these generators had only the possibility to compete against the utilities' planned generation facilities in a competitive tender for capacity additions, EPAct, through its creation of a new generator class and its far reaching transmission rights, enabled independent power producers to compete against the existing generation facilities of utilities. Transmission Orders of the FERC according to section 211 FPA and non-discriminatory transmission services will secure market access for entities, even not owning transmission facilities.

Retail Competition

The retail wheeling debate shifted the attention from the wholesale level to the retail level. Although EPAct prohibited FERC to order a retail transmission service, it did not prevent states to deal with retail wheeling issues. Some states (e.g. California, Michigan) interpreted the provisions of EPAct as an invitation to begin and proceed with the implementation of retail competition. Customers in states, which have not implemented retail competition, will exert pressure on state authorities to enable them comparable access to low-cost energy and financial arrangements such as contract-for differences. PoolCos could help to resolve technical problems associated with direct access for ultimate customers (integrity of system reliability, mitigation of market power, unjust and unreasonable allocation of costs between contestable and captive customers).

Disintegration/Unbundling

The vertical disintegration of the electric service industry will continue as a result of federal jurisdiction (such as PURPA and EPAct) as well as of the implementation

policies of FERC and the states. The Exempt Wholesale Generator (EWG) will be allowed higher profit margins, compared with generation facilities included in a rate base. Therefore utilities will probably be motivated to spin-off rate-base generation facilities to affiliated EWG entities or even to sell-off their generation facilities to independent third parties. The open transmission access NOPR will require utilities to charge separately for different transmission services. The utility has to unbundle its transmission services from other parts of the utility (i.e. separate cost accounting). The implementation of retail competition either on a bilateral basis or in form of a PoolCo compels the utilities to transfer their dispatch activities to an independent system operator. The physical delivery to ultimate customers through distribution companies will be separated from financial arrangements, offered by merchants and brokers. Regional Transmission Groups will possibly operate the transmission grids of member utilities. Far reaching models propose to detach the transmission grids from the utilities and to incorporate them into a Regional Transmission Company.

Market Organization

Price indices like the California-Oregon respectively the California-Nevada Index and power pools, will provide the market participants with price signals which much better reflect the scarcity or availability of electricity than the current structure both in short and in the long-run. Customers will have incentives to reduce demand if prices are high and vice versa. Investment decisions will rely on scarcity signals (e.g. high spot prices) instead of political influence. Imprudent outlays will be more improbable as in the current system, since investors bear the risks associated with investment decisions instead of customers. Real-time networks, open transmission tariffs and Regional Transmission Groups will grant the market participants access to the market. A level playing field will be achieved.

VI Germany

1 The Structure of the German ESI

The German ESI is a three-layer-system consisting of 9 interconnected utilities, 46 regional and about 800 local (municipal) utilities (tables VI.1 and VI.2).

Nine interconnected utilities (8 in West Germany and 1 (VEAG) in East Germany) operate the grid (380/220 kV) in their respective "delivery areas"[7]. This group of utilities accounts for about 2/3 of electricity generation by public utilities and for about 1/3 of total electricity sales to final consumers in West Germany. In East Germany VEAG still accounts for more than 90 % of total electricity generation. VEAG's share will decrease in the near future as more decentralized CHP capacity will be built. Only one of these nine companies is wholly privately owned (PreussenElektra), the others have a mixed public/private ownership (table VI.2). Public shareholders are mostly States or municipalities.

The delivery areas of the interconnected utilities are protected from competition by (horizontal) demarcation contracts between neighboring utilities, their franchise areas[8] are secured by concession contracts with the local political entities (municipalities or districts) which accord them the exclusive right of use of public ways for laying electricity wires and cables.

56 regional utilities (42 in West Germany, 14 in East Germany as of 1992) serve mainly the less densely populated (rural) parts of Germany. Their size, measured by total sales to final customers and distributors, ranges from 11 Twh/yr to less than 500 Gwh/yr. Together they account for 37% of total electricity sales to final customers but supply 71 % of the German territory. Their "delivery areas" are protected by vertical and horizontal demarcation contracts. Regional utilities buy most of their electricity from the interconnected utility in whose delivery area they are located. Some of the interconnected utilities are part-owners of regional utilities located in their "delivery

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7 Delivery area = area in which a interconnected utility supplies exclusively distributing utilities

8 Franchise area = area in which a utility supplies exclusively final consumers

area". In East Germany regional utilities still account for roughly 9/10 of total sales to final customers (compared to less than 1/3 in West Germany). This share will decrease sharply in the future because many municipal distributing utilities will be created.

Municipal utilities account for somewhat less than 1/3 of electricity sales to final customers and buy most of their electricity from interconnected or regional utilities. Their own generation accounts for less than 1/10 of total electricity generation by public utilities.

Besides these three groups of public utilities there exits some big non-utility generators, mainly power plants operated by the hard coal mining industry, which sell most of their electricity output to interconnected utilities under long-term contracts. These big non-utility generators account for roughly 1/10 of total electricity generation.

Industrial own-generation of electricity, which is based mainly on CHP, has fallen behind utility generation. At present, industrial own generation amounts to about 50 TWh (about 10% of total electricity generation) of which about 20 TWh is fed into the "public"[9] grid.

The smallest group of players comprises non-utility generation on the basis of renewable energy, mainly small hydro and wind energy.

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9 There is a distinction between total electricity industry (including electricity production by industry and the railways) and so-called public electricity industry which comprises only public utilities. The figures in tables VI.1 and VI.2 refer to the public electricity industry.

Table VI.1: The groups of players in the German ESI (1992)

	West Germany			East Germany		
	Net Generation	Sales to distributors	Sales to final customers	Net Generation	Sales to distributors	Sales to final customers
	TWh	TWh	TWh	TWh	TWh	TWh
Interconnected Utilities	254	164	128	51	49	0
Generators (Mining industry)	36	18	4	-	-	-
Regional Utilities	31	41	104	3	0	48
Municipals	30					
Other Generators	18		127			
Total	369	406	363	54	49	52

	%	%	%	%	%	%
Interconnected Utilities	69		35	94	100	0
Generators (Mining industry)	10		1	-	-	-
Regional Utilities	8		29	6	1	91
Municipals	8					
Other Generators	5		35			
Total	100		100	100	100	100

Table VI.2 gives an overview on the biggest individual players. The three biggest interconnected utilities, taken together, account for nearly 1/2 of electricity generation, 1/3 of total sales to distributors and 1/6 of totals sales to final customers.

Table VI.2: The biggest individual players in the German ESI (1992)

	Net Generation	Sales to distributors	Sales to final customers	Net Generation	Sales to distributors	Sales to final customers
	TWh	TWh	TWh	%	%	%
Interconnected Utilities						
RWE Energie	102	53	62	24	12	15
PreussenElektra	51	51	5	12	11	1
VEAG	51	49	0	12	11	0
Bayernwerk	28	33	2	7	7	0
VEW	20	11	18	5	2	4
EVS	16	8	10	4	2	2
Badenwerk	15	8	9	3	2	2
HEW	12	0	12	3	0	3
BEWAG	10	0	10	2	0	2
Generators (mining industry)						
STEAG	7	7	0	2	2	0
VEBA KW-Ruhr	15	11	4	4	2	1
Regional Utilities						
OBAG	1	4	7	0	1	2
IAW	6	3	7	2	1	2
LEW	1	3	6	0	1	1
EAM	0	2	7	0	0	2
Municipal Utilities						
Munich	5	0	6	1	0	2
Cologne	2	1	5	1	0	1
Stuttgart	5	1	4	1	0	1
Bremen	3	0	4	1	0	1
Subtotal biggest players	349	244	178	83	54	43
Total	422	454	415	100	100	100

2 The Legal and Regulatory Framework of the German ESI

2.1 The Present Situation

The basic laws which apply to the electricity and gas industry in Germany are the Energy Industry Law (Energiewirtschaftsgesetz, EnWG) and the Anti Cartel Law (Gesetz gegen Wettbewerbsbeschränkungen, GWB). The Energy Industry Law was introduced in 1935 and will be amended in the near future. The Anti Cartel Law was introduced in 1957 and has hitherto been amended five times; it will probably be amended again soon. The electricity and gas industries are exempt from the inhibition

to form cartels: exclusive franchise areas are allowed, so that no direct electricity-on-electricity-competition exists.

A framework agreement (Verbändevereinbarung) between the Association of Electric Utilities (VDEW), the Association of Big Industrial Energy Consumers and Producers (VIK) and the Association of German Industry (BDI) establishes rules for determining in each instance the prices which are paid for surplus electricity fed by industrial own generators into the public grid. The remuneration should reflect the avoided cost of the respective utility.

The prices for surplus electricity paid to small non-utility generators of electricity based on renewable energy are fixed by law (Stromeinspeisungsgesetz, enacted in 1991). The prices paid to non-utility generators are calculated as a percentage of the average value over all utilities of electricity sold to final customers (wind and solar 95%, hydro and other renewables 75%). Remunerations are not based on the principle of avoided cost.

The fourth and fifth amendments to the Anti Cartel Law have brought some small moves towards introducing some competition by weakening the exclusive rights: the duration of an exclusive concession granted by a municipality to serve its territory is now restricted to 20 years; a rival concessionaire must not be hindered by demarcation contracts to enter the market (a demarcation contract would be invalid in such a case); it has been made more difficult for a utility to refuse access to its network by third parties.

These amendments indicate that the attitude towards the monopoly position of utilities was changing in the past already. The public and the politicians were no longer convinced that utilities must be granted unassailable monopoly positions. On the other hand, there was no vision of how a competitive organization of the electricity industry could be created. At any rate, the minor changes in the legal framework did not kindle competition. When concessions expired, there were renewed and there was not a single case in which a competitor tried to enter the field.

As concerns access by third parties to the grid, the burden of proof has been put on the utility. If it refuses to transmit power for a third party, it must prove that there is no capacity available or that transmission would impair the supply of its own customers. So far, only one company - the newcomer Wintershall on the German gas market - has taken its demands for conveyance of gas by an East German gas utility to the cartel

office and the courts. This case confirms the general feeling that competition by means of TPA will not develop under the present legal and regulatory system.

The Federal Cartel Office argues that demarcation contracts and exclusive concession contracts (giving the utility the exclusive right to use public rights of way for electricity transmission cables in the town or district) are not allowed by the European law. It has taken action, on the basis of Article 85 of the Treaty of Rome, against RWE Energie AG over an exclusive contract to supply electricity to the town of Kleve near the Dutch border. Under this Article, the exclusivity clause represents a restriction to trade between companies in different EU countries. Although Article 85 deals with transborder transactions, it is likely that the outcome of this legal action will be applicable to other exclusive contracts inside Germany (domino effect under the bundle theory). RWE has applied to the Commission for exemption of the concession contract from Article 85 (because a legal battle with the German Cartel Office will not encompass the European dimensions of the case). The Federal Cartel Office has also taken action against Ruhrgas und Thyssengas over a demarcation contract.

In view of these individual cases and the EU proposals for directives it is to be doubted if exclusive franchise areas can survive much longer. At any rate, there is so much uncertainty about them that already now they can serve no more the purpose of providing planning and investment security for the utilities.

2.2 Proposed Changes in the Legal and Regulatory Framework

There exist contrasting proposals for far-reaching changes in the energy policy framework which lead into opposite directions.

Proposals by the Social Democratic Party

The proposal by the Social Democratic Party for a new energy law aims at a stronger and more ecologically oriented regulation of the electricity (and gas) industry. It would strengthen the influence of the municipalities, provide for a tighter control of investments undertaken by electricity (and gas) companies and would extend the supervision of electricity prices to non-tariff consumers (as well as to gas and district heat).

Proposals by the Federal Ministry of Economics

In contrast to this and as part of a wider deregulation movement, reforms proposed by the Federal Ministry of Economic Affairs aim at increased competition and deregulation. The Ministry has drawn up a draft new energy law and amendments to the Anti Cartel Law which would abolish some of the existing institutional barriers to entry, in particular demarcation contracts, the exclusivity of concession contracts and vertical price agreements concerning sales for resale. The proposal aims at a regime of negotiated TPA without, however, creating a market for electricity. This would create a retail wheeling system with individualized access. The conditions would strongly depend on individual negotiations.

The draft energy law includes the following changes:

- Only new energy suppliers of tariff customers would require a license. At present a generator wanting to supply any third party must first be licensed. With this change, many smaller generators including operators of renewable energy plant which supply few customers could avoid considerable bureaucracy.
- The state supervision of investment in power stations and transmission cables would be abolished. The Price Supervisory Offices of the states would be maintained to protect tariff customers who have no choice of supplier.
- An energy planning procedure for high voltage lines would be introduced to speed up the planning phase of such projects.
- Simple rights of way would have to be granted at least every twenty years by municipalities for the laying of distribution cables to supply third customers. Where several companies bid, the municipality must make its final choice public and explain the reasons for its decision.
- Larger utilities would have to unbundle their accounting procedures for purchase and/or generation of electricity from transmission grid accounting. Utilities with an annual electricity sales figure of under 500 GWh would be excluded from this requirement.

The proposed amendments to the Anti Cartel Law include:

- Demarcation contracts between utilities or between utilities and other bodies would no longer be allowed as an exception to cartel law.

- The exclusivity of concession contracts between utilities and municipalities would be abolished. Competitors would be able to build lines and supply consumers in hitherto closed franchise areas.
- Contracts on vertical pricing arrangements between utilities and distributors would no longer be allowed.
- No "unfair" refusal of TPA would be allowed. Only three grounds for refusal would be considered fair: if the owner of the grid has insufficient capacity, if the transport levy is unreasonable and if it becomes impossible to supply other existing customers under reasonable conditions.

Proposals by the Federal Ministry of the Environment

The Federal Ministry of the Environment seems to favor a further-reaching reform with an independent grid company and the introduction of a wholesale pool system for electricity trading. Competition would be restricted to the parties connected to the transmission grid. At lower voltage levels the present legal system would prevail. The franchise areas of municipalities and their generation and other decentralized generators would be sheltered from competition. Introduction of competition should be supplemented by an ecological framework including an energy/CO_2-tax in the European Union and bonus/malus payments based on environmental characteristics of fuel and power plant technology.

It is argued that a TPA-only regime (i.e. retail wheeling system) would have severe drawbacks: Interconnected utilities are in a dominant position vis-à-vis regional and local utilities and could go cherry-picking in the service areas of these companies. On the other hand, interconnected utilities often hold ownership rights in regional utilities and might therefore not attack them. They would, however, not compete vigorously against each other. Although municipalities often hold ownership rights in interconnected utilities it would be difficult for them to put up a common front against them and protect themselves from competition. Industrial and municipal auto-producers would face high market-barriers due to transaction costs and discrimination by interconnected utilities. It is further argued, that CHP-schemes would be injured by competition under a TPA-only regime.

3 Reactions from the ESI to the Proposals for Reform

The Position of the Interconnected and Regional Utilities

The German ESI comprises 9 interconnected utilities (Verbundgesellschaften) and 56 regional utilities as of 1992. The interconnected utilities operate the interconnected grids (Verbundnetz), account for about 2/3 of generation and sell about 1/2 of their electricity via regional and municipal utilities. In many cases interconnected utilities are part-owners of the regional utilities which they supply.

The association of the interconnected utilities (Deutsche Verbundgesellschaft; DVG) and the association of regional utilities (Arbeitsgemeinschaft regionaler Versorgungs-unternehmen; ARE) have published a joint declaration: "For undivided competition in electricity in Germany" (February 2, 1994). The position paper does not oppose moves toward competition but stresses the need for a level playing field. DVG/ARE fear that some of the proposals made in Germany (which would preserve the monopolies at the municipal level and increase regulatory intervention) and at the EU level (preserving monopolies in some Member States to fulfill public service obligations) would lead to one-sided competition. The main points made are:

- The interconnected and regional utilities have always spoken in favor of closed franchise areas for utilities. One important reason was, that a unilateral opening up of the German electricity market would lead to "competition as a one-way route", especially if there was no harmonization in Europe.

  There is obviously no longer a consensus at the political and societal level in favor of such a regime. In Germany the fourth and fifth amendments to the Anti Cartel Law had already created a "two-class society". Recent proposals made by the European Parliament, by the German Bundesrat (the representation of the States at the federal level) and by the States ministers for the environment would move the system still further in this direction because they except public monopolies at the national, regional and local level from competition.

  Competition would thereby be distorted to the detriment of the German interconnected and regional utilities. This would initially cause a massive concentration in German electricity generation, it would weaken the position of German electricity generators in the longer term and the electricity supply in Germany would become more and more dependent on a small number of foreign state monopolies.

- In view of this real danger of a misdirected development of the electricity sector the interconnected and regional utilities recommend measures which allow undivided competition at all levels to develop.

  The German government should fight for an open European electricity market to secure a level playing field and reciprocity. Proposals which impede this development, such as the proposals made by the European Parliament, are regarded as backward steps which are not compatible with the European law and not acceptable. Inside Germany, opening up the market must not stop at the city gates. In this respect, the amendments proposed by the federal Ministry of Economic Affairs are half-measures.

  If competition is introduced, there should be a level playing field. There must be no privileged state monopolies either at the national, regional or local level.

- The interconnected and regional utilities object to a German electricity pool or other forms of a nationalized or state-controlled grid company. They argue that this would not lead to competition but to more centralization and politization by way of government-enforced unbundling and other forms of state-access to the companies' productive means such as mandatory TPA or periodic access of municipalities to the local network.

- The fourth amendment of the Anti Cartel Law limited the duration of concession contracts to 20 years. However, no formal auctions for concessions were introduced and competition for the field did not develop. The present proposal of the Ministry of Economic Affairs does not include a formal bidding procedure. (If there are offers from several companies, the municipality must make its final choice public and explain the reasons for its decision). It is unlikely that this procedure can secure that the municipality will choose the offer which is most advantageous to electricity consumers instead of accepting an offer which promises higher revenues for the municipality or that it can secure a level playing field in those cases in which the municipality intends to create itself a utility. Instead of creating competition for the field it may well be a one-way-route to the "municipalization of electricity supply".

The Position of the Municipal Regional Utilities

The association of municipal utilities (Verband kommunaler Unternehmen, VKU) rejects the proposals made by the federal Economy Ministry, arguing that:

- Price competition in electricity would result in a concentration movement.

- Without prior harmonization, opening up the market would lead to distorted competition and is therefore not acceptable.
- Only large consumers will profit from competition. High transaction costs will split the market. Access will be easier for large customers whereas small customers will remain captives. Distributing utilities will be neither prepared nor able to protect small consumers.
- Local distribution companies will hardly be able to profit from competition by buying electricity cheaper. Interconnected utilities may be reluctant to compete vigorously and it will be difficult for distributing companies to secure transmission rights.
- Without exclusive franchise areas, the coordinated development of district heating, electricity and gas at the municipal level will no longer be possible. Combined utilities will be destroyed. CHP will be injured and municipal district heating will be endangered.

4 The German ESI in Transition

Even though no reforms have yet been introduced in the German electricity system, the status quo is no longer stable. The industry and the regulators are in suspense.

On the one hand, the creed of the unique characteristics of the electric utility industry which call for monopoly suppliers is no longer convincing. Academic economists had for some time cast doubt on this claim of uniqueness of the industry but what changed the general perception were the experiments in England/Wales and Norway which showed that a market based electricity system could work. The genie was out of the bottle.

On the other hand, there remains a strong movement against deregulation, backed - for example in Germany - by environmentalist, municipalities and others who argue in favor of a strengthening of the traditional "regulatory compact". It is argued that public policy objectives (equity, regional policy, environmental policy, energy conservation/least cost planning) would be obstructed if the monopoly system were abolished.

It is no yet clear which movement will prove to be stronger or which mixture of competition and regulation will be implemented. This depends on the political development in Germany as well as on the developments at the EU level. If the Member

States cannot agree on measures to promote an internal market in electricity in the European Union there is little prospect for isolated reforms in Germany. Nevertheless, the threat of competition has already led to changes at the energy policy level (the most important issue being the hard coal protectionism discussed below) and at the company level (restructuring of companies and new developments in electricity pricing).

The foremost example of political burdens borne by electric utilities is hard coal mining protectionism in West Germany. The price of German hard coal has risen to about 300 Deutschmark per ton (150 ECU/t) whereas its import parity value (i.e. cif price of steam coal imports plus inland transportation) is less than 100 DM/t (50 ECU/t). This results in a subsidy of about 7 billion DM per year. About 4 billion DM are paid directly by the electricity consumers in the form of a levy on electricity prices (Kohlepfennig). As concerns those 4 billion DM, utilities act solely as tax collectors. An additional 3 billion DM per year are, however, included in the coal input price paid by coal burning utilities. Beginning in 1996 utilities will be relieved from this burden. They will then be able to buy German coal at import parity prices. The reason behind this development is the threat of competition in the electricity sector: The German utilities were no longer prepared to renew the "Jahrhundertvertrag".[10] The competitive position of hard coal-based electricity generation in Germany will thereby be improved and the utilities which burn German hard coal will considerably decrease their electricity prices (prices for industrial consumers may be reduced by 10 - to 20%). It is also expected that market pressure will force brown coal producers in West and East Germany to price their product at import coal parity.

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10 In the past the difference between the price of German hard coal and the import price was paid by the electricity consumers, part of it concealed in higher electricity prices, part of it shown openly as an adder to the electricity bill (the coal levy (Kohlepfennig) which amounted to about 8% in recent years). The German Constitutional Court (Bundesverfassungsgericht) has recently decided that the coal levy is unconstitutional and must therefore be abolished. This forces the government to find new ways of financing the subsidies to the German hard coal industry.

There are thus two separate issues. First, the utilities are no longer prepared to shoulder part of the burden by buying German hard coal at prices which are higher than the price for imported coal. In 1996 they will be relieved from that burden. Second, the coal levy will be abolished in 1996.

VII The European Union

1 The historical development

1.1 The 1992 Proposal of the Commission

In January 1992 the EC Commission published its proposals for Directives aimed at creating an internal market in electricity[11] and gas in the European Community (now: European Union). The proposed Directive on electricity aimed at a mandatory TPA-system in an unbundled ESI. Its main elements were:

- Unbundling and Detailed Regulation of Transmission and Distribution Functions

  Separate accounts and management of the functions of electricity production, transmission and distribution. An unbundled network operator would operate the grid and operate the power plants according to a merit order.

- Mandatory TPA (Retail Wheeling System with regulated and cost-reflective grid charges)

  Mandatory TPA would give large distributing utilities and industrial consumers access to rival generators and thus the opportunity to shop around. Detailed regulation would have been necessary to implement the decreed TPA.

- Abolition of institutional barriers to entry

  Exclusive rights were to be abolished in order to allow free electricity production and free construction of power lines based on an authorization procedure. IPPs as well a utilities wishing to enter other utilities' service or franchise areas were thereby free to enter the market by building power plants and - if necessary - direct lines.

1.2 Critique of the Original Commission Proposal

These proposals met with strong opposition from many sides. The main points of argument were concerned (1) public service obligations of utilities, (2)

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11 COM (91) 548 final SYN 384. Draft Proposal for a Directive by the European Commission Concerning Common Rules for the Internal Electricity Market, February 21, 1992.

harmonization :as a prerequisite for liberalization and (3) excessive regulation. The following are the arguments for and against the above points.

(1) The special role of public utility services

The fundamental objection to opening the electricity market to competition was that utility companies fulfill obligations of public service which could no longer be provided if competition were the only organizing principle. The existing exclusive rights, it was argued, had allowed the development of economic and social policies desired by the public authorities and consumers. Competition should be restrained in order to allow utilities to contribute to such policies under the protection of monopoly.

Traditionally it had been stressed that public utilities supply essential services which pose special problems of security of supply, that tariff equalization throughout the (national) territory is desirable and that utilities operate under an obligation to serve. In the recent past new items have been added to the list of public service obligations: support of renewable energies, environmental policy and energy conservation as well as development of nuclear energy.

Economists have argued that there are more efficient instruments to pursue these aims of social, regional and environmental policy than protecting utilities from competition. They regard the opening up of utility industries to competition as a means to force politicians to seek for more efficient ways to promote such policies and argue that competition in electricity and the promotion of the above named goals are not inherently incompatible. Alfred Kahn has reminded us that "restrictions on entry and price competition and distortions of the relationship between prices and marginal cost are usually irrational ways of achieving those ends, and to the extent regulation has served them in these ways, it has typically done so at excessive social cost...one of the major accomplishments of deregulation has been to force us to seek more rational ways of achieving those goals."[12]

Nevertheless, at the political level, the idea of objectives of public service which would be jeopardized by competition still exerts strong influence.

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12 Alfred E. Kahn, Deregulation: Looking Backward and Looking Forward, The Yale Journal of Regulation, Vol. 7 (1990), 325 - 354, p. 353

(2) Harmonization as a prerequisite to liberalization

It was further argued that opening up the market leads to distorted competition as long as important cost elements (environmental standards etc.) are not harmonized among Member States of the European Union (and other countries).

The argument is correct in the case of policies (or neglect of policies) which, by their very nature, have transboundary effects such as for example transboundary environmental damages (e.g. SO_2) or global climate damages (e.g. CO_2). There is a danger that stricter standards in some Member States would not lead to corresponding reduction in emissions but would rather lead to a relocation of power plants to Member States with lower standards.

However, even in this case, it does not follow that "harmonization before liberalization" is a sensible strategy of economic integration. In the process of European economic integration the principle "liberalization takes precedence of harmonization" has been accepted. It has been confirmed by decisions of the European Court concerning matters of competition and all other industries had to live with this principle when an integrated European market was created. The underlying idea is that of systems competition: The principle "liberalization takes precedence of harmonization" puts pressure on the national systems of environmental (and other) policies and speeds up the process of harmonization; if liberalization were made dependent on prior harmonization, the status quo would be upheld.

There is another important consideration. Preferences for the environment differ between nations resulting in "politically warranted locational disadvantages" of countries preferring stricter standards. Such warranted locational disadvantages do not distort free trade. On the contrary, they are the very means to achieve the political aim (by relocation of industries).

(3) Excessive regulation

Many argued that mandatory TPA would lead to excessive regulation instead of more competition. As about 2/3 of total cost in the electricity system in the EU can be attributed to electricity generation, it was argued that competition essentially should be restricted to electricity generation. Competitive bidding would be an appropriate means to achieve this. Direct access of distributors/final consumers to rival producers via TPA should play only a supplementary role and negotiated access would be the appropriate means to achieve this without giving excessive power to regulatory bodies.

1.3 The Counterproposal of the European Parliament

Many of these ideas were incorporated in the Desama Report[13] which was the basis for the discussion of the Commission proposals by the European Parliament (EP).In November 1993 the European Parliament adopted an opinion which was for all practical purposes a complete counterproposal. The main points of the counterproposal were:

- Service public

  Emphasis on the responsibility of the Member States, in particular with regard to public service tasks of the electricity supply enterprises. The monopoly of local and regional authorities as electricity distributors should be recognized as before.

- Prior harmonization

  Prior to potential liberalization the framework conditions, especially environmental protection and taxation, would have to be harmonized.

- Negotiated TPA

  Instead of mandatory TPA, Parliament came out in favor of a "negotiated access to the grid" with the aid of which major industrial consumers and distributor enterprises would get access to direct electricity supplies from third parties. No framework for the negotiations (concerning pricing and access principles, regulatory overview, etc.) were given.

- Unbundling

  Unbundling of accounting only instead of the Commission's proposed separate accounts and management of production, transmission and distribution

1.4 The Amended Proposal of the Commission

In December 1993 the EU Commission presented its revised proposal of an electricity Directive.[14] The Commission retained its liberalization approach in a toned-down version.

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13 Named after the Belgian socialist member of the EP, Claude Desama, who presented the report.

14 EUROPEAN PARLIAMENT AND COUNCIL DIRECTIVE concerning common rules for the internal market in electricity (COM(93)643final) of December 7, 1993

It incorporated the following amendments proposed by the European Parliament:

- Service public

  Reinforcement of the public service obligation of energy companies. However, the Commission rejected Parliament's demand for a guarantee that would continue the monopoly position of distribution companies

- Negotiated TPA

  Negotiated network access instead of mandatory licensing rights for new entrants

- Unbundling

  A change from separation of accounting and management to unbundling of accounting only, i.e. separation of business accounts in production, transmission and distribution

The Commission, however, rejected the following amendments proposed by the Parliament:

- Prior harmonization

  EP's demand that national environment, safety and employment conditions in energy sectors be harmonized before liberalization

- Price and cost transparency

  EP's demand for a subsequent directive on price and cost transparency

- Trial period

  EP's demand for a "trial period" of experimental deregulation from July 1994 to December 1998. The Commission recognized, however, that a period of transition is needed to allow energy companies the time to prepare for each stage of liberalization.

As was to be expected, the integration of strongly diverging views on the proper role of competition, regulation and monopoly in the ESI in common rules for an internal market for electricity could only be achieved by including different regimes in the Directive and by giving the Member States the option to choose between these regimes. The amended proposal foresaw two such regimes:

- An authorization procedure under which each interested party could apply for a license to build power plants and direct lines in order to enter the market. This retained the original proposal of the Commission.

- A tendering procedure under which new generation capacity would be solicited. This would allow those Member States which wanted to preserve central planning of the generation system to opt for a tendering procedure. It was unclear, however, how access to the supply market would then be organized.
  Power plants dedicated for export or for the own use of the operator would be authorized in parallel to the tender procedure.

Under both regimes distributors and large industrial consumers were eligible to negotiate TPA.

To sum up, the amended proposal for a Directive contained the following two options:

- Negotiated TPA cum authorization;
- Negotiated TPA cum tender and authorization.

2 Attitudes in Germany Towards the Commission's Amended Proposal

The positions of the political parties, the government and the utility industry towards the revised proposal of the EU Commission reflected the attitudes described in section VI.3 of this report.

The Federal Ministry of Economics (which is the responsible body as concerns a reform of the system) was in favor of a reform along the lines developed at the EU level, i.e. a gradual approach through a regime of negotiated TPA cum authorization accompanied by unbundling of accounting and abolishment of legal restrictions to competition. The opposition parties, many of the States governments (in the hands of the opposition parties) and the municipalities opposed the proposed reforms and were closer to the amendments proposed by the European Parliament.

The utility industry was split. Whereas the association of municipal companies (Verband kommunaler Unternehmen, VKU) rejected the revised proposal as incompatible with the amendments and demands made by the European Parliament, another position was taken by the association of interconnected utilities (Deutsche Verbundgesellschaft, DVG) and the association of regional utilities (Arbeitsgemeinschaft regionaler Versorgungs-unternehmen, ARE).

DVG and ARE published a joint declaration (January 26, 1994) entitled "For undivided competition in electricity in Europe". In the prologue it is said that the interconnected and regional utilities have always spoken in favor of closed franchise areas for utilities.

However, in view of the fact that there is obviously no longer a consensus at the political and societal level in favor of such a regime, DVG and ARE advocate for undivided and undistorted competition in all Member States of the European Union and at all levels of the electricity industry. It concludes that out of proposals under discussion the amended Commission proposal is the easiest to accept.

The position paper stresses the following points:

- Reciprocity

  If competition is introduced, there should be a level playing field. There must be no privileged state monopolies either at the national, regional or local level. Reciprocity is indispensable across national borders as well as inside Germany.

- The liberalizing elements of the proposed directive should be maintained

  The Commission proposal gives Member States the option to choose between a liberalized system (authorization procedure) and a regime of central planning of generation and networks with competitive procurement of new capacity (tendering procedure). .Coexistence of centrally planned and liberalized systems is acceptable only if electricity companies from other Member States have access to the markets of Member States with a centrally planned electricity system, i.e. if foreign companies are given the right to set up business and access to the market via TPA or by building their own power lines.

- Public service obligations

  It is acceptable that some Member States put special obligations on electricity utilities while others opt for an enterprise system. The concessions granted under a regime of public service must, however, not be exclusive.

- Negotiated TPA

  DVG/ARE welcome the move of the Commission towards negotiated TPA. Member States should not be allowed to undermine TPA with the help of public service obligations.

- Unbundling an cost transparency

  Unbundling would not make access to the network easier and would not facilitate the cartel authorities' task of controlling abusive behavior by utilities. Unbundling might even lead to a stepwise nationalization of the grid. It stands to reason that the owner of a network is also its operator, except when the owner voluntarily transfers

to a third party the right to operate his network. Unbundling as a quasi-permanent preventive process of control is not necessary.

Publishing information on costs, investment plans etc. of the companies is incompatible with the competitive process. Abuse of power by electricity companies should be controlled on a case-by-case basis, i.e. companies should be obliged to disclosure their costs if an abuse of power is suspected.

3 The New Discussion in the European Union: Single Buyer versus Negotiated TPA

3.1 Overview

In late 1994 France put a new proposal on the table: the Single Buyer (SB) regime. This regime does not allow for TPA. The network operator is the single buyer of all electricity that flows over the grid and is also the sole supplier of electricity to distributors and final consumers. The SB regime foresees a partial opening of electricity generation to competition via a tendering procedure.

The amended Commission proposal

- introduced the option of a tendering procedure for required additional generating capacity (instead of a generalized authorization procedure for power plants)
- retained parallel authorization for IPPs and power plants of industrial self-generators;
- retained negotiated TPA.

The incumbent utilities' new generating capacity is thus exposed to competition via the tendering procedure side-by-side with competition in supply between rival utilities and IPPs via negotiated TPA and authorization of IPPs.

The SB proposal

- retained the tendering procedure;
- restricted parallel authorization to IPPs dedicated for export and to industrial self-generators and generation based on renewables, waste and CHP;
- abolished TPA.

Under the SB regime the incumbent utility's (utilities') new generating capacity is exposed to competition via the tendering procedure but competition in supply cannot develop because the SB retains the exclusive right to supply.[15]

The Energy Council (which is constituted by the ministers of the Member States responsible for energy) has now to decide if the parallel introduction of the amended Commission proposal and the SB regime is acceptable or what modifications of the proposed regimes would be necessary. In preparation of such negotiations and decisions the Energy Council of 29 November 1994 invited the Commission to study the possible simultaneous introduction of the amended Commission proposal and the SB regime and to investigate in particular if both approaches, in the spirit of reciprocity, lead to equivalent economic results and, therefore, to a directly comparable level in the opening of markets and to a directly comparable degree of access to electricity markets.

The Commission is now in the process of preparing its report to the Energy Council.

The following sections contain a detailed comparative evaluation of the SB regime and the Commission's proposed negotiated TPA-regime and an investigation of the issue of reciprocity. These sections are based on a report which was prepared by EWI for the EU Commission.[16]

3.2 An Evaluation Scheme: Access to Resources and Markets

The aim of the envisaged Directive is to further the establishment of the internal market for electricity as part of the overall effort to complete the internal market in all areas, including energy. Therefore, the starting point for deriving criteria of reciprocity are the Treaty rules such as free movements of goods and services, right of establishment and competition rules. The basic criteria of reciprocity thus refer to

- freedom of establishment (access to resources);
- freedom of trade (access to markets);
- unbiased competition (level playing field).

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15 There is one exception. Rival generators from outside the SB region can enter the supply market in the SB region under the condition that they build a direct line to serve their customer. In practice, this possibility would not be of great importance.

16 EWI, "TPA and Single Buyer Systems - Producers and Parallel Authorizations - Small and Very Small Systems", March 4, 1995. Report commissioned by the EU Commission, GD XVII

3.2.1 Access to Resources

Unimpeded access of competitors to resources which are necessary to enter the market (freedom of establishment) is a prerequisite for the opening of the electricity market to competition. In the electricity sector access to resources refers in particular to the freedom of

- construction and operation of power plants;
- construction and operation of direct lines by competitors;
- access to the (incumbent utility's/utilities') grid by third party competitors;
- establishment of enterprises or participation in existing utilities or generators.

3.2.2 Access to the Generation Market

Market access in electricity generation can be secured via a tendering procedure or by creating a pool (direct market access) or via access of generators to the supply market (indirect market access).

Direct market access in electricity generation

Full direct market access in generation describes a situation where existing power plants compete for coverage of the load of the (national) system and newcomers can freely enter the market. Free entry for newcomers implies that no planning authority decides on "required" total or additional capacity. An open electricity pool (mandatory pool) achieves such direct and complete market access. A pool thus creates generation competition among all existing and newly established generation facilities (provided they have access to the high voltage grid).

A tendering procedure for new (additional) generating capacity creates incomplete direct market access for generators. Tendering limits market access in generation to the required additional capacity (for capacity replacement and extension).

Indirect market access to electricity generation via access to the supply market

Access to utilities' customers (distributors and/or final consumers of electricity), i.e. competition in supply, is the indirect- by no means less important - way of access to the generation market in a vertically integrated electricity system. If utility B succeeds in selling electricity to customers in utility A's service area, it steps up its production to

supply the newly won customers and displaces utility A's generation to the extent of sales lost by utility A. Clearly, the degree of market access and competition in generation, which can thus be achieved, critically depends on the degree of market access and competition in supply. If there is effective competition in supply, however, this implies a much more far-reaching competition in generation than competitive bidding for additional capacity only.

3.2.3 Access to the Supply Market

Full market access in supply requires the supplier (be it a vertically integrated utility, an IPP (generator/merchant) or a pure merchant without generation of his own) to gain access to final consumers. With access to distributors only, he is restricted to wholesale merchandising. With access only to certain large final electricity consumers market access is obviously restricted to that segment.

Given the natural monopoly character of electricity transmission and distribution (including ancillary services), market access in electricity supply requires a newcomer to gain access to the incumbent utility's (and possibly other adjacent utilities') network(s). (Direct lines can be used in addition to or as a substitute for access to the incumbent utility's network.)

In order to assess the degree of market access under the regimes of SB and negTPA it is necessary to analyze how network access for third parties as well as construction and operating of direct lines are arranged under these regimes.

As has been shown above, opening up the supply market in a vertically integrated electricity industry implies opening electricity generation to competition. However, the reverse is not true. Opening up the market for (required additional) generating capacity (as such) has no influence on the degree of market access in electricity supply.

Understanding this interrelation between market access in electricity generation and market access in electricity supply is vital for understanding the operation of the SB- and negotiated TPA-regimes.

3.3 Description of the Negotiated TPA-Regime

3.3.1 Access to Resources Under a negTPA-Regime

3.3.1.1 New Power Plants and Power Lines

As far as construction of new power plants is concerned Member States can choose between two procedures:

- a tender procedure (negTPA cum tender and authorization-regime) or
- an authorization procedure (negTPA cum authorization-regime).

negTPA cum tender and authorization-regime

In general, power plants are constructed under a tender procedure. The Member States draw up an inventory of the new means of production. The required capacity is to allocated by means of a tender procedure (Articles 5 and 6)[17]. Tender procedures are to contain a description of the procedure to be followed by all tenderers and an exhaustive list of the criteria governing the selection of tenderers and the award of the contract. These criteria are to be objective and non-discriminatory.

However, autoproducers and IPPs must be authorized. This even applies in Member States that have opted for the tender procedure, to construct production capacity on the basis of objective, transparent and non-discriminatory criteria (Article 5(3); Article 7).

The criteria for granting the authorization may take into account the nature of the primary sources to be used for the authorization of the construction of production capacities (Article 7).

negTPA cum authorization-regime

All power plants, including those constructed by autoproducers and IPPs are authorized on the basis of objective, transparent and non-discriminatory criteria and procedures (Articles 5 and 7).

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17 Amended proposal for a EUROPEAN PARLIAMENT AND COUNCIL DIRECTIVE concerning common rules for the internal market in electricity COM(93)643 final - COD384

As far as the construction of new power lines is concerned the Member States can again choose between a tender procedure (negTPA cum tender and authorization-regime) or an authorization procedure (negTPA cum authorization-regime).

3.3.1.2 Use of the Grid(s) by Third Parties

The rules concerning the use of public grid(s) by third parties apply both to the negTPA cum tender and authorization- and negTPA cum authorization-regimes.

Member States shall take the necessary measures for ensuring that:

- electricity producers and transmitters inside or outside the territory covered by the system are able to negotiate access to the system so as to conclude supply contracts with final customers who are large industrial consumers and with distributors on the basis of voluntary commercial agreements (Article 21 (1,i));
- electricity producers are able to negotiate access to the system so as to supply their own premises, subsidiaries and affiliate companies in the same Member State or in another Member State, by means of the interconnected system (Article 21 (1,ii));
- producers outside the territory covered by the system are able to conclude a supply contract following a call for tender for new production capacities, and to have access to the system to perform the contract (Article 21 (1,iii)).

3.3.2 Access to the Generation Market

negTPA cum tender and authorization-regime

Domestic and foreign generators have (direct) access to the generation market via participation in the tender procedure

- "Domestic" generators (i.e. located in the respective negTPA-system) do not need a special grid utilization agreement in the negTPA-system
- "Foreign" generators need a grid utilization agreement to be negotiated with the respective grid operators in the negTPA-system.

Domestic or foreign generators have indirect access to the generation market by concluding supply contracts with large consumers or distributors (via negotiating access to the grid) or by supplying any customer via direct lines.

negTPA cum authorization-regime

Domestic or foreign generators have indirect access to the generation market by concluding supply contracts with large consumers or distributors (via negotiating access to the grid) or by supplying any customer via direct lines.

Special access may be granted to generation based on renewables, waste or CHP. They can be treated preferably (Article 13 (4)): "The electricity sold or purchased by these installations shall be priced in accordance with the guidelines laid down in recommendation 3(c) of Council Recommendation 88/611/EEC".

3.3.3 Access to the Supply Market

The rules concerning access to the supply market apply both to the negTPA cum tender and authorization- and negTPA cum authorization-regimes.

All large industrial consumers[18] and distributors have access to competitive supply opportunities by way of concluding supply contracts with any producer or transmitter and negotiating access to the incumbent utility's (several utilities') network(s).

All producers and suppliers of electricity can build direct lines to supply any customer (distributors or final consumers).

Foreign generators have the same opportunities of access as generators located in the negTPA-system.

A generator located in a negTPA-system can reach distributors and large industrial consumers in another negTPA-system by negotiating access to the grids of the exporting and importing systems and any final consumer in another negTPA-system via a direct line. But he can reach eligible industrial consumers and distributors in a SB-system only via a direct line.

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18 Large industrial consumer means a final consumer (buying electricity for his own use) whose consumption exceeds 100 GWh per year (or a lower quantity as may be specified by the Member State).

3.4 Description of the Single Buyer Regime

3.4.1 Access to resources under a SB-regime

3.4.1.1 New power plants and Power Lines

The construction of new power plants is subject to two different authorization procedures:

- a tendering system or
- a licensing system.

Tendering Procedure for Power Plants

All domestic or foreign producers can take part in open, non-discriminatory tendering procedures. The SB will prepare the tendering procedure and launch the necessary publication. The final decision will be with the regulator or another independent entity. It will be ensured that the confidentiality of the offers to be submitted by competitors will be respected and that the production division of the integrated utility (if the SB is the transmission part of an integrated utility) will have no access to these confidential data. The definition of the role and structure of the regulator will be left to Member States in the spirit of subsidiary.

Any bidding company (domestic or foreign integrated utility or IPP) which wins a tender procedure is allowed to build a power plant and to sell the electricity under a long-term contract to the SB.

The specifications issued in the tendering procedure must state:

- the nature of the investment (base load, medium load or peak load);
- the required availability;
- the duration of the contract, in the case of an import contract;
- the location.

In the tendering procedure the choice of fuel and/or technology can be specified and thereby restricted.

In the tendering procedure, the SB must weigh the development of new resources against the use of long-term import contracts. Winning bids can include long-term

import contracts of a duration which cannot be less than the duration of the planning and construction of equivalent production capacity.

In the case of long-term import contracts (see 3.4.2 below), the SB can impose no restrictions with respect to the fuel from which the electricity is produced.

Parallel Authorization for Power Plants

The following types of generators can build power plants under a licensing system (authorizations in parallel to the tendering procedure):

- Generation based on CHP, renewables or waste
  Such installations are not subject to tender. The SB makes compulsory purchases of their electricity generation at a price approved by the public authorities and based on the concept of "avoidable costs";
- Autogenerators producing electricity for their own use (including sales to affiliate companies i.e. other units in the same company);
- Generation for export.

No quantitative restrictions will be imposed on these capacities.

New power lines

New power lines as part of the (interconnected) grid can only be built based on the determination of a capacity needed by the SB. They can be built by the SB himself or by another party selected through a tendering system.

Direct lines can be built and operated by:

- autoproducers supplying units within the same company;
- IPPs exporting electricity;
- foreign companies selling to eligible industrial consumers in the SB region or these eligible industrial consumers.

These direct power lines are authorized via a licensing system.

The operation of direct lines must not disturb the network operated by the SB and must not interfere with the integrity of the system. Direct lines are not connected to the SB's network.

3.4.1.2 Use of the Single Buyer's Grid by Third Parties

The only two transactions in a SB-regime which are directly comparable to a wheeling transaction under a negTPA-regime are

- export of power by IPPs using the SB's grid;
- supply of power generated by an autoproducer to other companies within the same group using the SB's grid.

Conditions of access to the grid are negotiated with the SB. Indicative transport tariffs for electricity are published.

The SB would also accommodate transit of electricity on behalf of two neighboring systems.

3.4.2 Access to the Generation Market

There are two ways for a generator located in the SB-region to get access to the generation market in the incumbent SB's region:

- by winning a bid in the tendering procedure;
- by making use of the compulsory purchases of electricity (based on renewable energy sources and CHP produced in national territory) by the SB.

Access to Generation via Competitive Bidding

A generator located in the SB-region has access to the generation market in this region by participating in the open, non-discriminatory tendering procedure. The SB enters into long-term contracts with the winning generators. A fixed-term remuneration ensures a return on investment for the producer. A variable term is directly proportional to the duration of the operation. There may be restrictions on the choice of fuel and technology admitted in the tender.

Compulsory Purchase of Electricity by the SB

Electricity generation based on CHP/renewables/waste has secure access to the generation market due to the compulsory purchase of such generation, as far as it is produced in national territory, by the SB at a price based on the concept of "avoided cost" and approved by the public authorities.

Access for Generators Located Outside the SB-Region

Besides winning a bid in the tendering procedure, foreign generators can enter the generation market in the SB region by selling electricity to customers eligible for imports, i.e. to electricity-intensive industrial consumers[19] and distributors[20].

There is a declaration system for electricity imports. Declarations for imports will not have the character of formal authorizations and will not be preconditions for commercial transactions. Thus, declarations are of a formal or statistical nature to supervise the system to guarantee the good functioning.

Declarations can be filed

- by managers of the transmission grid (as defined in the Directive on transit) who might conclude contracts further to the tendering system;
- by industrial eligible consumers;
- by distributors.

The first case refers to electricity imports by the SB from other transmission system operators.

The eligible customers do not import for their own use, however, but have to resell the electricity to the SB who still supplies them. The electricity goes to the SB, with the eligible customers acting as intermediaries. The SB is obliged to buy the imported electricity (Q2) at the negotiated price (P3).

Three contractual relationships are involved in the "triangular" transaction:

- manufacturer X negotiates a purchase contract with a foreign producer at a price P2, presumed to be < P1 (the price offered to manufacturer X in the market of the SB-country);

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19 Whereas under the amended Commission proposal there is a size threshold (> 100 Gwh electricity consumption per year) for industrial customers which can enter into negotiations with grid owners for TPA, the industrial consumers eligible for importing electricity under a SB-regime are vaguely described as electricity intensive customers.

20 The papers produced by France to describe the SB-regime did not include distributing utilities as customers eligible for importing electricity. However, in a presentation in Brussels on January 31, 1995 Mr. Mandil, the French Director-General for Energy made it clear that the eligibility of distributors was not incompatible with a SB-regime.

- manufacturer X resells that quantity of electricity (Q2) to the network/sole purchaser at a price P3;
- the network manager concludes an agreement with the "foreign" network enabling the electricity to be transmitted and the transaction is deemed to be effected at the frontier.

The price P2 is negotiated between the consumer and the foreign producer and is not known to the SB.

The transactions between the SB and the eligible industrial consumer do not constitute a negotiated use of the SB's system for import transactions. It is not a negotiated wheeling transaction as the industrial consumer is not supplied by the foreign producer.

The transactions do not lead to competition in supply in the SB region but to competition in generation: The quantity Q2 imported by the eligible industrial customer and resold to the SB substitutes electricity generation of the SB by imported electricity.

The eligible industrial consumer or distributor is allowed to import electricity (quantity Q2) in excess of its own consumption (quantity Q1). It is unclear if there is any limit to the amount of electricity which an eligible industrial consumer may import in excess of the quantity of electricity he buys from the SB.

3.4.3 Access to the Supply Market

The SB is also the exclusive supplier of electricity which flows over its grid. Rival generators can enter the supply market in the SB-region only from outside and if they build and operate their own transmission and distribution infrastructure.

Eligible industrial consumers and distributors can import electricity for their own use only if they build and operate direct lines for this purpose. The use of these direct lines must not interfere with the operation of the system by the SB. These industrial consumers can still be connected to the SB's grid and can still conclude back-up contracts with the SB. But they cannot split their supply buying part of their supply from the SB and part from a competitor.

Final consumers with own generation (autoproducers) can supply other units within the same company by using the SB's public grid or by building direct lines.

4 Evaluation of a Parallel Introduction of Negotiated TPA- and Single Buyer-Systems in the European Union

4.1 Overview

The degree to which the electricity market will be opened and the access buyers and sellers will have to an open market, depends on two groups of factors:

- the common rules for the internal market in electricity as laid down in a EU DIRECTIVE and implemented by the Member States under the principle of subsidiary;
- the widely differing organizations, structural features and modi operandi of the electricity industries (idiosyncratic structures) and energy policy interventions (idiosyncratic policies) in the Member States.

The following considerations[21] only deal with reciprocity of the proposed negotiated TPA- and Single Buyer-regimes. As there are two varieties of negotiated TPA-regimes as regards the construction of production and transmission capacity, viz. a tender procedure or an authorization procedure, it would in principle be necessary to compare three regimes: (1) SB-regime, (2) negotiated TPA cum tender and authorization-regime and (3) negotiated TPA cum authorization-regime. However, if the Member States are free to choose between these regimes, it is to be expected that those who prefer a tender procedure (in order to uphold centralized planning of electricity generation) would opt for the SB-regime. We therefore restrict the comparison to the SB- and negotiated TPA cum authorization (only)-regimes.

We investigate the following issues:

- freedom of choice for final consumers and distributors - access to the supply market for producers;
- access to the generation market;
- freedom of establishment;
- equal opportunities for competitors: level playing field.

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21 These reflect EWI's views contained in a report prepared for the EU Commission (see note 16).

4.2 Freedom of Choice for Final Consumers and Distributors - Access to the Supply Market for Producers

The freedom of consumers to choose between suppliers and the corresponding access of producers to the supply market is a crucial element for competitive opening of the electricity market and creating an integrated electricity market.

Under a negotiated TPA-regime large industrial consumers and all distributors are free to choose their supplier and to enter into negotiations with the network owner(s) for wheeling of the power they wish to buy from a competing supplier. In addition, they are free to build direct lines to connect with a generator outside the incumbent utility's system. They can choose suppliers in other negTPA-systems as well as in SB-systems because all generators in a SB-system (the SB itself as well as IPPs and autoproducers) are allowed to export electricity by making use of the SB's grid or by building direct lines.

In principle, the negTPA-regime thus guarantees freedom of trade in electricity for eligible customers[22] between as well as inside the Member States. The options may de facto be more restricted if it proves difficult to negotiate access to the grid(s).

Under a SB-regime the SB is at the same time the exclusive supplier in its region. All electricity generated inside or outside the SB-region for this market is bought by the SB and sold by the SB. Neither final consumers nor distributors can choose between suppliers. They cannot import electricity for their own use neither from another Member State (irrespective of the regime which that Member State has chosen) nor from another SB-system (in the case where several SB-systems co-exist in a Member State). They are also not allowed to buy electricity from any generator located in the incumbent SB-region.[23]

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22 The idea is to lower the threshold for eligible consumers in the future irrespective of each Member State being free to choose a lower threshold from the beginning. Thus, the negTPA-regime aims at a far-reaching opening of the market where in the end the choice between shopping around directly or being supplied by a distributor would eventually only depend on economic factors, in particular the level of transaction cost.

23 There are two exceptions: autoproducers are allowed to supply companies in the same group making use of the SB's network and eligible customers may import electricity via a direct line (however under very restrictive conditions). In general, these two exceptions are of minor importance in the system as a whole.

Whereas a negTPA-regime gives the option to choose among rival suppliers to large groups of final customers/distributors[24] (and aims at further widening this group of eligible customers) and allows IPPs to build power plants and sell electricity to distributors/final consumers, the SB-regime forecloses these options and perpetuates a monopoly in supply. There is thus a clear lack of reciprocity between the two regimes as regards the freedom of trade between consumers/distributors on the one side and generators/suppliers on the other side both between and inside Member States.

The SB-regime allows eligible industrial consumers and distributors to import electricity under the condition that the electricity is resold to the SB. The question arises whether the opportunities created by this role of intermediary do not give the eligible industrial customers and distributors advantages which are comparable to the option to shop around under a negTPA-regime.

The argument has been put forward that eligible clients who pay considerably higher prices in a SB-system A than in a neighboring system B could take advantage of the price difference by buying electricity in the neighboring system and reselling it with a profit to the SB. Even though they are not allowed to import for their own use in a SB-system they nevertheless could reduce their electricity bill by the amount of profit from their role as intermediaries. It depends on the case at hand if eligible customers can make a profit in this way. First, if an eligible industrial consumer in the SB-system A pays a higher price than a comparable industrial consumer in a neighboring system B it does not follow that the cost of electricity in the system B is generally lower than in system A. The price difference for large or energy-intensive industrial consumers could rather result from different pricing policies (e.g. preferential rates for big industrial consumers in system B). Second, even if costs and prices in B were generally lower than in A, the generator in B might prefer to take part in a tender in the SB-system instead of selling to the SB by mediation of an eligible industrial consumer. On the other hand eligible industrial consumers could possibly make large profits if generators from outside used this channel to a large extent to circumvent restrictions in the tender

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24 Large industrial consumers (>100 Gwh annual electricity consumption) account for about 20 - 40% of total electricity consumption in many Member States with smaller shares in some Member States. The share of total electricity sold via distributors varies between 0% and nearly 100%. With very few exceptions (as e.g. in Ireland where there are neither distributors nor large industrial consumers) the groups of customers which can choose their supplier under a negTPA-regime account for more than ½ of the total electricity market and in many Member States for much more than that.

procedure (in periods when there is no call for tenders or if e.g. restrictions on fuels apply in the tender procedure). However, the total amount of such electricity imports is restricted by the capacity of the interconnectors and the use of interconnector capacity for import contracts under the tender system.

Given all these possibilities it is impossible to foresee what the commercial value of the eligible customers' role as intermediary would be.

4.3 Access to the Generation Market

Access to the generation market and thus competition in electricity generation is organized under the two regimes in ways which are fundamentally different. This makes the comparison difficult and the results may depend on the case at hand. The following general observations can be made:

- Under both regimes access to the generation market requires TPA. Non-discriminatory access to the network is a prerequisite for competition in generation under both regimes.
- A tender procedure only allows for restricted competition in generation: capacity existing already will not be exposed to competition and the winners in the tender are henceforward protected from competition. The secure outlet which a tender gives to the winner is obtained at the cost of restricting competition for others.

  If only a tender procedure existed under a SB-regime, access to the generation market would certainly be more restricted than under a negTPA cum authorization-regime.
- The SB-regime side-by-side with the tender procedure opens a second route (to foreign generators only) for entering the generation market by selling to the SB through the mediation of customers eligible to import electricity. If the quantities that could be imported in this way were not limited and if the SB were obliged[25] to

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25 The purchase obligation would, however, not be unconditional. The SB could refuse to buy if there was no free transmission capacity or if the fulfillment of public service obligations would be jeopardized.

buy these quantities, the generation market in the SB-region would be opened to a potentially much higher degree (depending on the case at hand).[26]

Whereas under this condition it appears that generators from outside would have an equal opportunity to enter the generation market under both regimes, IPPs located within the SB-region would still be at a disadvantage on their home market compared to IPPs under a negTPA cum authorization regime.

4.4 Freedom of Establishment

Freedom of establishment is an important element which has to be taken into consideration in evaluating the degree of reciprocity of SB- and negTPA-regimes. Do the regimes secure equal access to essential productive inputs such as

- third party access to the network;
- authorization to build direct lines;
- authorization to build power plants;
- access to inputs essential for generation (technology, sites and fuels).

Third Party Access to the Network

Under both regimes generators/suppliers are dependent on TPA.

The SB-regime makes use of TPA to enable

- generators to take part in the tender procedure (access to the generation market inside the SB-region);
- IPPs to export electricity (access to the supply market in a TPA-region or to the generation market in a SB-region);
- generators from outside the SB-region to sell electricity to the SB outside the tender through eligible customers acting as intermediaries (access to the generation market in the SB-region).

The negTPA-regime makes use of TPA to enable

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26 If entry into the generation market via sales to customers eligible for imports occurs on a large scale there is no longer a secure outlet for electricity contracted by the SB under a tender procedure. This would be reflected in the terms of these long-term contracts.

- all generators located inside or outside the TPA-region to supply distributors and large industrial consumers in the TPA-region[27] (access to the supply market in the TPA-region);
- generators to export electricity (access to the supply market in a TPA-region or to the generation market in a SB-region).

Under both regimes it is necessary to ensure that the services of the network are provided to third parties on equitable and non-discriminatory terms. If appropriate control and dispute settlement mechanism are created, a comparable degree of access to the network for third parties could be achieved under both regimes.

Authorization to Build Direct Lines

As concerns the option to build and operate direct lines the SB-regime is more restrictive than the negTPA-regime. It has been argued that this difference might not be relevant in practice in view of the well-known difficulties to build direct lines. Situations can differ, however, and the feasibility of direct lines can be decided only on a case-by-case basis. Certainly such difficulties cannot justify to create or uphold legal restrictions on building and operating direct lines.

Authorization to Build Power Plants

Under a SB-regime generators located in this region can enter the market only through participation in competitive bidding for additional required capacity. Whereas generators located outside the SB-region can enter the generation market by selling electricity (via customers eligible to import) to the SB, IPPs located inside the SB-region are not allowed to do so. Under a negTPA-regime no comparable restrictions exists. The SB-regime thus infringes upon a generators' right of establishment (resulting in less vigorous competition).

Access to Inputs Essential for Generation

Under both regimes access to inputs essential for generation such as technology, sites and fuels can be restricted, either as part of the tender procedure (SB-regime) or the authorization (negTPA cum authorization-regime). However, the tender procedure

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27 The initiative can also be taken by the customers who wish to buy from someone else than their home utility.

would make it easier to impose restrictions on competitors than an authorization procedure. For example, a call for tender can exclude certain fuels or restrict their overall share but it would be difficult to achieve the same result under a system with case-by-case decisions on the authorization of individual plants. The danger of abusing such restrictions to protect own generation interests is greater under a SB-regime (tender procedure) than under a negTPA-regime (authorization). However, this does not apply to the quantities which are imported by eligible customers and which the SB is under obligation to purchase.

4.5 Equal Opportunities for Competitors: Level Playing Field

The SB-regime thus does not secure a degree of opening of and access to markets comparable to what is to be expected under a negTPA cum authorization-regime:

- The monopoly of supply is preserved: the SB is for all practical purposes the sole supplier. This gives the SB complete pricing autonomy on its home market.
- Competitive entry into generation through the tender procedure will be slow as it depends on retirement of existing plants and load growth. Generators from outside the SB-region have the additional option to enter the generation market by selling to the SB via customers eligible to import. Such competition is, however, limited by the capacity of the interconnectors. IPPs located in the SB-region are excluded from such transactions. Competition in generation may be further restricted due to public service obligations.

As a consequence the SB is in a stronger position than integrated utilities under negTPA-regimes. It is therefore essential that measures are taken to prevent abuse of this dominant position. This concerns the organization of the tender procedure, the SB's repurchase obligation (from customers eligible to import) and the pricing of exports by the SB to prevent predatory pricing.

However, such controls cannot redress the fundamental imbalance in opening of and access to markets between the SB- and negTPA-regimes. In order to achieve an internal electricity market in the European Union with equal opportunities for generators and buyers via parallel introduction of SB- and neg. TPA-regimes, modifications of the SB-regime appear to be inevitable.

CONCLUDING REMARKS

From our global analysis of deregulation in the electricity supply industry, the following conclusions can be drawn.

First of all, it should be emphasized that the introduction of competition in the electricity supply industry is possible. Whereas network functions remain natural monopolies, other function -generation and supply- can be reorganized into competitive structures.

Based on this new understanding of the electricity supply industry, reform to introduce competition has been widely introduced in many parts of the world.

Along with these reform movements, there is also a growing trend to give customers access rights.

As a result of deregulation, competition has produced significant increases in efficiencies in electric power supply system in some cases, especially under the pool system. But reform results vary significantly among the selected models, which reflects differences in problem analysis and reform goals, as well as organizational and ownership structure.

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	Status and Result of Reform Model Selection	
	Decided	Under Discussion
England	Pool (mandatory)	
Scotland	Retail Wheeling	
Northern Ireland		Pool (mandatory)?
Norway	Pool (voluntary)	
Sweden	Pool (voluntary) jointly with Norway (starting 1996)	
Finland		Retail Wheeling or Pool
New Zealand		Unclear, no generation competition yet
Australia	Pool (mandatory)	
Chile	Cooperative Generator's Pool with limited Retail Wheeling	
Argentina	Pool (voluntary)	
(US - PURPA)	Competitive Bidding	
US - EPAct	Wholesale Wheeling	
California (proposal)		Retail Wheeling or Pool (voluntary)
EU - TPA-proposal		Retail Wheeling (or Pool, Subsidiary)
France SBS- proposal		Competitive Bidding
Netherlands	Cooperative Generator's Pool with limited Retail Wheeling	
Portugal		
- public system	- Competitive Bidding and Cooperative Pool	
- independent system	- limited Retail and limited Wholesale Wheeling	
Spain		
- public system	- Competitive Bidding and Cooperative Pool	
- independent system	- limited Retail and limited Wholesale Wheeling	
Japan	Competitive Bidding (voluntary only)	

Countries aiming at a further reaching competition in retail supply have understood the need for an organized short-term market for electricity, open to both sellers (generators) and buyers (wholesalers and retail customers) of electricity.

England and the State of Victoria in Australia are examples for the toughest form of introducing such a market. All market participants are obliged to trade all the electricity through the pool (mandatory pool). Longer-term contracts between generators and wholesalers or customers exclusively have financial character (hedging contracts).

Norway and Argentina have already introduced, Sweden and some interest groups in California want to introduce a somewhat weaker form of short term electricity market: market participants can choose between direct bilateral trade and trading through the pool (voluntary pool). Longer-term contracts can have the form of both physical delivery contracts and financial hedging contracts.

Chile, Portugal and the Netherlands have introduced cooperative generators' pools aiming at central dispatch and operation cost minimization with a limited form of competition in retail supply. In these systems, distributors and final customers are not allowed to buy directly from the cooperative pool. The models differ in the authorization procedures for new generation capacity, ranging from central planning (Netherlands) via tendering procedures for the "public system" and full liberalization for the "independent system" (Portugal) to full liberalization (Chile).

Other groups are arguing for a pure retail wheeling concept with bilateral physical type contracts. In Finland and California the current discussion is about whether a pool is necessary for retail competition. But even proponents of a retail wheeling solution agree on the need of transparent market information and the reduction of transaction cost. E.g. PG&E proposes the introduction of spot market substitutes like market indices and brokers and argues that the market development should be based on self-organization by market participants rather than on initiation and design by regulatory authorities.

For all countries restricting competition to the selection of capacity additions, the competitive bidding concept is naturally the appropriate solution. Many US States opted for this model in the eighties, Japan is currently introducing competitive bidding as a voluntary tool and France put forward an EC reform proposal (Single Buyer System) moving in that direction. The Single Buyer System is characterized by some modifications to the classical competitive bidding concept trying to adapt it to EC competition and Internal Market legislation: consideration of bids of external participants in solicitations, the possibility to build new generation capacity for export purposes outside the tendering procedures and the possibility for large eligible customers to enter into electricity import contracts to be repurchased by the network operator (Single Buyer) based on tariff conditions.

In its Directive Proposal the EU Commission defines (Negotiated Third Party Access-System) the aim of introducing retail supply competition but leaves the choice of a reform model the individual decisions of the Member States under the principle of subsidiary. In its minimum implementation form the Directive Proposal would require

retail wheeling on an individually negotiated basis, but a pool system (as it has already been introduced in England/Wales and is proposed for Sweden) would also be an allowed form of implementation.

3 Treatment of remaining monopolistic businesses

	Vertical Disintegration	
	Transmission	Distribution
England	separated	unbundled
Scotland	unbundled	unbundled
Northern Ireland	unbundled	unbundled
Norway	separated	unbundled
Sweden	separated	unbundled
Finland	separated	unbundled
New Zealand	separated	unbundled
Australia	separated	unbundled
Chile	separated	bundled with supply
Argentina	separated	bundled with supply
(US - PURPA)	none	none
US - EPAct/FERC proposal	unbundled	bundled with supply
California (proposal)	separated?	unbundled?
EU - TPA-proposal	unbundled	unbundled
France SBS- proposal	unbundled	bundled with supply
Netherlands	separated	unbundled
Portugal	separated	bundled with supply
Spain	separated	bundled with supply
Japan	none	none

Most of the reforms countries have understood the need for a vertical disintegration of competitive (generation, supply) and monopolistic functions (transmission, distribution).

Countries only introducing Competitive Bidding for generation capacity additions did not introduce a vertical disintegration of transmission and distribution. This is not necessary, because the entry of competitors does not depend on the use of utilities' transmission or distribution infrastructure. In a competitive bidding system an independent generator participates in a tendering procedure in which he has to compete against the projects of the subscribing utility. The utility as the monopolistic buyer of electricity could exercise market power via discrimination of competitive bids in the

tendering procedure (self-dealing-problems). To protect the competitors against this use of monopolistic power the tendering process is subject to the supervision of regulatory authorities in all countries introducing competitive bidding on a mandatory basis.

In countries introducing competition in electricity supply, the vertical disintegration of the monopolistic transmission function is viewed as very important. Most countries have separated the transmission function into one independent countrywide transmission company.

The treatment of the monopolistic distribution function differs between the reform countries depending on the degree of competitive opening of the system. Because all (those) countries aim at a competition in generation, the distribution function is either separated or unbundled from (new) generation. Countries which aim only at a limited retail competition do not introduce unbundling of distribution and supply, because both functions remain to be bundled services for by far the most of the retail customers. In countries aiming at further reaching competition in retail supply, the vertical disintegration of those services becomes a necessity: those countries tend to introduce an unbundling of accounts and management instead of the further reaching separation into different companies. Because of standard cost and tariff calculation techniques and the indifference of load flows in the distribution grid with respect to the choice of a supplier it is much more difficult for the regional distributor to discriminate competitors in supply (compared to the possibilities of a transmission owning company).

In contrast to models introducing only competitive bidding, the French Single Buyer System proposal also foresees wheeling transactions (for exports by IPPs) and special wholesale import trading arrangements (between the network operator as Single Buyer and eligible customers). This means that some competitive mechanisms depend on the monopolistic transmission function (wheeling-access and pricing) and the monopolistic procurement function outside the control of a tender procedure (valuation of own and purchased generation). This makes a vertical disintegration more important. The proposal therefore proposes an unbundling between generation, transmission and distribution.

4 Reform Aims

Deregulatory reforms in all countries aim at increasing the efficiency of the ESI by introducing competitive mechanisms.

The more general efficiency aim is sometimes specified or supplemented by additional reform aims:

- to objectify the price to be paid for electricity generation of independent power producers (USA - Competitive Bidding);
- privatization (England, Chile, Argentina, Portugal, developing countries);
- optimization of utility sizes (Netherlands, Norway);
- to increase spatial integration of investment and operation decisions (USA-Wheeling);
- equalization of regional price differentials (Norway, Netherlands);
- to give customers more choice (Norway, England, California);
- to increase also the efficiency in the remaining monopolistic grid businesses (England, New Zealand, Norway, Netherlands).

Ideally the statement of reform aims should be the starting point of the reform process. But frequently reform aims, reform design and reform implementation issues are mixed. This gives the reform processes in many countries a somewhat iterative and erratic character.

5 Reform Design

Deregulatory reforms differ significantly in the reform design. The reform design comprises:

- reform model selection;
- reform implementation schedule;
- transitional and supplementing regulations.

Reform Model Selection

The decisions on reform model selection and reform elements vary with the following conditions of the reform states:

(1)	problem analysis and reform aims	
(2)	legal conditions	
(3)	organizational structure	(degree of integration)
(4)	ownership structure	(private/state)

(1) Problem Analysis and Reform Aims

As described above the reform countries differ in their individual reform aims, which are derived from the individual problem analysis and the expectations of potential chances from introducing deregulatory reforms.

Because of the differing characteristics of the reform models, the reform aims can predetermine the reform model selection. If the introduction of more customer choices is an explicit reform aim, a pure competitive bidding system will not be an appropriate solution. If central planning shall continue to be used as the tool to reach a long-term optimization of generation capacity, only the competitive bidding system will offer the opportunity to combine planning with some competition on the generation level.

(2) Legal Conditions

The legal framework can heavily influence the selection of a reform model.

New laws or the enforcement of existing laws especially in the fields of competition law and free trade law can initiate and accelerate reform movements and can pose certain requirements to be fulfilled by the reform design. E.g. a pure competitive bidding system would not conform with general EU Internal Market law: when developing its Single Buyer Proposal the French Government therefore supplement it by additional liberalizations with respect to cross-border trade.

Deregulatory reforms are often implemented by abolishing old laws rather than by creating new laws. Depending on the design of the interrelation between the general industry laws and the special legal and regulatory framework of the electricity industry such an abolishment of existing regulations can have quite different effects. In Germany such a deregulatory reform by abolishment of existing regulations would directly lead to

a wheeling type system with the possibility of third parties to apply for the use of utilities' grids.

An important legal condition to be considered in deregulatory reforms is the relative importance of the legal protection of property rights and competition law. The implementation of a far reaching deregulatory reform (e.g. introduction of a pool model) can make it necessary to restructure the industry (vertical disintegration, market organization). Such measures infringe on the property rights of the utilities and their owners, resulting in a conflict between efficient competition and private property rights. While such restructurings are possible in some countries (US, e.g. Bell Companies, AT&T), they prove to be extremely difficult in other countries giving more weight to private property than to competition (e.g. Germany).

(3) Organizational Structure

Roughly seven types of organizational structures of national ESIs can be differentiated (see figure II.1).

Type1 One fully-integrated national utility [1GTD]

Type2 One integrated national generation-transmission utility and several regional distributors [1GT(D) + xD]

Type3 One utility as national transmission owner integrated in both generation and distribution and several generators and regional distributors [1GTD + xG + yD]

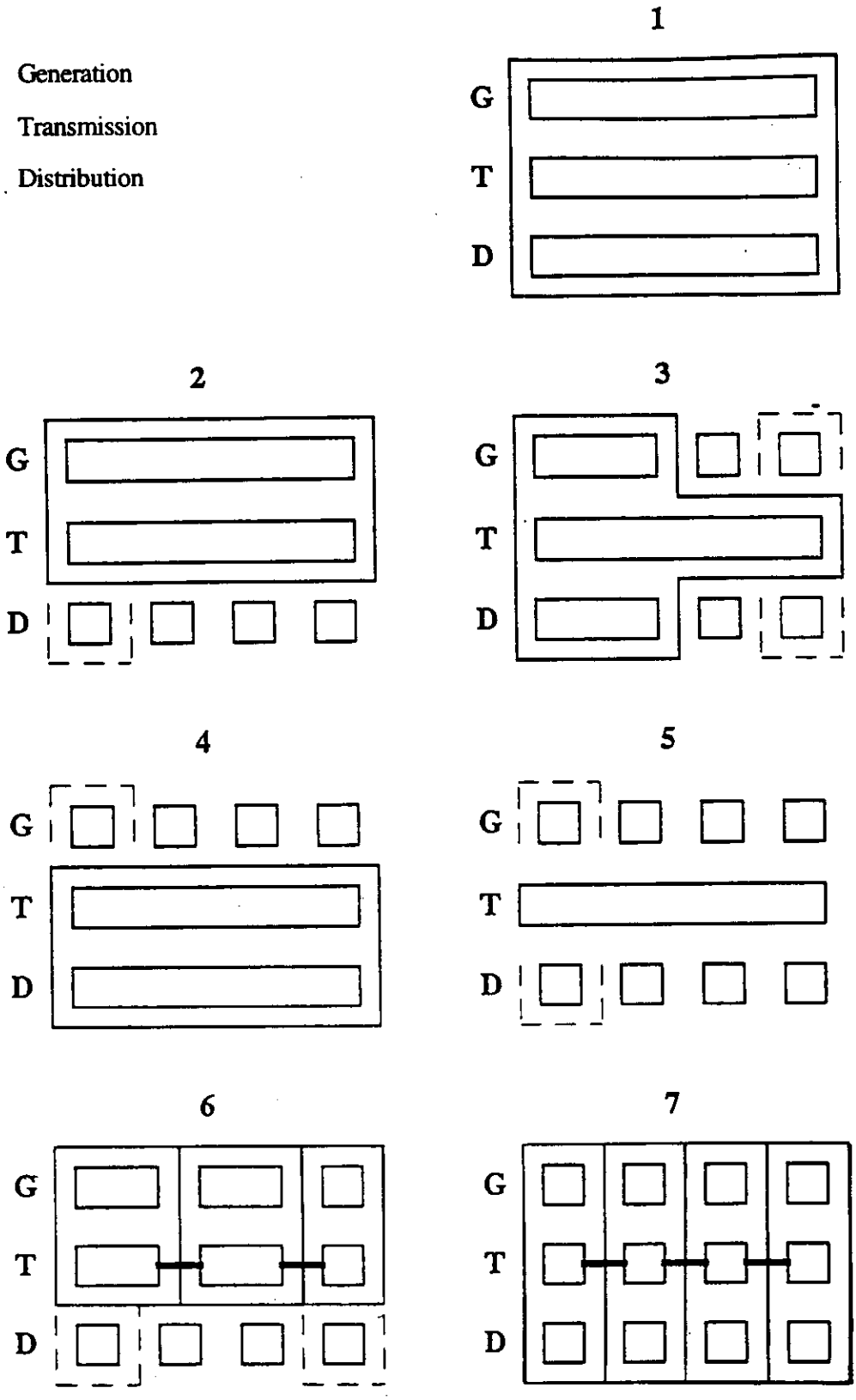
Type4 One integrated national transmission-distribution utility and several generators [xG + 1(G)TD]

Type5 One national transmission utility and several generators and distributors [xG(D) + 1T + y(G)D]

Type6 Several regionally integrated generation-transmission utilities and several distributors [xGT(D) + y(G)D]

Type7 Several regional fully integrated utilities [xGTD]

Figure II.1: Types of structure



The pre-reform organizational structure of the ESI is an important factor to be considered in reform model selection, because the different reform models pose different requirements with respect to the post-reform organizational structure. Compatibility of reform models with types of industry structure:

- Competitive Bidding — all types
- Wheeling — types 6, 7
  types 3, 4, 5 in connection with a generators pool
- Pool — type 5

The larger the difference between pre-reform structure and the (model-dependent) post-reform structure the deeper the necessary restructuring of the industry. Because a restructuring is always difficult, there is a strong incentive to adapt the reform model selection to the existing organizational structure.

If there is for example only one national utility or generation company, the introduction of full generation competition requires a split up into several competing generation companies. This solution was adopted by England and the Australian State of Victoria. In New Zealand the operation of the dominating generation business of Electricorp proved to be a very difficult, with political problems not yet resolved leaving the deregulatory reforms uncompleted. Another solution is to introduce "only" competitive bidding thus restricting competition to capacity additions and avoiding the need to split up existing generation.

Such limitations and restrictions of the organizational structure of the national ESI can be overcome, if the national ESI is part of an integrated international electricity system. The dominating power of a company in one national market can be balanced or outweighed by outside competitors. Without splitting up the dominant generator, competition can be introduced by e.g. a wheeling system. The liberalization of cross-border electricity trade and a minimum harmonization of market and competition rules will be necessary pre-conditions for such a solution, safeguarding reciprocal access to electricity markets and leveling the playing field between the international competitors. An example of the integration of national markets to prevent the split up of a dominant generator to introduce a competitive pool system is Sweden. The dominance of Vattenfall (about 50 % of total Swedish generation) shall be reduced by the integration with the similar size Norwegian electricity market thus reducing Vattenfall's share to 25 % of the integrated market. The EU Internal Electricity Market project is intended to

promote such internationally integrated solutions giving a common umbrella of European Internal Market and competition legislation.

(4) Ownership Structure

While the organizational structure determines the restructuring requirements of the implementation of a certain reform model, the ownership structure of the ESI heavily influences the political practicality of such restructuring measures.

Ideally two types of ownership structures of national ESIs can be differentiated: public and private. (In many countries additional forms like mixed ownership occur.)

Public ownership significantly increases the flexibility of government and legislators in selecting the reform model. The decisions only influence the public property rights over which the legislators have ultimate control. They can act not only as the designers of a regulatory framework of the ESI but also as its owner, enabling them to decide freely on a restructuring to reach an organization suitable to the chosen reform model. Far reaching restructurings have only been realized in countries with public ownership (England, Chile, Victoria (in Australia)).

Private ownership has adverse effects. It complicates the opening of the grids, because this has an expropriation effect in reducing the decision freedom of the grid owning utility. It complicates/prevents modifications of the organizational structure because these infringe even more on the private property rights. Even without restructuring, the decisions of the government to introduce competition can have a revaluation (predominantly a devaluation) effect on private utilities' assets especially in generation (stranded investments). This leads to a strong opposition against the introduction of competition and to claims for difficult and complex transitional compensation regimes. There is a strong political incentive to solve such problems by watering down the competitive opening for example by only introducing competitive bidding or by limiting and complicating access to the grids. The difficulty of competitive reforms in countries with private ownership can be seen in the US and Germany, where reform discussions and developments are very iterative and often appear inconsistent.

Reform Implementation Schedule

Countries' reforms differ significantly with respect to reform implementation.

One extreme can be characterized by the English reforms. Based on a legislation introduced in 1989 (Electricity Act) the general system change was realized in one single step (1 April 1990) supplemented by a detailed and binding schedule for additional reform elements like privatization and transitional regulations. The whole reform was based on a blueprint for the future functioning of the ESI and the reform implementation.

The other extreme is marked by the reform developments in the United States. As a result of years of controversial discussions a deregulatory reform legislation was introduced (PURPA 1978, EPAct 1992). Such a legislation only has the character of a framework law defining (deregulatory) policy aims and some details to be considered as restrictions in implementation. It leaves almost all practical implementation aspects to the federal regulatory authority (FERC) and state legislation or regulators. To complicate the reform process even more such framework laws are far from being clear, leaving a wide range of interpretations and sometimes formulating conflicting aims. The reform process is therefore to a large extend unpredictable and time-consuming, arriving at functioning systems 5 to 10 years after introduction of the legislation.

In countries with strong central governments (Chile, Argentina, Portugal) reforms tend to follow the English example, while in cases of conflicting legislative powers, reforms rather tend to follow the US example. Conflicting legislative powers are especially given in federally constituted countries (US, Germany, Australia) and in the European Union.

Transitional and Supplementing Regulations

In most countries a deregulatory reform is accompanied by transitional and supplemental regulations.

Transitional regulations are designed to handle problems which arise from changing from monopoly to competition. Such regulations refer to:

- the termination of existing long-term contracts;
- transfer regimes for compensation of stranded investments;
- the design of tariff structures;
- the use of domestic fuels in electricity generation.

Supplemental regulations are needed to find solutions for public policy obligations to be fulfilled by the ESI, such as:

- subsidization of environmentally desirable electricity generation;
- financing of energy savings programs;
- financing of social programs and tariffs;
- financing of R&D programs.

6 Results of Reforms

6.1 General Performance of Reform Models

Competitive Bidding (primarily based on US experiences)

- Intensive competition in capacity additions:
  Solicitations in the US are frequently 10-times over-subscribed

- No direct consumer effects:
  Because of the restriction of competition to capacity additions and the long-livety of generation projects, downward effects on consumer prices were limited so far: no interregional integration (e.g. price equalization) effect, no improvement effects on service quality and consumer choice.

Wheeling

- UK Energy Act - wheeling had no competitive effects:
  In 1983 the Energy Act was introduced in the UK, opening the public grid for private generators to wheel power to retail customers. High wheeling charges based on contract path methodologies and the unpredictability of the behavior of the mighty state-owned utility (CEGB) caused the total failure of this wheeling system. This was one reason for the more fundamental deregulatory reform in 1990 (separate for England, Scotland and Northern Ireland).

- EU Transit Directive had no competitive effects:
  In 1991 a limited form of wholesale wheeling was introduced on the EU level. It granted transmission grid owning companies access to the transmission grids of other companies under certain circumstances. This very limited form of competitive opening was not able to change the traditional cooperative behavior between these utilities, no competitive transactions occurred.

- US EPAct - wholesale wheeling not yet implemented:
  The wholesale wheeling system giving all generators access to the grids in order to complete transactions with any vertically integrated or distributing utility had no visible practical results so far, because many details of implementation are not yet decided. In the meantime several States started a debate on the introduction of retail supply competition, its possible forms ranging from retail wheeling to pools.

- Limited competition in the Scottish wheeling system:
  In Scotland a retail wheeling system was introduced in 1990. Although access is given in a generalized way based on non-discriminative postage stamp grid tariffs and grid cost are controlled by an unbundling of the transmission function of the two vertically integrated Scottish utilities, only very limited competition in supply and generation has developed. The reason is not a failure of system design, but a result of market conditions in Scotland: a) only two competitors (duopoly), b) very low cost and price levels and overcapacity in Scotland making competitive entry unattractive, c) only limited interconnection with England effectively separating these markets and limiting exports into the Scottish market.

Pool

- Pools instantaneously stimulate competition in generation and supply:
  Both in England and Norway the (mandatory/voluntary) pool system initiated an intensive competition. In England market shares of the competitors changed significantly during the first years in supply whereas competitors played only a limited role in generation because of the de facto duopoly in the generation market.

- Price reductions
  Customers with competitive supply opportunities have profited from significant price reductions in Norway or moderate price reductions in England.

- Integration effect:
  The pool system reduced interregional price differentials to the extent of cost differences. This was especially evident in Norway where the large regional price differences were strongly reduced.

- Customer choice and product innovation:
  Competition in retail supply increased customer choice as regards load management possibilities and the distribution of risks.

6.2 Results in Generation

Important results in generation are:

- losses for owners of expensive overcapacities (Norway);
- market entry by new "independent" generators (England, USA),
  such as gas suppliers, manufacturers, external and foreign utilities, industrial self-generators - single or jointly in groups;
- earlier replacement of old and inefficient plants (England) forced by competitive entrants;
- strong pressure to build cheap plants (England, USA);
- reduced construction times of plants;
- professionalization and internationalization:
  globally engaged companies (Mission Energy, Enron).

6.3 Results in Supply

Important results in supply are:

- competition in supply for customers down to 50000 kWh/a (Norway);
- sharply decreasing prices for non-franchise customers (Norway);
- interregional equalization of prices (Norway);
- increased customer orientation (England, Norway, New Zealand);
- better consideration of customer specifics such as load profile, load management possibilities, risk preference in contracts (England, Norway, New Zealand).

7 Conclusions

The following conclusions can be drawn from the analysis of deregulatory reforms worldwide:

- competition in the ESI is possible;
- different countries choose different models;
- results differ depending on model and country;
- in some cases competition caused significant increases of efficiency;
- competitive reforms become more and more common;
- growing trend to give customers access rights.

III Standardized Analysis of Countries with Reform Developments

This chapter outlines in a standardized format the development and present status of deregulatory reforms in countries which have undertaken major reforms like

- England
- Scotland
- Northern Ireland
- Norway
- Sweden
- Finland
- New Zealand
- Australia
- USA
- Chile
- Argentina
- Netherlands
- Portugal
- Spain
- Japan

1 England

System Size and Integration		Economic Indicators	
Installed Capacity	60.0 GW	Area	130.438 km2
Total Generation	230.0 TWh	Inhabitants	50.954 mill.
- Hydro	0 %	GNP	876,758 mill.$ (UK)
- Nuclear	20 %	GNP/capita	15,209 $ (UK)
- Fossil	80 %	El.consumption/capita	4,269 kWh
Grid Integration	Integration with the Scottish grid DC-link to France		

Structure and Ownership	prior to the reforms		currently	
Structure				
- Generation	1 GT	(CEGB)	3 + new (~15) G	(Nat. Power, PowerGen, Nucl. Electric) + new
- Transmission	1 GT	(CEGB)	1 T	(National Grid Company)
- Distribution	12 DS	(Area Boards)	12 DS	(Regional Electricity Companies/RECs)
- Retail Supply	12 DS	(Area Boards)	12 DS + new (~20	(Regional Electricity Companies/RECs) + new
- Type	2		5	
Ownership	public		private (exception: Nuclear Electric public)	

Reform Process

1983	Energy Act	Introduced wheeling without restructuring (failed in practice)
1988	Government White Paper	Announced need and specified details of a fundamental reform
1989	Electricity Act	Fixed the regulatory framework of the reformed system
1989	Restructuring of CEGB and corporization	Created 4 CEGB- and 12 Area Board-successor companies (plc)
1990	Licenses, Codes, Contracts, Pooling Agreement	Fixed details of regulation and functioning of the reformed system
1.4.1990	Start of the reformed system	Pool started working, retail supply competition was introduced
1990/91,95/96	Privatization	The whole ESI except the Nuclear Generator was privatized

Reform Elements

Restructuring of the CEGB	CEGB was split up into	- two fossil generators	(National Power and PowerGen)
		- one nuclear generator	(Nuclear Electric)
		- one transmission company	(National Grid Company)
Corporization and privatization	CEGB-successors and Area Boards were transformed into public limited companies and privatized in two steps		
Liberalization	Total removal of legal entry barriers in generation and supply (open licensing system)		
Generalized access to the grids	for all generators and (in a stepwise process) for all retail consumers		
Mandatory Pool	Organization of a short-term wholesale electricity market (Pool)		
	Obligation of all generators and retail suppliers (via license condition) to become Members of the Pool and to settle all physical trade through the Pool (mandatorily) based on a half-hourly calculated Pool Price for electricity		
Unbundling	Separate accounts and management for each function (generation, transmission, distribution and retail supply) in vertical integrated (or integrating) companies		
Price Cap Regulation	of remaining monopolistic functions		

Competitive Mechanisms

Pool	Generators compete daily via price bids to the Pool in shares of total required generation
Retail supply market	Suppliers compete in concluding sales contracts with retail consumers and fulfill their customer's demand via daily physical purchases through the Pool
Contract market	Generators compete in concluding financial type contracts with suppliers (instruments: contracts for differences 1-15 years, forward agreements 1-80 weeks)

Status of Reform Development	completed	
Reform Design		
Competitive Opening	generation	full competition
	supply	retail competition > 1 MW (1990), > 100 kW (1994), all (1998)
Reform Model		pool (mandatory)
Treatment of Monopolistic Functions	transmission	separation
	distribution	unbundling

2 Scotland

System Size and Integration (United Kingdom)		Economic Indicators (United Kingdom)	
Installed Capacity	11.7 GW	Area	78,772 km2
Total Generation	35.0 TWh	Inhabitants	5.100 mill.
- Hydro	12 %	GNP	876,758 mill.$ (UK)
- Nuclear	35 %	GNP/capita	15,209 $ (UK)
- Fossil	53 %	El.consumption/capita	5,176 kWh
Grid Integration	Integration with the English grid		

Structure and Ownership	prior to the reforms		currently	
Structure				
- Generation	2 GTDS	(NSHEB, SSEB)	2 GTDS + 1	(Scottish Power, Scottish Hydro-Electric)
- Transmission	2 GTDS	(NSHEB, SSEB)	2 GTDS	(Scottish Power, Scottish Hydro-Electric)
- Distribution	2 GTDS	(NSHEB, SSEB)	2 GTDS	(Scottish Power, Scottish Hydro-Electric)
- Retail Supply	2 GTDS	(NSHEB, SSEB)	2 GTDS + new(~5)	(Scottish Power, Scottish Hydro-Electric)
- Type	7		7	
Ownership	public		private	

Reform Process

1983	Energy Act	Introduced wheeling without restructuring (failed in practice)
1988	Government White Paper	Announced need and specified details of a fundamental reform
1989	Electricity Act	Fixed the regulatory framework of the reformed system
1989	Corporatization	Created 2 successor public limited companies
1990	Licenses, Codes, Contracts	Fixed details of regulation and functioning of the reformed system
1.4.1990	Start of the reformed system	Retail supply competition was introduced
1990/91	Privatization	The whole ESI except the nuclear generator was privatized

Reform Elements

Restructuring	The distribution of power plants between the two regional utilities was adjusted to reach less differing fuel mixes, nuclear plants were outsourced into a separate firm
Corporatization and privatization	The two utilities were transformed into public limited companies and privatized
Liberalization	Total removal of legal entry barriers in generation and supply (open licensing system)
Access to the grids	for all generators and (in a stepwise process) for all retail consumers to conclude wheeling transactions (postage stamp tariffs)
Access to back-up and top-up supplies	Incumbent utilities have to offer back-up and top-up services to anyone including their competitors based on the English pool prices (type of opportunity cost pricing)
Unbundling	Separate accounts and management for each function (generation, transmission, distribution and retail supply) in vertical integrated companies
Price Cap Regulation	of remaining monopolistic functions
Distribution of interconnection rights	The transmission capacity of the interconnection link with England was grandfathered between the two utilities (they are considerable net exporters to England)

Competitive Mechanisms

Retail Supply Market	The supply businesses of the two integrated utilities compete against each other and other (new) suppliers in concluding supply contracts with retail consumers Suppliers have to conclude physical delivery contracts with generators, which may be supplemented by back-up and top-up purchases from the incumbent utilities
Generation Market	There is no direct generation competition like in the English Pool. Generators have to competitively conclude physical delivery contracts with suppliers to find an outlet.

Status of Reform Development	completed	
Reform Design		
Competitive Opening	generation	full competition
	supply	retail competition > 1 MW (1990), > 100 kW (1994), all (1998)
Reform Model		retail wheeling
Treatment of Monopolistic Functions	transmission	unbundling
	distribution	unbundling

3 Northern Ireland

System Size and Integration (United Kingdom)		Economic Indicators	
Installed Capacity	2.2 GW	Area	14,121 km2
Total Generation	6.0 TWh	Inhabitants	1.594 mill.
- Hydro	0 %	GNP	876,758 mill.$ (UK)
- Nuclear	0 %	GNP/capita	15,209 $ (UK)
- Fossil	100 %	El.consumption/capita	3,764 kWh
Grid Integration	No Integration (Island System)		

Structure and Ownership	prior to the reforms	currently
Structure		
- Generation	1 GTDS (NIE)	4
- Transmission	1 GTDS (NIE)	1 TDS (NIE)
- Distribution	1 GTDS (NIE)	1 TDS (NIE)
- Retail Supply	1 GTDS (NIE)	1 TDS (NIE)
- Type	1	4
Ownership	public	generators private, NIE still public

Reform Process

1989	Electricity Act	Fixed the regulatory framework of the reformed system
1991	Government White Paper on Northern Ireland	Developed plans for a deregulation in Northern Ireland
1992	Restructuring, corporization	Separation of NIEs 4 power plants, NIE became a plc
1992/93	Privatization	Both the different power plants (92) and NIE (93) were privatized
1992	Supply Competition Code	Laid down functioning of the new system with NIE as central trader
1992	Start of the first phase of the reform	New contracts in place, retail competition was introduced (failed)
1994	Regulator's proposal for second phase of reform	Developed plans to introduce a mandatory pool-system
1996?	Starting of second phase of reform	

Reform Elements

Restructuring of the NIE	NIEs 4 plants were separated, a new business unit Power Procurement was installed
Corporization and privatization	The 4 plants were privatized having long term contracts with NIE Power Procurement NIE was transformed into a public limited company and later privatized
Liberalization	Total removal of legal entry barriers in supply (open licensing system)
Access to the grids	for all generators and (in a stepwise process) for all retail consumers
Single Buyer (Phase 1)	NIE Power Procurement acting as the monopolistic wholesale buyer of electricity grandfathering of initial contracts with existing power plants, because of lacking capacity needs no introduction of a formal system of competitive bidding
Opportunity for retail competition	NIE Power Procurement has to sell electricity to both NIEs Supply Business and potentially competing new suppliers at a regulated Bulk Supply Tariff
Unbundling	Separate accounts and management for each function (generation, power procurement, grid (transmission and distribution) and retail supply) in vertical integrated/ing companies
Price/Revenue Cap Regulation	of remaining monopolistic functions

Competitive Mechanisms

Retail supply market	De jure different suppliers could compete in concluding sales contracts with retail consumers fulfilling contracts by balancing purchases from NIE Power Procurement, de facto no competing supplier established a business (no competition yet)
Generation market	Potentially a competitive bidding regime would be consistent with the current system, but there is no capacity need (no competition yet) and a further reaching restructuring is now in discussion

Status of Reform Development: first phase completed (second phase under discussion)

Reform Design

Competitive Opening	generation	restricted, future full competition
	supply	retail competition > 1 MW (1990), > 100 kW (1994), all (1998)
Reform Model		(competitive bidding, further reaching model in discussion)
Treatment of Monopolistic Functions	grid business	unbundling
	power procurement	unbundling

4 Norway

System Size and Integration		Economic Indicators	
Installed Capacity	26.9 GW	Area	323.878 km2
Total Generation	117.7 TWh	Inhabitants	4.259 mill.
- Hydro	100 %	GNP	105.929 mill.$
- Nuclear	0 %	GNP/capita	24.872 $
- Fossil	0 %	El.consumption/capita	22.963 kWh
Grid Integration	Part of North-European Nordel-Grid in future DC-links to Netherlands, Germany		

Structure and Ownership	prior to the reforms	currently	
Structure			
- Generation	1 GTDS + 60 G/GDS	61 G/GDS	(Statkraft still being the largest ~30 %)
- Transmission	1 GTDS (Statkraft)	1	(Statnet)
- Distribution	1 GTDS + 210 DS/GDS	211 DS/GDS	
- Retail Supply	1 GTDS + 210 DS/GDS	211 DS/GDS + new	
- Type	3	5	
Ownership	predominantly public (Statkraft and Statnet national, regional and local in municipal ownership)		

Reform Process

1987/88	First deregulatory reform proposals	Competition to improve integration and investment behaviour
1990	Electricity Act	Liberalized generation investments and opened access to the grid
1.1.1991	Enacting the legislation	De jure start of the new system
1.5.1991	Opening of the existing generators power pool	Access of suppliers and consumers to the Pool
1.1.1992	Restructuring of Statkraft	Separated transmission into a new company Statnet
1.5.1992	Introduction of generalized grid tariff systems	De facto start of the new system (reached workable conditions)
1.1.1993	Enacting of a new regulatory framework	Fixed e.g. unbundling, tariff design issues..
1.1.1993	Restructuring of Pool responsibility	Transferred Pool from a generators club to Statnet

Reform Elements

Reorganization	Transmission grid was separated from Statkraft into a new company Statnet, initiation of voluntary mergers to reach more efficient structure (only limited results)
Liberalization	Total removal of legal entry barriers in generation and supply (open licensing system)
Generalized access to the grids	for all generators and (in a stepwise process) for all retail consumers
Voluntary Pool	Existing short-term market for transactions between generators (Samskoeringen) was opened to both suppliers and (large) consumers, thereby changing it from a cooperative pool to a competitive voluntary Pool, both generators and suppliers/large consumers can trade electricity through the Pool, settlement of trades based on an hourly calculated Pool Price for electricity, Pool organizes also a standardized forward contract market (up to 2 years) with physical delivery (hydro optimization!) Transfer of Pool responsibility from a club of generators to Statnet (transmission comp.)
Unbundling	Separate accounts and management between monopolistic and competitive functions (generation/supply and distribution) in vertical integrated (or integrating) companies

Competitive Mechanisms

Retail supply market	Suppliers (generators or pure traders) compete directly or via brokers in concluding sales contracts with retail consumers and fulfill them either by using physical delivery contracts or via daily physical Pool purchases (potentially hedged by financial contracts)
Contract market	Generators compete in concluding physical or financial type contracts with suppliers
Pool	Generators and suppliers/large consumers competitively trade daily via price bids

Status of Reform Development	completed	
Reform Design		
Competitive Opening	generation	full competition
	supply	retail competition (no access restrictions)
Reform Model		pool (voluntary)
Treatment of Monopolistic Functions	transmission	separation
	distribution	unbundling

5 Sweden

System Size and Integration		Economic Indicators	
Installed Capacity	34.0 GW	Area	449,964 km2
Total Generation	146.0 TWh	Inhabitants	8.644 mill.
- Hydro	51 %	GNP	206,411 mill.$
- Nuclear	44 %	GNP/capita	23,879 $
- Fossil	5 %	El.consumption/capita	15,248 kWh
Grid Integration	Part of North-European Nordel-Grid DC-Link to Germany (in future: Poland)		

Structure and Ownership	prior to the reforms	currently	
Structure			
- Generation	1 GTDS + 85 G/GDS	86 G/GDS	(Vattenfall, still being the largest ~50 %)
- Transmission	1 GTDS (Stat.Vattenfallswerk)	1	(Svenska Kraftnät)
- Distribution	1 GTDS + 290 DS/GDS	291 DS/GDS	
- Retail Supply	1 GTDS + 290 DS/GDS	291 DS/GDS	
- Type	3	5	
Ownership	different types of ownership (Vattenfall and Svenska Kraftnät tpublic)		

Reform Process

1991	First deregulatory reform proposals	Regulatory authority NUTEK proposed fundamental reform
1.1.1992	Restructuring/corporization of StatVattenfallsw.	Separated transmission, two successors became plc
1992	Competitive Electricity Market Bill	Fixed a general strategy for a reformed system
1993	Study on wholesale market reform	Proposed a voluntary Pool-system integrated with the Norwegian
1993	Study on legislative reforms	Developed details of a new regulatory framework
1994	Competitive Electricity Trade Bill	Fixed regulatory framework and design issues of the reform
1994	New majority initiated further studies	Delayed reform schedule for one year to investigate in more detail implications of competition on prices, security of supply...
1.1.1996	New scheduled start of a reformed system	Retail supply competition and voluntary Pool operation shall start

Reform Elements

Restructuring	Transmission grid was separated from Statens Vattenfallswerk and remaining parts were transformed into public limited companies (Vattenfall, Svenska Kraftnät)
Liberalization	Total removal of legal entry barriers in generation and supply (open licensing system)
Generalized access to the grids	for all generators and for all retail consumers
Voluntary Pool	New voluntary Pool shall be organized by Svenska Kraftnät both generators and suppliers /large consumers can trade electricity through the Pool, settlement of trades based on an hourly calculated Pool Price for electricity. Pool shall be accompanied by a separate forward contract market organized by a financial clearing house company Svenska Kraftnät and Statnet aim at the introduction of a joint Norwegian/Swedish Pool starting on 1.1.1996 (Some final decision will have to be made in 1995)
Unbundling	Separate accounts and management between monopolistic and competitive functions (generation/supply and distribution) in vertical integrated (or integrating) companies

Competitive Mechanisms

Retail supply market	Suppliers (generators or pure traders) compete directly or via brokers in concluding sales contracts with retail consumers and fulfill them either by using physical delivery contracts or via daily physical Pool purchases (potentially hedged by financial contracts)
Contract market	Generators compete in concluding physical or financial type contracts with suppliers
Pool	Generators and suppliers/large consumers competitively trade daily via price bids

Status of Reform Development	implementation/under discussion	
Reform Design		
Competitive Opening	generation	full competition
	supply	retail competition
Reform Model	pool (voluntary)	
Treatment of Monopolistic Functions	transmission	separation/unbundling
	distribution	unbundling

6 Finland

System Size and Integration		Economic Indicators	
Installed Capacity	13.3 GW	Area	338.145 km2
Total Generation	55.1 TWh	Inhabitants	5.029 mill.
- Hydro	27 %	GNP	110.033 mill.$
- Nuclear	33 %	GNP/capita	21.880 $
- Fossil	40 %	El.consumption/capita	11.871 kWh
Grid Integration	Part of North-European Nordel-Grid DC-link to Russia		

Structure and Ownership	prior to the reforms	currently	
Structure			
- Generation	1 GT + 4 G(T) + 16 G + 125 GDS	1 GT + 20 G + 125 GDS	
- Transmission	1 GT + 4 G(T) (IVO, others)	1 (G)T + 1 (G)T	(IVO-IVS, TVS)
- Distribution	125 GDS	125 GDS	
- Retail Supply	125 GDS	125 GDS	
- Type	6	6	
Ownership	IVO public, TVS private owned by 4 industrial companies involved in generation, IVO-IVS owned by IVO		

Reform Process

1989-1992	Growing wholesale competition by TVS	4 ind. generators enlarged their regional transmission grids, interconnected them and brought them into a new joint company (TVS) responsible for transmission and wholesale trading TVS started competing against public IVO in wholesale supply of distributors via its grid and offered wheeling services
1991	IVOs restructuring reacting on deregulation trends	IVO reorganized itself into different profit centers and companies, transmission part was brought into a separate company (IVO-) IVS
1992	Governments Finnish Energy Strategy	Formulates aim of liberalization of the electricity industry
1995	Electricity Market Act	Proposed in 1993 it was adopted in February 1995
1994/95	Development of market rules	Based on a Pool study rules for the future functioning of the Grid shall be developed (further decisions required)
1.1.1996	Start of the new system	

Reform Elements

Voluntary restructuring	Creation of TVS, separation of IVOs transmission business into (IVO-) IVS
Liberalization	Total removal of legal entry barriers in generation and supply (open licensing system)
Access to the grids	for all generators and (stepwise) for all retail consumers
Unbundling	Separate accounts and management between monopolistic and competitive functions (generation/supply and transmission/distribution) in vertical integrated companies
Voluntary Pool(?)	Future functioning of the reformed system (retail wheeling/pool) not yet decided. market rules shall be developed before start of the new system
Participation in Scandinavian market(?)	Interrelation of Finnish market with intended Swedish-Norwegian Market not decided

Competitive Mechanisms

Wholesale supply competition	To a limited extent already existing competition between IVO and TVS and generators using IVS/TVS-wheeling in supply of distributors (in regions reachable by both grids)
Retail supply and generation competition	Suppliers (generators or pure traders) will compete in supply contracts with retail consumers, generators will compete in contracts with either suppliers or consumers (Details not yet clear, depend on reform model - retail wheeling vs. voluntary pool)

Status of Reform Development: implementation (still discussion on reform model)

Reform Design

Competitive Opening	generation	full competition
	supply	retail competition (>0,5 MW in 1996, all in 1997)
Reform Model		retail wheeling, participation in the Scandinavian pool?
Treatment of Monopolistic Functions	transmission	unbundling
	distribution	unbundling

7 New Zealand

System Size and Integration		Economic Indicators	
Installed Capacity	7.1 GW	Area	270,986 km2
Total Generation	31.9 TWh	Inhabitants	2.549 mill.
- Hydro	72 %	GNP	42,861 mill.$
- Nuclear	0 %	GNP/capita	16,815 $
- Fossil	28 %	El.consumption/capita	11,220 kWh
Grid Integration	2-island-system connected via DC link		

Structure and Ownership	prior to the reforms		currently	
Structure				
- Generation	1 GT		1 G	ECNZ
- Transmission	1 GT	(NZElecDivision)	1 T	Transpower
- Distribution	44 DS	(ElSupply Author)	44 DS	Distribution Companies
- Retail Supply	44 DS		44 DS + new	Distribution Companies + others
- Type	2		2 / 5	
Ownership	public, distributors now in mixed ownership			

Reform Process

1986	State owned Enterprises Act	Plan to commercialize/corporize NZED, liberalized generation and wholesale supply (failed in practice: no entry, no competition)
1.4.1987	Corporization of NZ Electricity Division	Transformation into ECNZ, a public limited company
1988/90	Restructuring of ECNZ (1)	Profit centers: generation, transmission, marketing,(construction)
1990	Restructuring of ECNZ (2)	Transmission was transformed in an affiliated comp. Transpower
1992	Energy Companies Act	Corporization/partial privatization of distributors, unbundling
1992	Wholesale Electricity Market Study (WEMS)	Study sponsored by utilities on options for wholesale reform opted for independence of Transpower, the introduction of a Pool system, two-phase split-up of ECNZ (profit centers, indep. comp.)
1.4.1993/94	Introduction of retail competition	Stepwise introduction of retail supply competition, still de facto monopoly of ECNZ in generation (and wholesale supply)
1.7.1994	Separation of Transpower	Ownership was transferred from ECNZ directly to the state
1994/95	Development of wholesale market deregulation	Based on the results of an all-interest group working group

Reform Elements

Corporization and partial privatization	Both New Zealand Electricity Division and Electricity Supply Authorities were corporized into new public limited companies, distribution companies partly privatized
Restructuring	The new ECNZ was split into profit centers, transmission was separated into an (finally) independent State-owned public limited company (Transpower)
Liberalization	Total removal of legal entry barriers in generation and supply (license system)
Access to the grids	for all generators and for all retail consumers
Unbundling, light handed-regulation	Separate accounts for generation, distribution and supply, abuse-control type regulation
Mandatory Pool?	Existing studies propose a split-up of ECNZ into several competing generation units and the introduction of a (modified) English-type Pool organized by Transpower

Competitive Mechanisms

Retail supply market	Suppliers (distributors, pure traders) compete directly or via brokers in concluding sales contracts with retail consumers and fulfill them by using physical delivery contracts concluded with ECNZ Marketing Division responsible for wholesale trade of ECNZ
Future	The split-up of ECNZ and the introduction of a mandatory Pool-System would add English-type wholesale market mechanisms (Pool, financial contract market)

Status of Reform Development: implementation (still discussion on reform model)

Reform Design

Competitive Opening	generation	liberalized de jure, de facto monopoly of ECNZ
	supply	retail competition > 0,5 GWh (1993), for all (1994)
Reform Model		retail wheeling (proposals for wholesale pool)
Treatment of Monopolistic Functions	transmission	separation
	distribution	unbundling

8 Australia

System Size and Integration		Economic Indicators	
Installed Capacity	33.9 GW	Area	7.713.364 km2
Total Generation	158.9 TWh	Inhabitants	17.341 mill.
- Hydro	10 %	GNP	299.800 mill.$
- Nuclear	0 %	GNP/capita	17,289 $
- Fossil	90 %	El.consumption/capita	7,900 kWh
Grid Integration	Island System consisting of several parts Largest grid: Vict., NSW, SA (, Queensland)		

Structure and Ownership (in the largest grid)	prior to the reforms	currently
Structure		
- Generation	3 GTDS, 1 GT	1 GTDS, 1 G/T, 5+1 G
- Transmission	3 GTDS, 1 GT	1 GTDS, 1 G/T, 2 T
- Distribution	3 GTDS + 24 DS	1 GTDS + 29 DS
- Retail Supply	3 GTDS + 24 DS	1 GTDS + 29 DS
- Type	6	6 (-> 4 / 5)
Ownership	public	

Reform Process

1991	Industry Commission Report	Proposed a deregulatory reform to increase efficiency of the ESI
1991	Foundation of National Grid Management Council	To study developments of grid and market development options
1992	National Electricity Strategy	Laid down general aims and options of a deregulatory reform
1992/93	Conduction of Market Trials in NSW and Victoria	Profit center reorganization in each of both States and market experiments (Vicpool 1/2/3, ELEX)
1993	Council of Governments Decision on Reform	Laid down the aim of a national competitive market and a time-schedule for implementation
1993/94	Conduction of a National Electricity Market Trial	Market experiment to prepare market design and restructuring
1994	Restructuring in New South Wales (PacificPower)	Separated transmission from generation, in 1995 independence
1994/95	Restructuring and reform in Victoria (SECV)	Split-up of SECV into a transmission comp, a pool co., 5 generators and 5 distributors, introduction of retail competition, privatization of generators and distributors in 1995-97
1994/95	Restructuring in Queensland (QEC)	Split-up of QEC into a generation and a transmission/distribution company with transmission as a separate affiliated company planned
1995	Completion of Code of Conduct (planned)	Specifying regulatory framework and final market design
1.1.1996	Start of the competitive National Market	Introducing retail supply and generation competition in the large grid based on a mandatory (national) Pool system

Reform Elements (with respect to the largest grid)

Restructuring	Separation of transmission in 3 of 4 States, spit-up of larger State's generation in separate companies (Victoria) or profit centers (NSW)
Commercialization, corpor-/privatization	Increased commercial orientation of the utilities in all States, in Victoria SECV's successors were transformed in public limited companies to be privatized in future
Liberalization	Total removal of entry barriers in generation and supply (licensing system)
Generalized access to the grid	for all generators and (stepwise) for all retail consumers on standardized tariffs already started in Victoria, will start on National level on 1.1.1996
Unbundling	Separate accounts/management for generation, transmission, distribution and supply eventually foundation of a separate National transmission company (not yet decided)
Mandatory Pool	A Market Management Company will be founded to organize and operate the the National Pool

Competitive Mechanisms (with respect to the largest grid)

in future (in Victoria already introduced)	English-type market mechanisms (retail supply market, financial contracts, Pool)

Status of Reform Development	implementation	
Reform Design		
- Competitive Opening	generation	full competition
	supply	retail competition (>10 MW (1996), all (1999))
- Reform Model		mandatory Pool
- Treatment of Monopolistic Functions	transmission	separation
	distribution	unbundling

9 USA

System Size and Integration		Economic Indicators	
Installed Capacity	736.0 GW	Area	9,372,614 km2
Total Generation	3217.8 TWh	Inhabitants	252.7 mill.
- Hydro	8 %	GNP	5,610,880 mill.$
- Nuclear	21 %	GNP/capita	22,204 $
- Fossil	71 %	El.consumption/capita	10,919 kWh
Grid Integration	3 integrated networks DC-links to Canada		

Structure and Ownership	prior to the reforms	currently
Structure		
- Generation	200 GTDS, GDS + some G	200 GTDS, GDS + >4000G
- Transmission	200 GTDS	200 GTDS
- Distribution	200 GTDS, 3000 DS	200 GTDS, 3000 DS
- Retail Supply	200 GTDS, 3000 DS	200 GTDS, 3000 DS
- Type	6	6
Ownership	GTDS mostly private, some G Federal, GDS and DS in different types of ownership (coop, muni, priv)	

Reform Development

1978	Public Utilities Regulatory Policies Act (PURPA)	Obliged utilities to purchase electricity at avoided cost from Qualifying Facilities (based on renewables or cogeneration)
1984	First introduction of Competitive Bidding	in Maine to objectify avoided cost remuneration and to restrict capacity additions to required levels, until beginning of the 90s more than 30 States followed using CB mandatory or voluntary
1992	Energy Policy Act (EPAct)	opened all utilities an unregulated generation business, introduced wholesale wheeling between generators and distributors
1993-	Implementation of EPAct	Development of regulatory framework: transmission access and expansion, transmission pricing, future of cooperative Pools and market organization issues...
-1994	Widening of eligibility in solicitations	An increasing number of States with Competitive Bidding systems opened their solicitations for non-Qualifying Facilities, which was made compulsory in 1994
1993-	Retail wheeling debate	Several States started investigating a more fundamental reform
1994	Retail wheeling trials and proposals	Michigan introduced a limited retail wheeling experiment, California put forward a reform proposal aiming at full retail supply competition, majority of Californian utilities share the aim of retail competition, favor a voluntary Pool and separation and inter-utility integration of the transmission grid)

Reform Elements

Stepwise liberalization of generation	Removal of entry barriers in generation (entry for Qualifying-for all other technologies-for all operators, entry restricted to capacity additions-via competition against existing park)
Access to the grids	For generators to realize wholesale supply transactions with distributors

Competitive Mechanisms

Solicitations of capacity additions	In States using Competitive Bidding any generator can offer compete with projects in realization of required capacity additions
Wholesale supply competition	Generators compete in concluding wholesale supply contracts with distributors

Status of Reform Development: EPAct in implementation (further reform in discussion)

Reform Design

Competitive Opening	generation	full competition
	supply	wholesale competition (retail competition in discussion)
Reform Model		competitive bidding/wholesale wheeling (retail wheeling versus voluntary Pool in discussion)
Treatment of Monopolistic Functions	transmission	only unregulated generation separated (separation in discussion)
	distribution	only unregulated generation separated (unbundling in discussion)

10 Chile

System Size and Integration		Economic Indicators	
Installed Capacity	5.1 GW	Area	756,945 km2
Total Generation	22.3 TWh	Inhabitants	13.232 mill.
- Hydro	75 %	GNP	31,311 mill.$
- Nuclear	0 %	GNP/capita	2,366 $
- Fossil	25 %	El.consumption/capita	1,455 kWh
Grid Integration	Two (a large and a small) "island" systems		

Structure and Ownership (large grid system)	prior to the reforms	currently	
Structure			
- Generation	1 GTDS + 1 GDS(Endesa, Chilectra)	7 GS	
- Transmission	1 GTDS	1 T	(Transelec)
- Distribution	1 GTDS + 1 GDS + 14 DS	26 DS	
- Retail Supply	1 GTDS + 1 GDS + 14 DS	26 DS + 7 GS	
- Type	3	5	
Ownership	public, now predominantly private		

Reform Process

1982	Electricity Power Services Law	Legal framework for restructuring, privatization and liberalization
1983-1985	Restructuring of Endesa and Chilectra	Separation into 10/2 distribution, 4/1 generation and 1 generation-transmission company
1985	Creation of ELDC (a generators pool)	All generators became subject to central cost-based dispatch, introduction of marginal cost wholesale pricing/price regulation
1986/88	Introduction of retail supply competition	for consumers larger than 2 MW
1986-91	Privatization	of all successor companies
1993	Separation of Endesa´s transmission business	into a separate company (Transelec) and transfer of ownership from Endesa to its shareholders

Reform Elements

Restructuring and privatization	The important state-owned companies Endesa and Chilectra were spilt-up and privatized
Vertical disintegration	Split-up was designed to secure a disintegration between competitive generation, transmission and distribution (bundled with regulated retail supply)
Liberalization	Total removal of legal entry barriers in generation and transmission (no licensing requirements), only distribution is subject to a license
Mandatory generators pool	Generators are cost-based dispatched, differential energy quantities (trade) are settled based on SRMC of the system, short-falls in capacity between contractual obligations and available capacity are settled based on a regulated LRMC-capacity-premium (generators pool gives generalized access to back-up and top-up-supplies)
New price regulation	Prices between generators and distributors are based on actual Pool prices for energy and the regulated LRMC-capacity premium, retail supply is based on a regulated tariff, which is the sum of a Pool price forecast-derived energy price, the regulated capacity premium and transmission and distribution cost
Access to the grids	for all generators and for all retail consumers larger than 2 MW based on grid tariffs

Competitive Mechanisms

Retail supply	Generators compete in concluding supply contracts with distributors (regulated conditions) and retail consumers larger than 2 MW (unregulated conditions)

Status of Reform Development	completed	
Reform Design		
Competitive Opening	generation	full competition
	supply	retail competition (> 2 MW)
Reform Model		retail wheeling with cooperative generators pool
Treatment of Monopolistic Functions	transmission	separation
	distribution	separation bundled with monopolistic retail supply (< 2 MW)

11 Argentina

System Size and Integration		Economic Indicators	
Installed Capacity	17.8 GW	Area	2,780,092 km2
Total Generation	52.4 TWh	Inhabitants	32.7 mill.
- Hydro	34 %	GNP	114,344 mill.$
- Nuclear	15 %	GNP/capita	3,497 $
- Fossil	51 %	El.consumption/capita	1,362 kWh
Grid Integration	No Integration (Island System)		

Structure and Ownership	prior to the reform	currently
Structure		
- Generation	1 GT + 1 GDS + 4 G	22 G
- Transmission	1 GT (AyEE)	1 T (Transener)
- Distribution	1 GDS + 22 DS	25 DS
- Retail Supply	1 GDS + 22 DS	25 DS
- Type	3	5
Ownership	Public	Private

Reform Process

1989	State Reform Law	Legislatory framework for a program to privatize State-industries
1991-94	Restructuring and privatization	Dominant companies AyEE and Segba were separated into generation, transmission and distribution companies, these were privatized
1992	Electricity Market Law	Fixed regulatory framework of the reformed system
1992	Start of the new system	Pool started working, retail supply competition was introduced

Reform Elements

Restructuring	AyEE was separated into 1 transmission company (Transener), 1 pool company (Cammesa), 14 generators, the higher level distribution grids were passed to the Provincial distributors Segba was separated into 4 generators and 3 distributors
Vertical disintegration	Split-up was designed to secure a disintegration between competitive generation, transmission and distribution (bundled with regulated retail supply)
Privatization	The successor companies of AyEE and Segba were privatized
Liberalization	Total removal of legal entry barriers in generation and supply
Generalized access to the grids	for all generators and for large retail consumers (currently >5 MW)
Voluntary Pool (MEM)	organized by Cammesa; all generators, distributors and large consumers can participate in short-term trade organized by the Pool, distributors have to purchase 20 % of maximum forecasted load through the Pool, Pool trade of generators and large consumers is settled on the basis of an hourly Pool-price (system marginal cost + capacity element), Pool purchases of distributors are settled on a 3-monthly averaged Pool-price (seasonal Price)
Prohibition of vertical re-integration	Companies engaged in either generation, transmission or distribution are excluded from majority engagements (ownership or operation) in the other functions

Competitive Mechanisms

Retail supply market	Suppliers (generators or pure traders) compete directly in concluding sales contracts with retail consumers or distributors and fulfill them either by using physical delivery contracts or via daily physical Pool purchases (potentially hedged by financial contracts)
Contract market	Generators compete in concluding physical or financial type contracts with suppliers
Pool	Generators and suppliers/large consumers competitively trade daily via price bids

Status of Reform Development: almost completed

Reform Design

Competitive Opening	generation	full competition
	supply	retail competition >5 MW
Reform Model		voluntary pool
Treatment of Monopolistic Functions	transmission	separated
	distribution	separation bundled with supply <5 MW

12 Netherlands

System Size and Integration		Economic Indicators	
Installed Capacity	15.1 GW	Area	41.861 km2
Total Generation	77.2 TWh	Inhabitants	15.023 mill.
- Hydro	0 %	GNP	290.725 mill.$
- Nuclear	5 %	GNP/capita	19,352 $
- Fossil	95 %	El.consumption/capit	5,165 kWh
Grid Integration	Part of West-European UCPTE-Grid DC-link to Norway (commissioned for 2000)		

Structure and Ownership	prior to the reforms	currently	
Structure			
- Generation	16 GTDS	4 G + some GDS	
- Transmission	16 GTDS	1 T	(SEP)
- Distribution	16 GTDS + 68 DS	~ 40 GDS/DS	
- Retail Supply	16 GTDS + 68 DS	~ 40 GDS/DS	
- Type	7	5	
Ownership	public		

Reform Development

1981	Government proposals for structural reforms	aiming at a reduction of existing fragmentation and an improvement of investment behaviour and pricing
1982-85	Voluntary measures of the industry	Creation of a transmission company (SEP) organizing a cooperative generators pool for central dispatch and international trade and responsible for coordinating fuel purchase and expansion plans
1986	Government proposal for an Electricity Act	aiming at a vertical disintegration and concentration of the utilities, their corporization and a national cost pooling and price system
1987	New Cooperation Contract	Introduced most of the Governments requirements
1989	Electricity Act	Fixed restructuring rules (minimum sizes) and measures of a deregulation, it opened access to the grid for generators, distributors and large retail consumers, large consumers can enter import contracts
1993-	Movement against SEPs import-monopoly	Legal prohibition of import contracting by distributors was challenged by both a distributor and the EC Commission, monopoly will have to be removed
1994	Studies on a further reaching deregulatory reform	Two consultants developed proposals for a reform opening both wholesale and retail competition and is currently investigating them

Reform Elements

Restructuring and corporization	Generation was concentrated on 4 generation companies, transmission was separated into one nationwide transmission company, distribution was concentrated in 40 distributors
Vertical Disintegration	Spilt-up of effectively separated generation, transmission, distribution
Cooperative generators Pool	The introduction of the generators pool integrated nationwide dispatch and expansion
Cost pooling and pricing system	Integrated the national electricity system with respect to generation and transmission prices
Access to the grids	For all generators and for all distributors/large customers (>20GWh, 4000h/a)

Competitive Mechanisms

wholesale and retail competition	generators compete in supply contracts with distributors (wholesale) and large consumers (retail), effectively restricted by lacking liberalization in generation and fuel procurement and cost pooling system

Status of Reform Development	completed	
Reform Design		
- Competitive Opening	generation	non
	supply	retail competition > 20 GWh, 4000 h/a
- Reform Model	cooperative generator pool	
- Treatment of Monopolistic Functions	transmission	separation
	distribution	unbundling

13 Portugal

System Size and Integration		Economic Indicators	
Installed Capacity	7.4 GW	Area	92,389 km2
Total Generation	30.1 TWh	Inhabitants	9.853 mill.
- Hydro	17 %	GNP	65,103 mill.$
- Nuclear	0 %	GNP/capita	6,607 $
- Fossil	83 %	El.consumption/capita	2,568 kWh
Grid Integration	Part of West-European UCPTE-Grid		

Structure and Ownership	currently		planned	
Structure				
- Generation	1 GTDS		1 G + new	(CPPE + new)
- Transmission	1 GTDS	(EDP)	1 T	(REN)
- Distribution	1 GTDS		4 DS	
- Retail Supply	1 GTDS		4 DS	
- Type	1		5	
Ownership	public, CPPE and distributors in future mixed ownership, additional generators private			

Reform Development

1988	Liberalization of small-scale generation	Removed legal entry barriers for independent private projects
1991	Corporization of EdP	Transformation into a public limited company, regulated via licenses
1993	Privatization of PEGO power plant	Transferred a large plant in construction to a private consortium
1991-94	Development of reform design	Specified reform elements like the restructuring of EdP and the competitive mechanisms
1995	New electricity legislation	To fix the regulatory framework for the reform and the reformed system
1995	Restructuring of EdP	Split-up of EdP in one generator (CPPE), one transmission company (REN) and 4 distributors
1996	Partial privatization of EdP-successors	Part of CPPE (~25%) and distributors shares will be sold

Reform Elements

Corporization and restructuring	After being transferred into a public limited company, EdPs businesses will be reorganized in 6 separate companies with EdP as the owner acting as a financial holding company
Privatization	by out-sourcing of plant under construction and by sale parts of EdP-successor's shares
Vertical disintegration	Split-up is designed to separate generation, transmission and distribution
Liberalization	Legal entry barriers in generation were removed
Separation of markets	Differentiation between a Public Electricity Service System (SEP) and an Independent Electricity System (SEI): SEP will be organized by the transmission company (REN) acting as a central trader concluding contracts with both distributors and generators, starting with existing generators and later engaging in new contracts based on competitive bidding. generators and large consumers as well as distributors for a defined part of their total consumption will be allowed to conclude direct contracts bypassing the SEP-system, thus being the SEI-system
Access to the grid	for SEI-generators, distributors and large consumers to realize transactions outside SEP

Competitive Mechanisms

Competitive Bidding for capacity additions	required to fulfill capacity needs of the Public Supply System (SEP)
Retail supply	Independent generators will compete against SEP and between each other to conclude supply contracts with large retail consumers (> 50 kV?)
Wholesale supply	Independent generators will compete against SEP and between each other to conclude supply contracts with distributors for the liberalized part of their procurement (~8 %)

Status of Reform Development: implementation

Reform Design

Competitive Opening	generation	capacity additions only
	supply	wholesale competition only/retail competition >50 KW
Reform Model		single buyer system with limited tendering procedure and wheeling
Treatment of Monopolistic Functions	transmission	separation
	distribution	bundled with supply

14 Spain

System Size and Integration		Economic Indicators	
Installed Capacity	43.8 GW	Area	504.782 km2
Total Generation	158.5 TWh	Inhabitants	38.872 mill.
- Hydro	13 %	GNP	527.131 mill.$
- Nuclear	35 %	GNP/capita	13.561 $
- Fossil	52 %	El.consumption/capita	3.398 kWh
Grid Integration	Part of West-European UCPTE-Grid		

Structure and Ownership — actually/in future

Structure		
- Generation	149 GDS	Caused by the deregulation process on both EU and National level a series of take-overs happened
- Transmission	1 T (RedElectrica)	
- Distribution	149 GDS + 313 DS	
- Retail Supply	149 GDS + 313 DS	
- Type	5	
Ownership	dominant company Endesa public, other 12 leading groups different kinds of ownership	

Reform Development

1993	Government proposed new legislation	introducing deregulatory reforms
1994	New Electricity System Law	after several re-writings of its initial reform proposals the Government passed them through the legislative process, many implementation issues important for concrete functioning of the new system are still open

Reform Elements

Liberalization	the entry barriers in generation are removed
Separation	of electricity businesses in diversified companies
Unbundling	Separate accounts for generation and distribution (transmission remains separated company)
Separation of markets	Differentiation between a public and an independent electricity system in the public system a competitive bidding system will be introduced, the public system can be bypassed by independent generators to conclude contracts with eligible parties (yet unclear which retail consumers and to which extend distributors will be defined as eligible).
Access to the grid	for independent generators and eligible distributors and large consumers to realize transactions outside the public system

Competitive Mechanisms

Competitive Bidding for capacity additions	required to fulfill capacity needs of the public system
Retail supply	Independent generators will compete against the public system and between each other to conclude supply contracts with large retail consumers
Wholesale supply	Independent generators will compete against the public system and between each other to conclude supply contracts with distributors for the liberalized part of their procurement

Status of Reform Development — implementation/under discussion

Reform Design

Competitive Opening	generation	public system = capacity additions only; independent system = full competition
	supply	integrated system = no; independent system = retail/wholesale
Reform Model		competitive bidding (integrated system) limited wholesale/retail wheeling (independent system)
Treatment of Monopolistic Functions	transmission	separation
	distribution	unbundling from generation/bundled with supply

15 Japan

System Size and Integration		Economic Indicators	
Installed Capacity	205.1 GW	Area	377,781 km2
Total Generation	895.3 TWh	Inhabitants	124.764 mill.
- Hydro	10 %	GNP	3,696,885 mill.$
- Nuclear	25 %	GNP/capita	29,749 $
- Fossil	65 %	El.consumption/capit	7,194 kWh
Grid Integration	No Integration (Island System)		

Structure and Ownership	currently	planned
Structure		
- Generation	10 GTDS + 56 G	10 GTDS + 56 G + new
- Transmission	10 GTDS	10 GTDS
- Distribution	10 GTDS	10 GTDS
- Retail Supply	10 GTDS	10 GTDS
- Type	7	7
Ownership	private	private

Reform Process

1995	Amendment of Electric Utility Industry Law of 1964	Opening of the generation market to competition (capacity additions)
1.1996	Implementation of Amended Utility Industry Law	

Reform Elements

Liberalization	Removal of legal barriers in generation Promotion of wholesale wheeling

Competitive Mechanisms

Solicitation of capacity additions	Through competitive bidding any generators can compete with each other for capacity additions. Bidders located outside the service area where the bidding is conducted will be able to take part in it. Winners have the right to ask the utilities to wheel the power to the purchaser. Regional electric power companies are obliged to establish concrete conditions for wheeling the power.

Status of Reform Development	implementation (1996 -)	
Reform Design		
Competitive Opening	generation	capacity additions only
Reform Model		competitive bidding and wholesale wheeling
Treatment of Monopolistic Functions	transmission	bundled
	distribution	bundled with supply

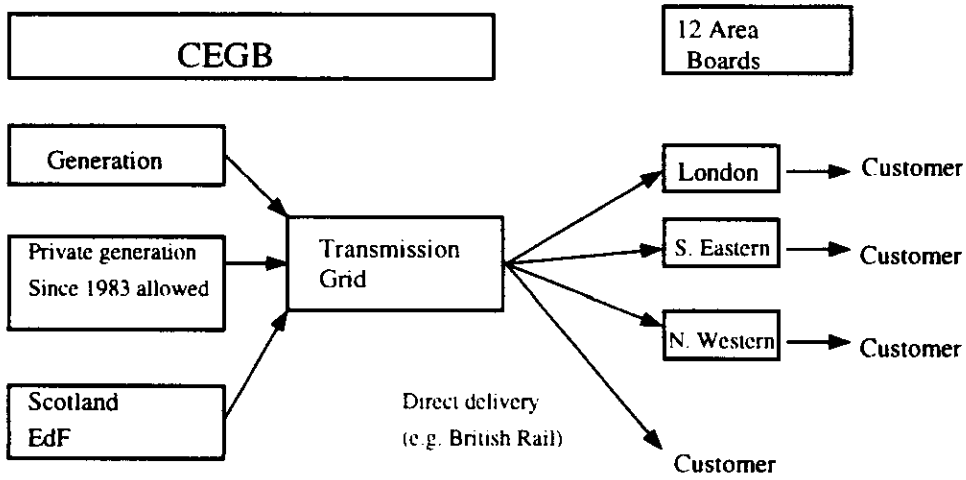
PART B The Reform Process in Selected Countries

IV England & Wales

1 Situation prior to the Reforms

Since 1957 the ESI of England & Wales (the English ESI) was characterized by a vertically differentiated structure. The Central Electricity Generating Board (CEGB) was responsible for generation and transmission. Distribution and retail supply was carried out by 12 regional distributors (Area Boards). The CEGB supplied the Area Boards (and selected industrial customers directly connected to the transmission grid) on the basis of the Bulk Supply Tariff. Both CEGB and Area Boards were part of the public administration. The Electricity Council coordinated and controlled their activities.

Figure IV.1 Structure of the ESI before Reforms



2 Reform Development

In 1983 the Energy Act abolished the legal monopoly in electricity generation and supply. It forced the utilities to buy up electricity from selected independent generation sources at the Private Purchase Tariff and opened up the grids for wheeling transactions between independent generators and retail customers on the basis of contract path based Use of System Charges. High wheeling charges and the dependence on the dominant generator CEGB as the wheeling utility as well as subsidized electricity prices for large customers as the potential contract partners created high entry barriers for independent generators. The Energy Act practically failed to introduce competition in the ESI.

In the time between 1988 and early 1990 a more fundamental deregulatory reform of the ESI was developed. Milestones were the Government's presentation of a White Paper (1988), the Amendment of the Electricity Act (1989), the split-up of the CEGB (1989) and the approval of final documents fixing the details of reform implementation (early 1990, e.g. licenses, pool rules, grid code, initial contract system, privatization schedule, etc.).

On April 1, 1990 the new deregulated system was effectively introduced. It is characterized by significant changes in both structure and functioning of the ESI.

3 Structure of the ESI after the Reforms

3.1 Market Design

The reform of the ESI lead to a separation of competitive and monopolistic functions. While generation and retail supply is organized competitively, transmission and distribution remain regulated monopolies. Central element of the competitive ESI is a system of three markets: the Pool, the contract market and the retail supply market.

Central and most innovative element of the system is the Pool. It is an organized short term wholesale market for electricity. All generators and retail suppliers are members of the Pool organization and have to trade all their electricity generation/requirements through the Pool (mandatory pool). The generators compete daily via price bids in shares of total electricity demand aggregated by the Pool. The production of generators and the wholesale requirements of the suppliers are settled on the basis of half-hourly

calculated Pool Prices for electricity. The Pool leads to a formal separation between generation and retail supply market.

In the retail supply market suppliers compete in concluding supply contracts with retail consumers.

In the contract market generators compete in concluding financial type contracts with retail suppliers. With these contracts both parties can hedge their counter-directional risk exposure on the Pool Price developments.

3.2 Market Regulation

The ESI is supervised and controlled by the Director General of Electricity Supply, who is supported by the Office of Electricity Regulation (Offer). His primary tasks are the designing and granting of licenses for all parties engaged in the ESI as well as the supervision of the conformity of the parties' (market) behavior with the provisions of the licenses.

Table IV.1: License System

License	Function
Generation License	Generation
Transmission License	Transmission
Public Supply License	Distribution and retail supply in the authorized distribution area
Second Tier Supply License	Retail supply in all other cases

The licenses refer to industry standards to be observed, specify market behavior rules to be complied with and lay down information requirements to be fulfilled. The Generation and the Supply licenses oblige the licenses to join the Pooling and Settlement Agreement, which lays down the Pool Rules and the rights and obligations of the Pool Members (Table IV.1).

3.3 Competitive Functions

Generation

To create a more competitive generation market structure the CEGB's generation operations was split into three division. Each part was commercialized by founding public limited companies (National Power, PowerGen and Nuclear Electric). While the fossil generators National Power and PowerGen were privatized (in two steps), Nuclear Electric remained under public ownership.

Electricity generation is completely liberalized, subject only to the formal procedure of applying for a Generators License. Open and generalized access to both the Pool and the grids reduce any systematic entry barriers.

The generators compete in both the short term Pool (physical delivery business) and the long- to medium term contract market (financial hedging business).

Like any other party generators can establish a retail supply business. Subject to the Generation and Supply Licenses the businesses have to prepare unbundled information to the regulator.

Retail Supply

By limiting the traditional role of a regional distribution company to the pure distribution function (the wires business), the new retail supply function was introduced.

The 12 Area Boards as the traditional integrated distribution and retail supply entities were also commercialized and privatized and are now named the 12 Regional Electricity Companies (RECs). They continue to be retail suppliers in their franchised distribution region, but they now face competition in the supply of retail consumers in their regions from other RECs and new entrants as they can compete in retail supply in other RECs areas.

The supply business is also completely liberalized, subject only to the formal procedure of applying for a Second Tier Supply License. Open and generalized access to both the Pool and the grids reduce any systematic entry barriers, the separation of generation and supply businesses also reduces economic entry barriers.

Suppliers compete in concluding supply contracts with retail consumers. Physical delivery is realized by buying electricity through the Pool (based on Pool Prices) and

using the transmission and distribution grid as a transport infrastructure (based on generalized tariffs). To manage their risk exposure and to improve their average procurement cost suppliers conclude hedging contracts with generators.

To manage transition from monopoly to competition, access of customers to competing suppliers has been introduced stepwise. Up to the year 1998 only customers with a peak demand above a certain threshold (Franchise Limit, Table IV.2) are allowed to shop around and to conclude a contract with a competing supplier. For the transition phase the supply of smaller customers continues to be organized as a franchised monopoly. Prices for smaller customers are subject to a regulated tariff. This leads to a timely limited segmentation of the retail supply market into a competitive and a monopolistic part.

Table IV.2: The competitive supply market

Time Frame	Threshold	Number of retail customers with access rights	Size of the competitive part of the supply market
4/90 - 3/94	1 MW	4260	30%
4/94 - 3/98	0.1 MW	46641	46%
4/98 -	no restriction	all (22 mill.)	100%

3.4 Monopolistic Functions

Distribution

The 12 RECs are the monopolistic distributors of electricity in their franchised region. Their obligations are described in the Public Supply License. They have to plan, build, operate and maintain a distribution grid designed to meet the requirements of regional electricity demand. They are obliged to connect any (decentral) generator or consumer to their grid and allow utilization to any interested party based on generalized conditions (tariffs). Relevant technical specifications are laid down in the Distribution Code.

Transmission

The transmission part of the CEGB was commercialized as a separate public limited company named National Grid Company (NGC). NGC is owned by the RECs and was therefore indirectly privatized. The government reserved itself a Golden Share securing quasi-ownership influence on NGC under special restricted circumstances.

NGC has the monopoly in transmission in England & Wales. Its obligations are described in the Transmission License. It has to plan, build, operate and maintain a transmission grid designed to meet the requirements of regional electricity demand. Relevant technical and planning specifications are laid down in the Distribution Code. It is obliged to connect any generator or consumer to their grid and allow utilization to any interested party based on generalized conditions (tariffs). Generally, it has to dispatch the generation plants based on the orders of the Pool organization. It may only deviate from these orders under certain technical conditions, which are specified together with other technical specifications in the Grid Code (so called "constraining off or on").

4 Functioning of the Reformed System

4.1 The Pool

Pool operation

The Pool operation is based on a procedure repeated daily. Until 10.00 am the generators have to submit bids specifying the availability and offer prices for each of their generation sets. Based on these bids and a demand forecast the Pool calculates a cost-minimizing unit commitment and dispatch schedule for the following day. Plants are dispatched according to merit order of price bids.

Calculation of the Pool Prices

Based on the respective price bid of the marginal plant required to meet demand the half-hourly System Marginal Price (SMP) is calculated. In parallel the so called Capacity Element (CE) is calculated as the product of the respective probability of a brown out and the difference between the value of capacity and the actual SMP.

Settlement of Pool Trades

Generators are paid their generation based on the Pool Input Price (PIP), which is the sum of SMP and CE. PIP equals SMP most of the time. Only in peak periods with scarcity of reserve capacity PIP increases above the SMP-level. Reflecting the value of generation capacity under conditions of scarcity the Capacity Element is designed to give investment incentives.

Suppliers pay their electricity demands based on the Pool Output Price (POP), which is the sum of PIP and the Uplift, the latter reflecting additional system cost of providing reserves, ancillary services and redispatchs caused by grid congestions.

4.2 Contract Market

Pool Price Risk of Market Actors

Because of the uncertainties especially of electricity demand and fuel prices the Pool Price is difficult to predict. Both the profits of generators and suppliers are exposed to Pool Price Risks. The risk exposure of those parties has opposite directions: ceteris paribus generators can gain from high prices, while suppliers suffer et vice versa. This opens the opportunity of risk management.

Risk Hedging Instruments

The most important risk hedging instrument is the Two-way Contract for Differences (CfD). A CfD specifies a quantity of energy and a strike price. If the Pool price is higher than the strike price the generator pays the price difference multiplied with the contracted quantity to the supplier, if the pool price is below the strike price the supplier pays the price difference multiplied with the contracted quantity to the generator. For the energy quantity fixed, Pool price risks are excluded for both parties. CfDs are individually negotiated (based on some standardized contract terms and designs), their duration range is from 1 to 15 years. CfDs can only be adapted marginally to the load and leave some risk (shorter term, time-limited...) systematically uncoverable.

As an instrument for hedging such remaining risks, Electricity Forward Agreements were developed. Their nature is similar to CfDs. By offering a wide variety of contracts with respect to the covered time they allow a fine-tuning of risk-coverage. A standardization of contract terms and the organization of trade by a broker company

reduces transaction costs otherwise prohibitive for bilateral contracts. All generators and suppliers as well as some large consumers participate in the EFA-market.

4.3 Retail Supply Market

Currently, all consumers with a peak demand above 100 kW are allowed to purchase electricity from competing suppliers. Installation of time-differentiating metering equipment is a precondition for the change of the supplier. Smaller consumers are traditionally supplied by their regional utility based on regulated tariffs.

The service given by a supplier to the consumer primarily consists of administrative functions, a risk management function and possibly value added services. Administrative functions refer to the settlement of transmission and distribution charges (he collects the money from the consumer and passes it through to the relevant REC) and the settlement of daily Pool purchases to supply the consumers demand (he collects money from the consumer and passes it to the Pool), because Pool and grid payments are directly determined by the consumers load profile metered half-hourly. The risk management function refers to the take-over of Pool price risk by offering fixed-price contracts (contract elements) to the consumer. By offering different types of contracts, consumer can choose the risk distribution best suited to their risk preferences and risk (load) management possibilities. The different suppliers compete in offering risk management at lowest prices, which can only be achieved by an optimization of his risk hedging contract portfolio.

5 The Experiences with the Competitive Markets so far

5.1 Pool - Short-term Wholesale Electricity Market

Function

The Pool worked without any large problem. He was always able to match demand with the generation capacity bid to him.

Market Actors and Market Shares

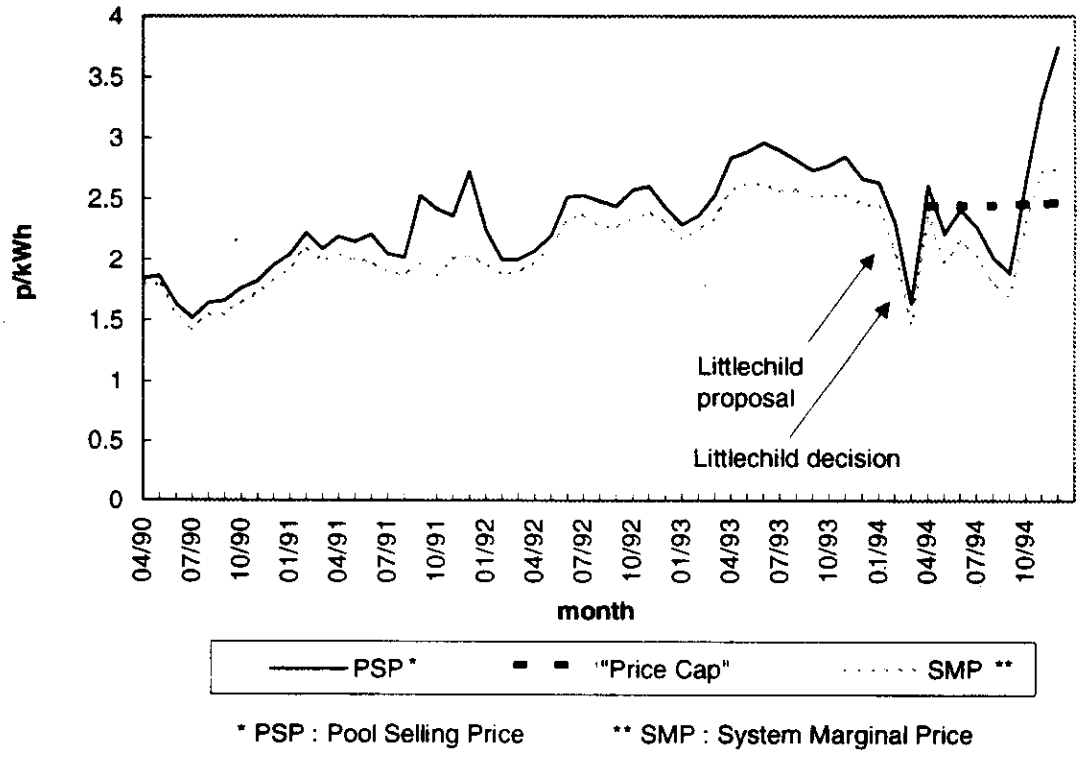
Right from the start of the new system on April 1, 1990 an intensive competition occurred leading to significant changes in market shares of the competing actors.

Largest looser was National Power (from 48% in 1989/90 to 35% in 1993/94) followed by PowerGen (from 30% in 1989/90 to 26% in 1993/94), both Nuclear Electric (from 16% in 1989/90 to 24% in 1993/94) and other generators (importers, newcomers: from 6% in 1989/90 to 15% in 1993/94) could significantly increase their shares. The growing market share of new independent generators reflects the good market entry conditions for newcomers.

Pool-Prices

After a year of significantly low levels (1.85 p/kWh) the Pool price increased significantly in the following years in 1993 reaching initially (1990) forecasted levels. In late 1993 and early 1994 the Pool price came close to the price level of long-term CfDs (which reflect the full cost of new capacity) despite having an overcapacity situation.

Figure IV.2: Pool Price Development (time-weighted)



The price development between 1990 and 1993 could largely be explained by "objective" market factors such as the initial system of CfDs (which overcovered

generators risk exposure), the high take-or-pay obligations of the generators caused by the initial coal contracts and the tougher than expected competition in the Pool, which altogether made the incumbent generators interested in initially very low and later increasing prices.

The price levels reached in late 1993 and early 1994 could not anymore be explained by such factors. The only explanation was an abuse of market power by National Power and PowerGen. The market power of those companies especially refers to the level of prices, because they are the almost exclusive medium to peak generators, setting the (system marginal plant bid derived) Pool price 80 to 90 % of the time. (Their decreasing market shares show that they have no considerable market power in influencing market shares because of the tough competition in base load.)

The regulator decided to prevent further abuses of market power by special measures. He forced the generators to agree on a price-cap on Pool input prices (2.4 p/kWh in 1993 prices) for two years (April 1994 to March 1996) and obliged them to offer 6000 MW of their medium plants during the same time frame. Up to early 1996 this transfer of plants plus the entrance of newcomers will change the market structure sufficiently to restrict National Power and PowerGen's market power to tolerable levels (=belief of the generator) thus allowing the price cap in Pool prices to be abolished.

5.2 Retail Supply Market

Function

The retail supply market also worked without any serious problem. No eligible large consumer was unable to attract competing supply offers. More than two thirds of large consumers changed their supplier during the first years. Since the reduction of the eligibility threshold from 1 MW to 0.1 MW in April 1994 retail competition now reaches 46000 consumers representing about 46 % of total demand. In the first year, more than one third of 0.1-1 MW consumers changed their supplier. By a further reduction of prices for metering equipment and through settlement system cost competition it will be possible to introduce competition for lower sized consumer levels on the abolition of the access threshold in 1998. To let the group of the smallest consumers (households) participate in supply competition a settlement system based on standardized load profiles (instead of time-differentiating metered load profile) is currently under investigation.

Market Actors and Market Shares

All RECs and all traditional domestic and importing generators as well as some large consumers and independent (newcomer) suppliers applied for a Second Tier Supply License, opening participation in retail supply competition.

Because of their old role as monopolistic suppliers all competition by other companies engaging in the retail supply business would reduce the market share of the RECs. In fact the RECs lost on average about 40 to 50 % of their total market share in the competitive part of retail supply. Because of differing strategies and market performance the losses in market shares range from 20 % to more than 60 % for the individual REC. The RECs differ significantly in their out-of-area behavior ranging from aggressive marketing activities to almost complete neglect of respective market opportunities.

Winners were predominantly PowerGen and (to a lesser extent) National Power. Other suppliers played only a limited role (5 %).

Competition Factors

In the first years, price was the dominating factor in procurement decisions of consumers. Lacking product differentiation between producers and the conservatism of consumers contributed to this result.

While larger consumers showed significant price sensitivity and changed the supplier for minor reductions in price, small consumers (on an average) showed some risk aversion leading to a preference for their existing supplier. These consumer characteristics together with the higher transaction cost for smaller consumers related to the (first) change of the supplier (specific metering and settlement cost) were the reason for the lower utilization of competitive suppliers by smaller consumers (compared to larger ones).

Because of their better ability (knowledge, market power) to forecast the development in the generation markets (Pool, contract markets) and their interest in hedging the Pool price risks, generators prefer to sell power through fixed price contracts, while the pure suppliers like the RECs predominantly offer spot-price based contracts, because this frees them of engaging in the risk management business (the consumer takes the Pool price risk himself). Because Pool-price based contracts proved to be very attractive in the first year and competitive also in years of high Pool prices (1994) RECs were able to defend some considerable market share.

Contract Design

Retail supply competition leads to a variety of differentiations in the distribution of risk between consumer and supplier. This enabled consumers to better adapt risk distribution to their preferences and management abilities.

As described above the two extremes of risk distribution are fixed price contracts and spot-price based contracts. Energy purchases by the consumer are settled either at a pre-determined or at a respectively varying price equal to the actual Pool prices. A number of intermediate contract design have been developed such as time-of-use differentiated fixed price contracts reflecting the probable distribution of Pool prices and capped spot price contracts which fix a maximum price for energy. Contracts are also differentiated with respect to terms of payment.

5.3 Contract Market

Function

The separation of a wholesale spot market (Pool) and the medium and long term contract market has proved successful. Employed contract types proved suitable to hedge against risks of short term Pool price developments.

Market Actors and Market Shares

Several sources of contracts are available to purchasers particularly RECs. Effective contract prices depend on the required load profile for each individual contract. RECs can contract with the major incumbent generators National Power or PowerGen, Nuclear Power, IPPs and others. The structure and development of contract has been such that for political reasons initial contracts at vesting with NP and PG (also) served to pass through coal subsidies to franchise customers (i.e. electricity purchased for supply to franchise customer was effectively made more expensive). Contract coverage through NP/PG declined together with coal purchase coverage of generators after April 1993. Overall contract coverage reduced from 88% in 1990/91 to approximately 65% in 1995.[1] Contracts with Nuclear Electric mainly serve to secure base load (load factor approximately 90%) thus allowing for low prices while contracts with NP/PG are

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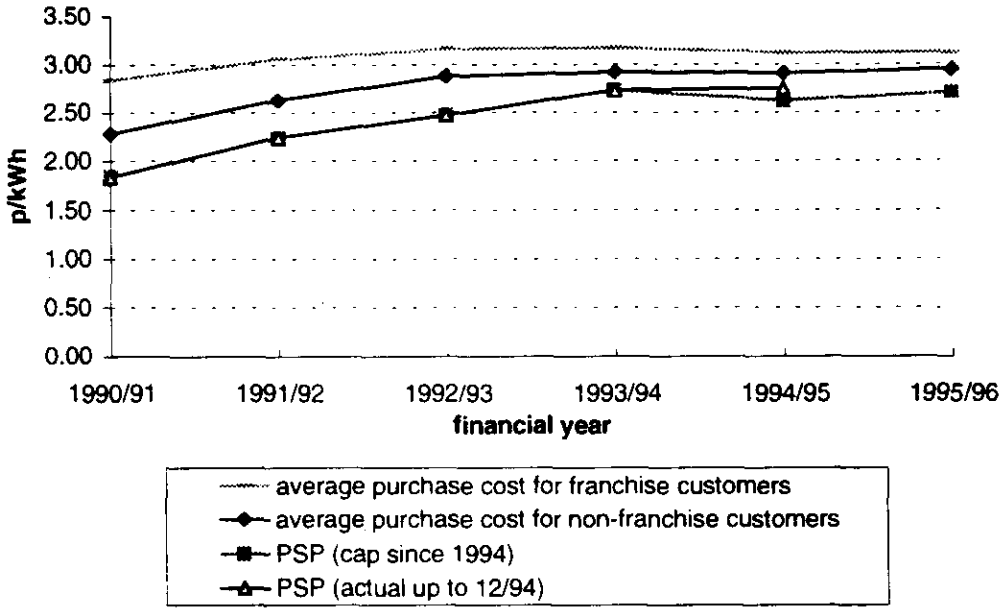
1 OFFER (1992): Review of Economic Purchasing, Birmingham, December 1992.

adjusted to accommodate load factors of between 50% and 60%. Furthermore, contracts for base load procurement with IPPs in which RECs themselves hold stakes are gaining in importance. Recently indication of contracts, especially to fuel cost could be observed.

Contract Prices

Upon a simulation of the development of electricity purchase cost for supply to franchise and non-franchise customers which are largely determined by contract prices we detect a convergence of purchase cost to pool prices. This is a clear indication of increasing efficiency of the contract market. We calculate a premium of overall purchase cost over pool prices of about 6% which can be described as a risk premium (Figure IV.3).

Figure IV.3: Development of Largely Hedged Purchase Cost of Electricity and Pool Prices (nominal, demand weighted)



6 Global Evaluation of Reforms

6.1 Security of Supply

Security of supply was not endangered at any time during the first years.

The *primary energy supply* of generation plants was secured by almost exclusive use of domestic fuels. This will not change in future, because the future use of gas is also based on domestic sources available for similar duration as (economically predicable) domestic coal.

Plant availability was considerably improved by competitive pressures, thus securing the matching of supply and demand at any time. *Plant capacity* increases significantly by new power plants coming on line (> 10 GW up to 1996) securing security for the medium-term future.

Grid capacities were increased according to plan. *Grid utilization* always considered grid security standards. This is ensured by the grid operators power and obligation to influence unit commitment and dispatch under relevant conditions and to procure necessary ancillary services. In both transmission and distribution grid quality and security standards were improved by regulatory incentives.

Grid connection as a precondition for a consumer to get access to the grid as the physical infrastructure of his supply is secured by the license based connection obligation of distributors and the transmission company.

Supply contracting as a precondition for a consumer to get supplied is either secured by monopolistic obligations (for franchised consumers) or by competitive pressures. All consumers interested in a competitive supply were easily able to attract several offers.

6.2 Primary Energy Use

In the first years no significant change in fuel use took place. Competition led to a growing consideration of fuel cost. Generators significantly increased the pressure to procure their coal needs at world market prices, forcing the government either to create a new subsidization regime or phasing out subsidization to domestic coals (which they do until 1998).

Even with world market prices new gas plants proved to be more economic than new coal plants. The large number of CCGT plants now operating or under construction will reduce the share of coal from 70 % to 45 % in 1998 and increase the share of gas to around 30 %. This will lead to a more balanced fuel mix and an improvement in security of supply. Firstly, gas is a reliable domestic fuel, secondly, the dependence on British Coals Coal supply proved very dangerous at times of coal miners strikes (e.g. 1985).

6.3 Investments

The reform led to a new investment behavior of the companies. The competitive pressure to reduce both risks and cost led to a new evaluation of the comparative advantages of fuels and plant types. New CCGT plants proved to be competitive against both other potential plants and older existing plants, especially under consideration of tightening environmental policy with respect to sulphur dioxide standards and CO_2-policy. Based on these facts an investment boom occurred leading to new generation capacity of 10 to 15 GW in the time up to 1996.

The relatively low capital intensity of these plants and the high need to a medium term renovation of the plant park created very good entry conditions for independent power producers (manufacturers, RECs, fuel producers, large consumers...), which are now responsible for almost 50 % of total capacity additions.

The current cap on Pool prices reduced incentives to build new capacity. Independent generators acknowledged that they will reduce their investments after 1996 if the cap is prolonged.

6.4 Consumer Prices

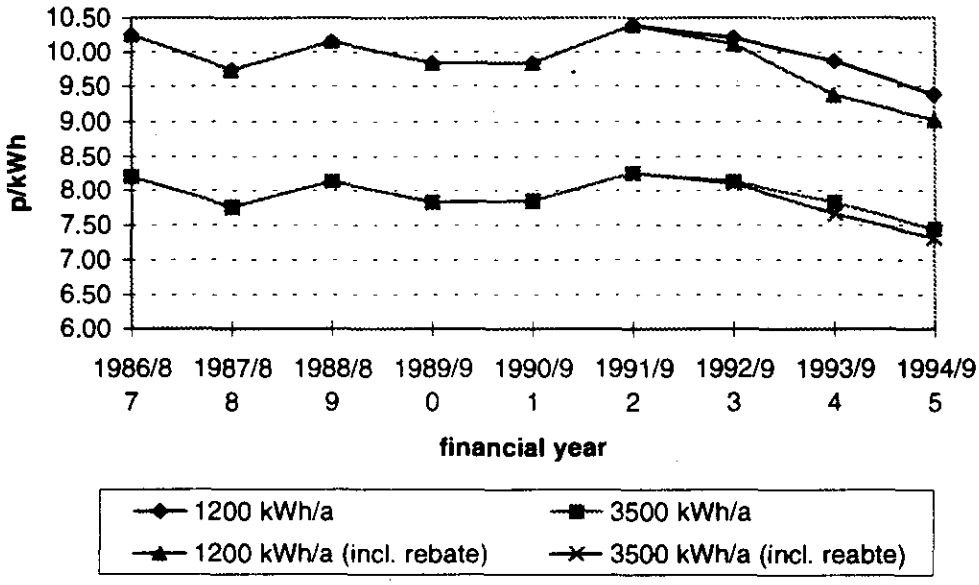
End User Prices for Domestic Customers

Two significant phases of tariff developments have been observed, the periods before and after vesting. Well before vesting, tariffs dropped even in nominal terms (from 1986 to 1987) and rose steeply until vesting in nominal terms (e.g. for a standard 3500 kWh/a customer from 6.19 p/kWh in 1987/88 to 8.76 p/kWh in 1992/93). This rapid tariff development went along with high inflation, though, and tariffs remained fairly stable in real terms. It has often been argued that tariffs have been increased in the run

up to vesting in order to raise profit expectations and thus increase privatization revenues. After extensive analysis conducted by EWI we cannot confirm this argument. Tariffs did in fact rise sharply in the financial year before vesting in April 1990, but these increases were offset almost exactly by inflation thus leaving tariffs unchanged in real terms.

We can, however, observe a price increase during the first year upon vesting. This is a combined effect of allowed real distribution price increases in OFFER's initial distribution business price cap and increasing electricity purchase cost (see also below Figure). After this initial tariff increase after vesting, tariffs have fallen in nominal and real terms from 1992 onwards (e.g. for a standard 3500 kWh/a customer from 8.76 p/kWh in 1992/93 to 8.26 p/kWh in 1994/95). Rebates in the form of one-off lowering of bills by a fixed amount or adjustments of standing or operating charges have also been significant from 1992/93 onwards. Fixed per customer rebates lead to higher average tariff reductions to small customers (who on the other hand pay considerably higher tariffs than larger customers). Rebates will lead to tariff reductions of around 4.0% in UK average to small customers and 1.7% for medium customers in the financial year 1994/95.

Figure IV.4: Average Domestic Tariffs (standard customer, 1990/91 prices)



6.5 Company Profits

All companies except Nuclear Electric are now in private ownership. The companies have to consider now the aim of profit maximization to reach a good rentability of shareholders investments. In the first years companies were able to improve their profits by up to 150 %. The most difficult business is the supply business with intensive competition, low value added, and significant market risks, leading to relatively volatile profits.

Reasons for this development are significant cost reductions. This tendency can be described by the development of employee numbers in the first three years. The generators reduced it by almost 50 %, the National Grid Company by more than 20 % and the RECs by more than 7 %, reaching a total reduction of 25000 employees (19 %). Part of employee reductions were achieved through outsourcing so that jobs were not lost in general. Other cost reductions were realized by reorganization in profit centers, acceleration of construction times and decreasing fuel purchase prices. The high level of generator's profits may be partly explained by their dominant market power.

6.6 Environmental Protection

The reformed system leads to both an acceleration of generation plant park renewal and an increasing use of high thermal efficiency power plants (CCGT) and low specific emission fuel (gas), both significantly decreasing SO_2, NOx and SO_2-emissions.

6.7 Conclusion

The reform as a whole can be declared successful, in the sense that the task of electricity supply is fulfilled at lower social cost by guaranteeing at least a constant level of supply quality and security.

In the chapters on security of supply, primary fuel use and investments it was described that quality and security of supply have either been secured or improved in the recent past and are also secured for the short to medium term future.

The chapters on company profits, consumer prices and environmental protection showed that the reform caused positive efficiency gains by increasing both producer

and consumer surplus (company profits/prices) and by reducing externalities of electricity supply (emissions).

As for the applicability of the English model to other countries, however, one thing should be noted. Although in English circumstances reliance on gas as the fuel for new capacity additions contributes to energy security of the country, this doesn't also hold for other European countries or Japan with scarce natural resources. In these countries depending on one particular fossil fuel will possibly endanger the energy security in a long-run.

7 Evaluation of Special Reform Elements

7.1 Disintegration of Competitive and Monopolistic Functions

A key success factor of the English reforms was the vertical disintegration between the four functions of the electricity supply industry: generation, transmission, distribution and (retail) supply by either separation or unbundling of management and accounts.

Potential problems of vertical disintegration especially with respect to coordination of generation and grid investment and utilization could be avoided to a large degree by measures such as publications of National Grid Company on indicative planning studies and a far reaching information disclosure (completely unknown in monopolistically organized ESIs) as well as the rights and obligations granted to the grid operator to influence unit commitment and dispatch where necessary and to procure required ancillary services. The experiences show that the system can still be improved in these coordinating instruments: e.g. the design of grid charges (despite its regional differentiation) and the incentive structure between generation and transmission with respect to scheduling grid maintenance have not been optimal during the first years.

7.2 The Split-up of the CEGB Plant Park

The most serious mistake of the reform with respect to its implications for the competitive functioning of the system was the CEGB's separation into only three, in some parts of the load curve only two, competing generators. It created a duopolistic market structure and left the companies with considerable market power. Studies before the reform showed that a split-up into 5 companies would have ensured a much more

competitive outcome. The growing market share of new competitors show that the negative effects will be slowly overcome over time.

7.3 The System of Markets

The introduction of the mandatory Pool effectively separated the generation and the supply market and increased significantly market transparency. Indirectly it improved market entry conditions and the quality of regulation.

The separation between physical day to day system operation and settlement in the Pool and contractual relations promoted the development of both highly individualized as well as highly standardized financial type contracts. These flexible financial type contracts much better allow a management of significant risks involved in long term investments than a system of contracts purely based on physical supply. After a time where these risks were hidden by monopolistic decision making and the right to pass through the costs, risk management become fundamental for the participants in a competitive market.

V United States

1 The US Electricity Supply Industry

Structure

The US ESI is characterized by a very differentiated structure. The three different interconnected transmission systems are owned by about 301 vertically integrated and privately owned utilities (investor-owned utilities, IOU). Additional 2024 municipal and 1079 rural cooperative utilities are engaged in local or regional distribution. The generation function is dominated by the IOUs, but some Federal and State owned companies plus about 4000 independent companies are also engaged in generation.

Traditional Regulatory Framework

The regulatory framework is based on both Federal and State legislation and is administrated by the Federal Energy Regulation Commission (FERC) and 50 State Public Utility Commissions (PUC). The Federal level is responsible for general economic and energy policy and all issues effecting inter-state electricity trade. FERC especially supervises wholesale electricity pricing, transmission pricing and formal cooperative pooling arrangements between utilities. The State is directly responsible for all aspects directly affecting the retail consumers. PUCs supervise investment decisions and retail pricing. Regulation tends to be heavy-handed in most of the US-States.

The US ESI is traditionally based on closed service territories. Utilities cooperate to a varying degree in reliability councils and informal and formal cooperative power pools.

Reform Development

The Public Utilities Regulatory Policies Act (PURPA) adopted in 1978 was the first reform step. It obliged utilities to purchase electricity generated by independents based on environmentally friendly technologies. Since 1984 Competitive Bidding was increasingly introduced to organize the selection of these/all capacity additions.

The second step was initiated by the Energy Policy Act (EPAct) of 1992 which granted all generators access to public utilities grids to conclude supply contracts with wholesalers (distributors or integrated utilities) of electricity (wholesale wheeling).

While the EPAct is still in implementation, several States started investigating a more fundamental reform opening their ESIs for retail competition(retail wheeling/pool).

2 Competitive Bidding under PURPA

2.1 The Development of Competitive Bidding

PURPA obliged utilities to purchase electricity generated by independents using defined environmentally friendly technologies (Qualifying Facilities/QFs) like cogeneration and renewables at prices equal to or greater than the utilities' long run avoided cost (LRAC). In practice it was difficult to determine the LRAC. Politically motivated high levels of prices and the decreasing cost of such projects significantly increased the capacity additions of independents caused problems in generation capacity planning and operation (overcapacities, suboptimal capacity) and increasing electricity prices.

Since 1984 Competitive Bidding was increasingly introduced to solve these problems. Purchases from larger Qualifying Facilities were restricted to projects which successfully participated in the utility's tender, in which it had to solicit its total capacity needs. Independent projects had to compete against the expansion plans submitted by the utility itself. Competitive Bidding effectively restricted capacity procurement to capacity requirements and objectified the price for independent generation by its determination based on submitted bids. By using more sophisticated evaluation and selection criteria Competitive Bidding also led to a better adaptation of the new contracted capacities to the system requirements (size, location, dispatchability, price characteristics).

2.2 Status of Competitive Bidding

Application

The application and use of Competitive Bidding under PURPA falls under jurisdiction and supervision of the respective State and its Public Regulatory Commission (PUC). In 1984 the Maine PUC for the first time approved the application of Competitive Bidding as a tool to implement PURPA. Virginia, Hawaii and Massachusetts followed in 1986 and 1987. Since then, the number of States using Competitive Bidding

increased considerably to 29 in May 1993. Additionally 4 States were introducing it at that time. Because all larger States already introduced Competitive Bidding the application may have reached about 75 % of the US ESI.

Changing Function

During the first years Competitive Bidding was exclusively used for implementing PURPA. Eligibility to participate in tenders was limited to Qualifying Facilities. By opening eligibility to other potential participants Competitive Bidding was used by an increasing number of States as the central tool to select new generation projects and organize an efficient and far reaching competition in capacity additions. In January 1995 FERC decided future tenders to generally be "all-source", which opens eligibility to all types of projects irrespective of ownership, technology and location. This decision reflects the fact that the EPAct introduced in 1992 aims at an intensified wholesale competition and eases the participation of projects located out of the utility's area by access to third parties grids via wheeling transactions.

2.3 Structural Implications of PURPA and Competitive Bidding

The stepwise introduction of competition in generation capacity additions partly organized through Competitive Bidding considerably changed the structure of the ESI.

Development of the "Independent" Generation Sector

After having being restricted to self-serving purposes for a long time, independent generators increasingly used the new possibility to sell electricity to the public utilities under PURPA. Between 1985 and 1991 the installed capacity and generation of independent (non-utility) generators doubled (25 GW to 50 GW/120 TWh to 280 TWh). In 1991 independent generation accounted for almost 9 % of total generation (after less than 4 % in 1985) and since 1990 for 50 % of total capacity additions.

Composition of the "Independent" Generation Sector

- *Actors*

An analysis of independent generation projects for the year 1991 shows the following results:

*	"independent generators" in the classical sense	86 %
	- industry companies	60 %
	- gas producers/shippers/suppliers	~ 6 %
	- refineries	8 %
	- mining companies	5 %
	- others	~ 7 %
*	unregulated utility affiliate generators	14 %

The role of unregulated utility affiliated companies is a result of the growing all-source character of Competitive Bidding, the preparedness of regulatory authorities to allow utility engagements in independent power projects (via separated affiliated companies) and the increasing flexibility of utility's to think beyond their service territories.

- ***Technologies***

In 1991 almost 73 % of the capacity of independent generators (48.2 GW) were cogeneration plants followed by the group of Small Power Producers consisting of renewable generators (15 %) and other (conventional) generators (11%). The share of other generators reflect the increasing trend to all sources bidding opening tenders also to conventional technologies and large-scale generators.

The role of Competitive Bidding for the independent generation sector

Since 1984 Competitive Bidding has played a steadily increasing role in determining generation projects. In the first years only about 1500 MW capacity was annually subscribed in 2 to 5 tenders each year. After a significant increase in 1988 and 1989 the annual subscribed capacity reached 5000 MW, distributed over 20 to 30 annual tenders. In the last years more than 50 % of total generation capacity expansion was subject to competitive pressures organized via Competitive Bidding.

Tenders were and still are very successful. Since 1988 each tender attracted (on average) 24 competing bids, 9-times oversubscribing the capacity required. (The discrepancy of the two numbers is caused by the fact that participants are allowed to offer smaller than required capacity projects.). Between 1984 and 1993 260 independent projects totaling 19000 MW were selected in 115 tenders for 29000 MW required generation capacity. In about two-thirds of the tenders independent power projects proved to be cheaper than the own expansion plans of the utilities.

2.4 Deficits of Competitive Bidding

Despite the successes of Competitive Bidding in organizing an effective competition in generation capacity additions, a number of efficiency short-comings of the ESI remained unsolved:

- missing interregional integration of investments, operation decisions and prices
- pass through of demand- and fuel price-induced cost risks onto consumers

Reform promoters argued that such problems can only be solved by introducing wheeling rights and by exposing utilities to increasing competition.

3 Wholesale Wheeling under the Energy Policy Act of 1992

3.1 The EPAct

History of EPAct

In the late 1980s the discussion on introducing wheeling rights intensified. FERC used its very limited powers (with respect to this issue) to initiate "voluntary" wheeling of utilities by respectively conditioning its approval to pending cases (like mergers). Additionally 10 States introduced limited inter-state wheeling rights to help especially independent generators marketing their output. In spring 1991 the Republican Government fixed the aim of a more competitively organized ESI:

"Existing policies and programs under the Federal Power Act will be reviewed to ensure that transmission services and facilities are adequate for the emerging competitive generation market. Expansion of transmission access and promotion of transmission pricing for these services would use existing electricity generation facilities most efficiently and provide lower electricity prices for the industries, shops and homes."

After the discussion of two differing proposals for a new legislation the Congress Members agreed to introduce mandatory wheeling as the tool to improve the recognized short-comings of the ESI. A very controversial issue was the definition of the parties which should be eligible for applying for wheeling transactions. While some wanted very restrictive criteria others argued for an opening of all grids to introduce retail supply competition. Both extreme positions were dropped. The first, because a

significant step towards competition should be reached. The second, because all issues relating to retail supply fall under the jurisdiction of the States: whether Congress has the legislative power to order retail access and competition was (and still is) a very controversial issue and a respective Congress Legislation could have been challenged at the Supreme Court.

EPAct and the Introduction of Wholesale Wheeling

In 1992 the "Energy Policy Act" was adopted containing an amendment of the Federal Power Act which includes a compromise position on the introduction of wheeling (Section 211 (a)):

"Any electric utility, Federal power marketing agency, or any other person generating electric energy for sale for resale, may apply to the Commission (FERC) for an order under this subsection requiring a transmitting utility to provide transmission services (including any enlargement of transmission capacity necessary to provide such services) to the applicant."

De jure only generators (independent generators, utilities with generating capacities) can apply for a wheeling transaction and only if they intend to sell the electricity to a wholesale requirements customer of electricity. De facto also their respective contract partners (distributors, vertically integrated utilities) gain from the generators' rights because they widen their purchasing opportunities. All 4000 independent generators and the at least 300 utilities engaged in generation can gain directly (being generators/sellers), further 3250 distributing utilities can gain indirectly from those wholesale wheeling rights (being wholesale requirements customer/buyer).

The fact, that FERC can also order wheeling transactions causing grid capacity expansions, shows, that the legislators aim not only at an improvement in the use of the existing infrastructures, but also at an interregional improvement of generation (and grid) investments.

A key determinant of the practical success of a wheeling system is the design of grid access and pricing rules. EPAct specifies the following regulations given in the Section 212 of (the amended version of) the Federal Power Act:

"...Such rates, charges, terms and conditions shall promote the economically efficient transmission and generation of electricity and shall be just and reasonable, and not unduly discriminatory or preferential.

Rates, charges, terms and conditions for transmission services provided pursuant to an order under section 211 shall ensure that, to the extent practicable, costs incurred in providing the wholesale transmission services, and properly allocable to the provision of such services, are recovered from the applicant for such order and not from a transmitting utility's existing wholesale, retail, and transmission customers."

The broad character of such formulation make clear the future task of the FERC responsible for implementation of EPAct: to develop a workable regulatory framework.

Additional Provisions with Respect to the Introduction of Wholesale Competition

EPAct also changed the Public Utilities Holding Company Act. PUHCA had constrained the ability of both utilities and non-utilities to engage in the development of independent power projects not meeting PURPA requirements as Qualifying Facilities. Utilities had been prevented from selling electricity from plants not integrated in their own grid system. (Especially non utility-) producers had been discouraged, because engaging in (non-QF) generation projects would have forced them to apply for the status of an utility limiting profit chances by rate of return regulation.

Because these regulations contradict the new aims of introducing a competitive wholesale electricity market, EPAct created the new type of Exempt Wholesale Generators (amended PUHCA Section 32):

The term "exempt wholesale generator" means any person determined by the Federal Energy Regulatory Commission to be engaged directly, or indirectly through one or more affiliates as defined in section 2(a)(11)(B), and exclusively in the business of owning or operating, or both owning and operating, all or part of one or more eligible facilities (and selling electric energy at wholesale).

The status as an EWG can only be granted to a facility "used for the generation of electric energy exclusively for sale at wholesale". Such a generation facility can also have a hybrid character (being partly a utility plant and partly an EWG-plant).

Great advantage of being an EWG is, that "An exempt wholesale generator shall not be considered an electric utility company ... and ... an exempt wholesale generator shall be exempt from all provisions of this Act."

That means that anyone is allowed to implement an EWG-project, which is not anymore subject to cost of service regulation but by definition controlled by (wholesale) competitive market pressures enabling the EWG to earn unregulated profits.

EWG will be especially important with respect to future capacity additions, which can be undertaken now by utilities interested in unregulated engagements in-and outside their service territories and independent generators interested in larger-scale projects.

EWG status can also be granted to existing rate-based generation facilities conditioned to approval by the State PUCs and the fulfillment of certain conditions aiming at the protection of State law, public interest and utilities' ratepayers. The same conditions apply to the case that an EWG (new or previously rate-based) wants to conclude a sales contract with the associate utility. Both provisions together could open States an elegant opportunity to vertically disintegrate the generation function.

Implementation Issues

The following issues need further regulatory action by FERC to implement EPAct with respect to establishing a workable wholesale electricity market:

- grid access
  (procedures, conditions, interaction with expansion planning, arbitration)
- grid charges
  (calculation and design, (transitional treatment of stranded investments)
- access to existing cooperative/potential new competitive power pools
  (degree of necessary opening, pool access and pricing rules, promotion of pools)
- the future use of Competitive Bidding
  (tendering, eligibility and selection criteria)

Implementation is developed on a case by case basis. In October 1993 the FERC ordered for the first time a wholesale wheeling transaction, requiring Florida Power & Electric to provide transmission service to members of the Florida Municipal Power Agency.

3.2 Grid Access / Regional Transmission Groups

Open Transmission Access

With the new provisions FERC has the authority to mandate transmission order after determination that the requested transmission order meets regional or national reliability standards, guidelines or criteria. FERC even has the authority to order the

expansion of the existing transmission grid, enabling the requested transaction. Due to the state commission's traditional regulatory influence whether and where to build a transmission line, the EPAct contains a Death Clause. If the transmitting utility makes a "good-faith effort" to expand transmission capacity, but fails to obtain sitting or necessary environmental certification for enlargement of transmission capacity, the obligation to provide transmission service has to be withdrawn.

Due to FERC's obligation to determine that a transmission request would not impair reliability, the Commission has adopted new reporting requirements for transmitting utilities. This transmission information has to be published and includes power flow studies, transmission maps and transmission reliability criteria.

Regional Transmission Groups

As described above the FERC has to evaluate reliability concerns before mandating a transmission order. In order to lower the number of transmission service requests, the new institution "Regional Transmission Group" (RTG) was developed.

A RTG is a voluntary organization of transmission owners, transmission users, and other entities interested in coordinating transmission planning (and expansion), operation and use on a regional (and interregional) basis.

RTG's were mentioned in the EPAct (Section 216 of the amended Federal Power Act), which requires FERC to "certify a regional transmission group if it determines ... that such RTG's Governing Agreement is just, reasonable (and) is not unduly discriminatory or preferential" and meet special criteria listed below.

A RTG has to:

- allow for broad membership, and allow at a minimum all entities, which are subject to, or eligible to apply for, an order under section 211 of the FPA, to be a member.
- embrace an area large and contiguous enough to allow reliable, efficient and competitive transmission services
- require members to provide transmission service to other members, even when system expansions are needed

- require members to develop and update a regional transmission plan
- include fair and non-discriminatory governance and decision-making procedures, including voting procedures
- include voluntary dispute resolution procedures

Other reasons for FERC promoting RTGs are, that FERC believes that transmission governance arrangements freely negotiated among interested parties will be more effective than policies imposed by a remote federal government agency. FERC recommend the transition of Regional Reliability Councils (RRCs) into Regional Transmission Groups (RTGs). There should not be two different organizations in a region, dealing with similar issues (RRCs with reliability and RTGs with regional planning, pricing and access).

Industry efforts to establish Regional Transmission Groups

- *Western Regional Transmission Association (WRTA)*

A working group[2] filed the Western Regional Transmission Association's Governing Agreement on May 20, 1994 and asked the FERC to approve the WRTA as a Regional Transmission Group. The FERC evaluated the request and approved WRTA as RTG with minor amendments. All transmitting utilities are required to offer comparable services to members through transmission tariffs. Either these transmission tariffs have to be filed by individual utilities or a generic regional transmission tariff has to be developed. Since the WRTA has outsourced its planning function to the Western Systems Coordinating Council (WSCC) will also be obliged to open membership to non-public utilities. Membership is open to Transmission Providers, Transmission Users and State Commissions, operating or located in the Western Interconnection.

The purpose of the Western Regional Transmission Association is to:

- assure the development of an efficient and reliable regional transmission system in the Western Interconnection consistent with the WSCC reliability criteria.

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2 The working group was formed by the Portland-based IOU PacifiCorp, the California Municipal Utilities Association and the Independent Energy Producers.

- provide a forum for negotiating transmission contracts between the member utilities.
- arbitrate disputes between members.

The Governing Agreement waives to develop own pricing principles. Instead the WRTA-wide used pricing principles and methodologies respectively shall conform with the FPA and the applicable standards and policies of the FERC. The Agreement contains a provision, that prohibits an arbitrator to order the wheeling of electricity to retail customers (no mandatory wheeling).

The Agreement and Bylaws of the WSCC have been revised in order to grant membership not only to public utilities, but also to independent power producers and power marketers. The purpose of the WSCC is to promote regional planning and the reliable operation of the interconnected bulk power systems through the coordination of planning and operation of generating and interconnected transmission facilitates. This planning process is divided in two time frames. The near-term (up to five years) phase of the planning process will be handled through the newly implemented WSCC's Regional Planning Process.

- *Southwest Regional Transmission Association*

On October 27, 1994 FERC approved the Bylaws of SWRTA with minor amendments. FERC criticizes that SWRTA is a subregional RTG, covering not the entire reliability area (WSCC). FERC orders, that SWRTA has to work closely with WRTA on planning, coordination and reliability issues. All transmitting utilities are required to offer comparable services to members through transmission tariffs. SWRTA also must revise the Bylaws to provide for the development of a single regional transmission plan. SWRTA's bylaws cover four major areas:

- Access rules : SWRT will define the information to be provided in a request, the timing of responses and studies, and cost responsibility.
- Planning Coordination: SWRTA Commission provides a forum where all members can share their transmission plans and needs over a 10-year horizon

- Pricing policies: SWRTA will defer to FERC on transmission pricing, SWRTA will develop pricing methodologies for its members in the future.

- Dispute resolution: SWRTA offers an advanced dispute resolution process.

Membership is open to all entities, which are eligible for a section 211 order. Members are comprised in three classes: Class 1 embraces transmitting utilities, Class 2 consists of transmission dependent utilities and class 3 contains non-utility suppliers of electric energy for sale and for resale. Most of initial members are located in Arizona, Southern California, New Mexico, Nevada, Utah and Texas.[3]

- *New England RTG Initiative*

Even before EPAct was enacted, New England utilities began negotiations concerning the formation of a New England Regional Transmission Agreement (RTA) in November 1990. After two years of discussions and negotiations involved parties agreed to establish a RTG. Just at this time the largest New England utility Northeast Utilities announced that it would merge with forth largest utility Public Service of New Hampshire. Since FERC would approve a merger only if involved parties offer open transmission rates, FERC issued on March 29, 1993 an order on the Northeast Utilities transmission tariffs. Transmission tariffs were based on the proposals discussed in the RTA. Barely a month later second largest utility New England Electric Systems (NEES) informed other parties that it could no longer accept the proposed RTA. It became clear that NEES wanted to assure itself of an opportunity to reap significant return on transmission investment, especially in retail wheeling, that it might have been denied by the RTA rate rules, which would have kept it from setting its own rates. Without NEES there would be no RTA. Consequently, all parties agreed to stop efforts to develop a RTA. In the meantime utilities continued to develop individual conceptions on how to establish an RTA and what features it should include. Since September 1994 interested parties began once more to discuss proposals for a RTG. Questions, which must be solved before a RTG can be introduced, are the relationship between NEPOOL (New England Power Pool) and the RTG and in particular if transmission pricing should be composed of individual tariffs rates or a single RTG rate.

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3 The 16 current members of SWRTA are mostly public owned utilities.

3.3 Grid Pricing

Legal Requirements

Section 212 (a) of the Federal Power Act requires that wholesale transmission rates must:

- permit recovery of all costs incurred in the transmission service and necessary associated services.
- promote the economically efficient transmission and generation of electricity
- ensure that costs incurred in wholesale transmission service are recovered from the transmission applicant and not from the utility's existing wholesale, retail and transmission customers.

Transmission Pricing Concepts

In FERC's policy statement concerning its pricing policy for transmission services, the Commission develops a catalogue of acceptable transmission pricing concepts. These differ in their pricing methodologies (the evaluation of assets' cost and the interrelation between prices and these costs) and their grid utilization methodologies (to determine the implications of an individual transaction's use of the transmission system).

The following *pricing methodologies* are differentiated:

- embedded cost pricing
- (long run) incremental cost pricing
- "or" pricing = pricing the higher of embedded and incremental cost
- "and" pricing = pricing the sum of embedded and incremental cost
- short run marginal cost pricing
- opportunity cost pricing

The following *grid utilization* methodologies are differentiated:

- load flow simulation based methodologies
  - line-by-line calculation (use of individual lines)
  - zonal pricing (use of aggregated subareas)
- conventional contract path methodology (assumes use of a dedicated line)

- postage stamp methodology (assumes partial use of the system)

Pricing concepts allowed for individual utilities:

- zonal "or" pricing
- line-by-line based embedded costs or "or" pricing
- contract path "or" pricing

Pricing concepts additionally allowed for Regional Transmission Groups (RTGs):

- (averaged MW-mile) line-by-line "or" pricing
- zonal (utilitywise) embedded cost pricing
- line-by-line (losses) short-run marginal cost pricing, in case of grid congestion's alternatively opportunity pricing

Postage-Stamp "and" pricing (sum of embedded costs and incremental costs) and individual utilities' accounting for loop flows will be prohibited. "And" pricing was found to be unjust and unreasonable by the Commission. To avoid a patchwork of mutually inconsistent loop flow pricing methods within a region, the Commission only allows RTGs to account for loop flows.

Treatment of Stranded Investment

Stranded investments or costs can be defined as the difference between embedded costs and market prices. *Recovery of stranded investments through transmission charges* on the wholesale level is allowed, provided that:

- the existing wholesale contract contains no stranded cost provision (e.g. exit fee)
- the former wholesale customers leaves its host utility before the end of the three-year transition period, and requests transmission service from its former utility before the end of the three-year transition period.

This is the only possibility to recover stranded costs through a transmission tariff.

3.4 Access to and Future of Power Pools

The discussions concerning power pools range about two major issues. On the one hand, amendments to the access rules of existing power pools seem necessary, in order to enable access for new market participants (e.g. exempt wholesale generator and transmission dependent utilities) to existing power pools. On the other hand the creation of new power pools has been discussed as a possibility to foster the development of efficient and effective market institutions.

Issues relating to power pooling institutions are addressed at federal level as well as state level. At the federal level the discussions about power pools are concerned with to wholesale wheeling, implemented with EPAct. FERC sees the pooling concept as an interesting option to solve state-federal jurisdictional problems and stranded cost issues. At the state level discussions about alternative pooling proposals have emerged as a result of the debate about retail access/competition. Proponents of the PoolCo-concept argue that the PoolCo provides ultimate customers contractual access (not in a physical sense as in the direct access/retail wheeling proposal) to a competitive wholesale market without the inefficiencies (higher transaction costs, cost shifting, impact on system reliability) of a retail wheeling regime.

State level

Initially the debate on alternative power pooling institutions began with the California Commission's proposal to restructure the electric services industry. Instead of beginning directly with open access/retail wheeling, *Southern California Edison Co. (SCE) and San Diego Gas & Electric Company (SDG&E)* proposed the introduction of a competitive wholesale power pool (PoolCo). (For a detailed description see 4.2.4.4 California)

Another PoolCo-Concept was introduced by the *Southern California Public Power Authority (SCPPA)*. The main difference between the PoolCo-Concept presented by SCE/SDG&E and SCPPA's proposal is the separation of grid from the pool operations. Owner of the grid will be the grid company, commonly owned by the distribution companies. Pricing of transmission services will rely on locational prices, based upon transmission constraints within the grid.

In response to the Wisconsin Commission's investigation concerning the restructuring of the state's electric industry *Wisconsin Electric Power Company (WEP)* presented its

proposal for a PoolCo-concept. Central element of WEP's proposal is the creation a Regional Power Exchange. The Regional Power Exchange has two functions:

- creation of a competitive market through dispatching the system based on sell offers from generators
- operation of the transmission system control area efficiently while maintaining system reliability.

In difference to the proposals of the California IOU's WEP would separate the market clearing duties of the Regional Power Exchange from the operation of the transmission grid, which would be under the authority of a GridCo. This GridCo could either be an individual entity or a Regional Transmission Company bundling the transmission systems of several transmission companies.

These PoolCo proposals are very similar to the existing competitive pool in England and Wales, although they differ in some attributes. The differences affect the role of the transmission grid (in contrast to the English/Welsh Pool the PoolCo would in some proposals operate the transmission grid), access for ultimate customers (some PoolCo proposals limit access to resellers, they do not even foresee access for ultimate customers through financial instruments, such as contracts for differences) and the legal separation of competitive and monopolistic functions (in difference to England and Wales, it is not intended to separate the functions in legally independent corporations in the United States).

Federal level

On October 26, 1994 the *FERC* issued an inquiry concerning alternative power pooling institutions. FERC emphasized that "Given the ongoing changes in the competitive environment of the electric utility industry -- in particular, the potential for substantially increased access to transmission -- we must consider whether we are appropriately balancing our dual objectives of promoting coordination and competition. ... The Commission believes that the new alternative power pooling institutions have great potential. In particular, they may be of assistance in facilitating the resolution of some difficult federal - state jurisdictional issues and in developing mechanisms for resolving

or minimizing stranded cost issues."[4] Over 80 parties supplied comments on the inquiry.

The *Department of Energy*[5] supports FERC's opinion, that power pools have great potential and states: "The Department believes that alternative pools [in the sense of PoolCo] can provide greater benefit than a wholesale market in which there is little pooling and physical delivery of power is largely governed by a network of bilateral contracts". These benefits would be achieved through:

- Economic dispatch
- Improved operation and maintenance of generating plants
- Shared reserves and use of market forces to establish reliability and reserve requirements
- Transparent and efficient real-time spot prices available to all sellers and buyers
- Development of an economically efficient electricity futures market
- Improved transmission pricing
- Provision of ancillary services to all market participants at market prices
- Settlement based on market prices

Therefore the Department believes the Commission should encourage the formation of alternative pools (PoolCos).

The *Department of Justice* views the PoolCo concept as one of several potentially market institutions. "A properly structured PoolCo could facilitate the provision of equal transmission access, without resort to complex and cumberstone regulations. A properly structured PoolCo could accomplish this by divesting utilities of control over the dispatch of their plants." But the DOJ also points out, that "a PoolCo is [not]

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4 All voluntary coordination and interconnection agreements involving public utilities must be filed with the Commission. Additionally, section 205 (a) PURPA authorizes FERC to exempt electric utilities from state law, rule or regulation which prohibits voluntary coordination. Section 205 (b) PURPA enables the Commission to recommend electric utilities entering into negotiations concerning pooling arrangements.

5 The DOE plays besides FERC a pivotal role in promoting and encouraging pooling arrangements through section 202 FPA (a).

necessarily preferable to other market institutions that may efficiently allocate electricity supply." The DOJ recommends, that the Commission issues a policy statement defining allowed and prohibited activities and conditions for approving PoolCos. Conditions, that must be met in order to be approved as PoolCo, are:

- Independence of the PoolCo from Generators
- Equal transmission access for all buyers and sellers
- Open participation in the PoolCo for all buyers and sellers
- Separation of transmission operations from PoolCo operations through an independent TransCo in order to avoid preferential transmission access for PoolCo transactions

The DOJ emphasizes that participation in PoolCo has to be voluntary and that no PoolCo proposal will be approved unless bulk power markets are sufficiently competitive.

The use of split-the-savings rules, which are today used to distribute savings from central dispatch of power pools on an after-the-fact basis, will no longer be tolerated by the Commission unless the individual utilities or the pool offers non-discriminatory open-access transmission services.

Power pools will have to offer open access transmission services like individual public utilities. As FERC states: ".., power pools would have to comply with the non-discrimination requirements of the Open Access NOPR (see 4.2.3.6 Open Access Non-discriminatory Transmission Services) by making power pool transmission services available to all wholesale transmission customers and offering services at rates, terms, and conditions that are not unduly discriminatory." Since power pools raise complex issues the Commission will not develop compliance tariffs for power pools. Instead the Commission intends to hold a technical conference with power pools to discuss implementation issues and subsequently will issue a supplemental order directing tariffs for power pools.

Development of existing cooperative power pools

In the United States cooperative power pools have evolved over the last decades. A cooperative power pool is a voluntary organization of utilities, which provides the

utilities the ability to purchase or sell economic energy or capacity between the members at the wholesale level, thereby leaving their organizational structure and their exclusive franchise territories intact. The structure of these power pools range from highly integrated "tight power pools", either as voluntary organizations of independent utilities or as affiliated power pools (holding companies), to very "loose power pools". Tight power pools provide their members benefits through central dispatch of all members' plants, joint construction and operation of plants, common reserve sharing and coordinated planning. Settlement is based on the fiction of a bilateral transaction, comparing fictional "own-load dispatch" with actual dispatch. Benefits are shared between buyer and seller based on a "split-the-savings" rule. Prominent examples for these types of power pools are the New York Power Pool (NYPP), the New England Power Pool (NEPOOL) and the Pennsylvania-New Jersey-Maryland Interconnection (PJM). There are other organizations which refer also to the term (loose) power pool, but which have in reality more or less the structure of electronic bulletin boards (e.g. Western Systems Power Pool: a hub computer provides several utilities in the west of the United States with information about available transmission and generation offers, WSPP does not match the transactions itself) or brokers (e.g. Florida Energy Broker, matches bilateral transactions according to low-high bids of sellers/buyers, beginning with lowest sell and highest purchase bid).

PJM has announced, that it will reform its current structure as a cooperative pool to a competitive structure. Key features of the new structure are:

- central dispatch based on price bids instead of variable production costs
- open participation in the pool for a all entities eligible after section 211 FPA
- open access to the pool's transmission grid for all entities eligible after section 211 FPA
- a pool-wide cost-based transmission service rate
- separate billing of control area services (e.g. dispatch and ancillary services) and administrative services (e.g. accounting and billing)

NEPOOL will open membership "to include additional non-utility generators as well as power marketers and others who would otherwise qualify for wheeling under section 211 of the Federal Power Act". Furthermore the NEPOOL Review Committee considers changes in the present structure of the pool:

- Pooling services shall be priced separately in order to allocate costs to properly priced individual prices.
- "A range of pricing options for central dispatch of generation units should explored. The range should include options such as keeping the current system of dispatch based on replacement energy prices, ..., and replacing outright the current system with a bid system that uses a market clearing mechanism."

Conclusion:

The PoolCo today is the most discussed and litigated concept for restructuring the electric service industry. As the changes in the existing power pools and the proposed introduction of pools in California and Wisconsin show, the PoolCo-Concept will be one interesting option for a new electricity structure. The comments of the DOJ indicates that minor changes must be made to existing proposals (independence of the transmission operations from the pool operations), until new pools or amendments to existing pools will be approved.

3.5 Interaction with Competitive Bidding

A far reaching restructuring of the electric service industry raises the question of the future of competitive bidding. Although section 210 (f) PURPA assigns, that utilities have to pay their long-run avoided costs for purchases from QFs, which have won a competitive tender, it is possible that the real price, to be paid by the utilities, exceeds their avoided costs. Two reasons are responsible for this:

- First, in California for example, the California Energy Commission (CEC) determines the type of plant, which has to be build according to a capacity expansion plan.
- Second the CEC estimates the costs, which the utility would have to pay for the capacity addition, determined by the CEC.

This could lead to prices which by far exceeds the avoided costs of the utility, if it could choose which type to add by itself.

This is the reason why Southern California Edison and San Diego Gas & Electric filed petitions to the FERC, requesting FERC to clarify the procedures for choosing the source for additional capacity and for evaluation of the avoided costs. In particular, they request FERC to order the California Energy Commission to allow utilities to take all sources into consideration.

In its statement the FERC rejected to interfere in California's implementation of the PURPA, the FERC emphasizes, that according to section 210 (b) PURPA no Commission rule on QF rates "shall provide for a rate which exceeds the incremental cost to the electric utility of alternative energy". Furthermore FERC points out, that if a state commission determines avoided costs, it must in its process reflect prices available from all sources able to sell to the utility whose avoided cost is being determined.

All sources include the utilities' own generation facilities, generation facilities of other utilities, independent power producers and Qualifying Facilities, not necessarily based in the service territory of the host utility or even in the state area, which operates the solicitation. The consideration of all sources has been enabled through the wholesale wheeling provisions of the EPAct.

Since the California Public Service Commission announced that it will eliminate the Biennial Resource Plan Update, but would not cancel competitive bids already undertaken, this issue is only of transitional character.

3.6 Open Access Non-discriminatory Transmission Services

On March 29, 1995 FERC issued a Notice of Proposed Rulemaking on "Promoting Wholesale Competition Through Open Access Non-discriminatory Transmission Services" (Docket No. RM95-8-000). In particular this NOPR will probably, if the final rule will look like the proposed, have the most significant influence on the future of the electric service industry since enactment of the EPAct. In this NOPR the FERC

- "proposes to require all public utilities owning or operating facilities used for transmitting electric energy in interstate commerce to file open access transmission services,

- proposes to require the utilities to take transmission service (including ancillary services) for their own wholesale sales and purchases under the open access tariffs,

- issues a supplemental proposed rule to permit the recovery of legitimate and verifiable stranded costs associated with requiring open access tariffs, and

- proposes regulations to implement the filing of the open access tariffs and the initial rates under these tariffs."

FERC emphasizes that in the light of the experience with mandatory wholesale wheeling this NOPR could help fostering the development to robust competitive wholesale markets and would help to avoid time delays according to the lengthy procedures of section 211 FPA.

Open access transmission tariffs will cover point-to-point and network transmission services, including ancillary services. The NOPR will also require the functional unbundling of wholesale services, but will not require the corporate unbundling, although FERC accommodates corporate unbundling.

The Commission proposes to develop industry-wide real-time networks "to ensure that potential purchases of transmission services have access to information to enable them to obtain open access transmission services on a non-discriminatory basis." RINs should operate under industry-wide standards to ensure a comparable level of available information.

The open access tariffs provisions define the terms of eligibility for transmission customers, and contains obligations to expand the transmission if necessary and a catalogue of services which must be offered. These services comprise:

- Network Transmission Service; this service will enable a transmission customer to use the whole network to connect generation plants and loads without having to pay a separate charge for every load flow. Network service includes the ability to import power from other control areas.

- Flexible Point-to Point Service; Both firm and non-firm service must be available on a point-to-point basis.

- Ancillary Services; A variety of ancillary services is needed in conjunction with providing basic transmission service to a customer to maintain reliable operations of the interconnected transmission system. These ancillary services embrace 1. Reactive Power/Voltage Control Service, 2. Loss Compensation Service, 3.

Scheduling and Dispatching Services, 4. Load Following Service, 5. System Protection Service, 6. Energy Imbalance Service.

Since FERC only has authority to mandate open access transmission tariffs for public utilities (Investor Owned Utilities), FERC intends to promote open access for utilities, which are not subject to section 206 FPA and control almost 40 % of all transmission facilities in the United States, through broad use of section 211 FPA (mandatory wholesale wheeling). The NOPR also contains a reciprocity condition, which will compel all utilities which are not subject to section 206 FPA to offer comparable transmission tariffs. Otherwise public utilities can reject transmission requests.

Implementation process

As a first step FERC proposes to put into effect generic open access transmission tariffs simultaneously 60 days after the effective date of the final rule. The Commission would specify rates, terms and conditions in the final rule. Additionally FERC would set rates in the final rule for each affected utility using the FERC Form No. 1 data. Rates will be postage rates based on the embedded costs of the transmission grid. These rates will be valid for one day. In step two 61 days after the final rule, each utility wishing to change the generic tariffs may seek changes according to section 205 FPA. In this second step the utilities will be free to use every mechanism for determination of transmission rates. According to the Commission's Transmission Pricing Policy Statement all methods for evaluation of transmission rates will be allowed, as long as they are not unjust and unduly discriminatory. Possible methods are non-conforming as well as conforming proposals.

The Appendices B and C of NOPR contain definitions of necessary features of the rates, procedures and initial rate schedules for both Point-to-Point and Network transmission services.

Commissioner Bill Masey is in part in dissent with the NOPR. He has apprehensions hat the NOPR will have a negative effect on the voluntary formation of RTGs.

4 The Retail Competition Debate

4.1 Introduction

State Responsibility

Subsection 212 (g) FPA prohibits FERC from issuing a transmission order which would violate state laws. Since granting exclusive franchise territories is under the

authority of the states, this subsection prevents FERC from retail wheeling. Requiring sham wholesale transactions is also prohibited according to subsection 212 (h) FPA. A sham wholesale transaction is the transmission of electricity to an entity, which would then sell the energy directly to an ultimate (retail) customer. The subsection contains a grandfathering clause, exempting entities, which have served ultimate customers before October 24, 1992, from the provision. This shifts the debate over retail wheeling into the state arena.

Existing State Legislation on Retail Wheeling Issues

Even prior to the enactment of the EPAct three states already had laws, which permitted retail wheeling in well defined circumstances. After EPAct had been enacted, in several states a discussion began about the future structure of the electric service industry. Retail wheeling is a major issue in this debate. There is no uniform point of view among states, whether to allow retail wheeling or not. While some states began legal actions, which could in the end lead to open access for all customers (e.g. California) others states decided to reject retail wheeling (e.g. Connecticut). The reason for the refusal of retail wheeling was not, that retail wheeling would not be desirable or feasible, but would raise difficult economic and legal questions in a climate of excess capacity and imperfect wholesale competition.

State Interest

One reason for states fostering retail wheeling is that in some parts of the country prices for retail customers exceed prices in low-cost regions of the country by the factor of 2. Large industrial customers exert pressure on state authorities to undertake actions to lower rates for industrial customers (e.g. California or New York). Not surprisingly ELCON, an association of large industrial energy consumers, is one of the outstanding proponents for retail wheeling. States will have to follow such requests, if they do not cause increasing industrial self-generation or removal of such industries in low-cost regions. Load-retention and economic development rates have been used in the past to lower industrial rates. But this causes cost shifting and higher rates for commercial and residential customers.

But also states with relatively low rates have begun to evaluate the benefits of retail wheeling for the public. Increasing competition at the wholesale level has led to lower costs for supplying electricity. These benefits should not flow to the shareholders but instead to the customers. The pressure of retail competition could bring utilities to purchase or generate electricity more efficiently. The costs of excess capacity could not passed through to consumers in a framework, allowing retail competition.

4.2 Status of State Action - A Survey

California

On April 20, 1994 the Commission ordered a rulemaking proceeding to consider a restructuring of California's electric services industry. The initial plan proposes the introduction of direct customer access for eligible customers from January 1, 1996 on and for all customers from January 1, 2002. A final policy decision is expected for mid May 1995.

Connecticut

In its decision not to implement retail wheeling in the near future, the Commission mentioned as a major reason the high excess capacity in New England, leading to stranded investments of about 400 million $ in Connecticut. As a precondition for retail competition a workable wholesale market should be developed.

Florida

Two members of the state legislature introduced in both houses of the Florida legislature bills to order a year-long study on whether the state should in fact opt for comprehensive retail wheeling. In the maintime these bills have been declined.

Illinois

The Illinois Commerce Commission conducted a retail wheeling workshop in April 1993. The Illinois Regulatory Initiatives Task Force will examine numerous issues including unbundling, retail wheeling, flexible pricing, incentive regulation, stranded costs, cost-shifting, cross-subsidization and leveling the competitive playing field.

Indiana

PSI (Public Service Company of Indiana) considers offering retail wheeling service to its largest forty customers after the customer provides advance notice.

Massachusetts

In December 1993, The Massachusetts Governor set up an Electric Utility Market Reform Task Force to evaluate issues relating to retail competition. The Task Force published a report on July 15, 1994. On retail wheeling the report recognized "that retail competition can be an effective means to allocate resources and provide discipline to markets," but "did not reach any conclusions regarding the costs and benefits associated with retail competition."

Michigan

On April 11, 1994 the Michigan PSC (Public Service Commission) issued an interim order that ordered a five-year, experimental retail wheeling program for Consumers Power and Detroit Edison.

Nevada

The Nevada legislature enacted a limited retail wheeling law for economic development purposes. Furthermore the Public Service Commission of Nevada held three workshops on issues relating to the restructuring of the electric supply industry, in particular questions concerning retail wheeling.

New Hampshire

The Commission investigates a request by an out-of-state corporation to purchase and resell power to retail end users served by Public Service of New Hampshire.

New Mexico

In 1993, several bills were introduced in the New Mexico Senate to mandate retail and self-serving wheeling. These bills were rejected in favor of a two-year study of retail wheeling by a joint house and interim committee.

New York

The Commission opened a discussion of issues relating to the transition towards competitive wholesale and retail electric markets. The Commission invited comments from interested parties. In mid 1995 a conference will be held to discuss the proposals.

Ohio

A retail wheeling legislation was introduced in the state legislature as H.B. 676. In the maintime this bill has been refused.

Texas

The Commission found that the self-service wheeling - the independent generator consumes the output at remote site - was a legitimate option in the resource planning process.

Vermont

The Board addresses the issue of retail wheeling within a contract approval for Citizen's Utilities Co. Citizen's Utilities agreed to provide a large ski resort with

interruptible power at discounted rates, and to contract with Hydro-Quebec to supply the needed power. The Board said that the arrangement shows some resemblance to the retail wheeling phenomenon. The Board found that retail wheeling has the potential to cause cost shifting among customer classes and to impair a utility's financial integrity (stranded costs issue).

Wisconsin

On September 8, 1994, the Commission issued a Notice of Investigation to consider the probable costs and benefits of changing the structure and regulation of the electric utility industry in Wisconsin. The Commission sees no immediate need for direct consumer access (retail wheeling). The direction of competitive reforms in Wisconsin generally points more towards a competitive wholesale market rather than retail competition. The Commission will prepare a final report with recommendations for legislative changes until December 1, 1995.

Comparable activities in neighboring Canada

Alberta

In the state of Alberta TransAlta applied for retail wheeling authorization and presented detailed proposals for implementation.

Users were to be given the right to utilize TransAlta grid for wheeling at standardized tariffs (electricity purchases from independent producers) and to purchase top-up electricity from TransAlta (differentiated by base, intermediate and peak load). Wheeling with purpose of procurement from out-of-area utilities, was to depend on provision of reciprocal access rights (possibilities for TransAlta to supply users in the other utility's service region).

British Columbia

On December 16, 1994 the Governor ordered the British Columbia Utilities Commission to review the British Columbia's electricity market structure. On May 8, 1995 there will be a public hearing which addresses the following topics:

- development of electricity policy
- unbundling of transmission or wheeling services and
- retail wheeling and the future competitive position of electricity services.

4.3 Michigan

Background

ABATE, a group of Michigan industrial customers, proposed the introduction of retail wheeling in Michigan. ABATE argued, that retail wheeling would bring "discipline to the utilities' planning activities" and deprives them "of their ability to recover costs that are far in excess of competitive prices for power".

Relying on ABATE's arguments for retail wheeling, the Commission stated out in its order, that retail wheeling might have merit.

Legislative action

On April 11, 1994 the Michigan PSC issued an interim order that ordered a five-year, experimental retail wheeling program for Consumers Power (CP) and Detroit Edison (DE). The purpose of the Experiment is to determine whether retail wheeling is in the public interest and whether it should be implemented on a permanent basis. The proceeding was remanded to the administrative law judge for determination of rates, terms and conditions of retail wheeling service.

In order to ensure that customers cannot escape present unmarketable costs, and to prevent uneconomic bypass, no one can engage in retail wheeling until there is more demand; thus, the start of the experiment would coincide with each utility's next capacity solicitation.

John G. Strand, Chairman of the Michigan Public Service Commission, provided insight into the Commission's motivation for an experimental retail wheeling program. He stated out, that utilities are already confronted with bypass and municipalization. A month after the Commission's decision, a large automotive factory in Michigan announced that it would be going to on-site generation by mid-1997. Rumors indicate, that several other comparable facilities will follow. Municipalization threats arise as a result of the provisions of the Energy Policy Act, allowing the FERC to mandate wholesale wheeling.

The problem of stranded investments on the other hand has the potential to slow down the speed at which regulators can implement a competitive structure for the electric supply industry.

The Commission emphasized the experimental nature of the program.

The Experiment

Main items of the retail wheeling program are:

- Limitation of the program to one percent of the individual loads of Detroit Edison (90 MW) and Consumers Power (60 MW).
- Limitation of a customer's wheeling capacity to between 2 and 10 MW.
- Retail service is only available to customers served at transmission or subtransmission voltage with a minimum load of 5 MW.
- Requirement of a certificate of necessity and convenience to the third-party power producer, granted by the Michigan Commission.
- Effective only, when CP or DE issues new capacity solicitations.

Perhaps the most controversial part of the order, the Commission ruled that it has jurisdiction over rates, terms, and conditions of transmission service.

Utilities' Reactions

In reaction, Detroit Edison is appealing to the United States District Court for the Western District of Michigan on the grounds that the Michigan Commission cannot set rates, terms, and conditions of transmission service, as well as on the grounds that the Michigan Commission does not have authority to order retail wheeling. The utility argues, that the FERC's authority over the use of transmission facilities in interstate commerce-under the Federal Power Act- preempts any authority of the Michigan Public Service Commission to require DE to provide any transmission service to retail wheeling customers. Allowing DE and CP to serve each other's retail customers would also impair or destroy the existing pooling arrangement and should therefore not be allowed.

The case is pending. The utility expects, that it could be 18 months to two years before oral arguments are held.

Consumers Power chose another way in petitioning the commission for rehearing; the utility argued that the order would violate the reciprocity issue, until other third party providers would open their systems to retail wheeling on a comparable basis. The reciprocity condition would prevent third party providers from cherry-picking

customers in a utility's service territory without allowing reciprocal access to their own customers.

On August 26th, both Detroit Edison and Consumers Power filed retail wheeling tariffs with the Michigan Commission.

4.4 California

The Proposal

On April 20, 1994 the California Public Utilities Commission (CPUC) published its by now famous Blue Book (R.94-04-31 Order Instituting Rulemaking on the Commission's Proposed Policies Governing Restructuring California's Electric Industry and Reforming Regulation and I.94-04-31 Order Instituting Investigation on the Commission's Proposed Policies Governing Restructuring California's Electric Industry and Reforming Regulation, April 20, 1994). In this Blue Book CPUC envisions a competitive electricity industry with open access in the end for all customers. The Commission enumerates three reasons for this step:

- Command-and-control regulation and governmental central planning collide with an increasingly competitive electricity services industry
- California is among the states with the highest electricity prices.
- If appropriate, CPUC promotes market-based solutions for all industries, over which it has regulatory oversight

CPUC proposes to open access[6] to different classes of consumers according to a timeframe shown below in the implementation schedule.

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6 Hence the terms direct access and retail wheeling are used synonymous in the Blue Book.
"In the policies we propose for California, consumer choice through direct access -- "retail wheeling" in the jargon of the industry -- represents the cornerstone . of our vision for the electric services industry." R.94-04-031 and I.94-04-031 Order Instituting Rulemaking/Investigation on the Commission's Proposed Policies Governing Restructuring California's Electric Services Industry and Reforming Regulation (Blue Book)
In order to distinguish between retail wheeling/direct access and retail competition, which is possible in a PoolCo-model through financial arrangements without granting retail customers physical access, the authors use the term direct access for physical transactions and retail competition as an all-embracing conception.

Table V.1 Proposed Implementation Schedule (Direct Access in California)

Proposed Implementation Schedule	Begin	Completion
Comment Period	April 20, 1994	June 6, 1994
Hearings	June 14, 1994	
Policy statement	August 1994	
Investigation into stranded cost issues	September 1994	May 31, 1995
Investigation into unbundling and pricing of unbundled services	September 1994	May 31, 1995
Notice of direct access seeking consumers		July 1, 1995
Implementation of performance-based regulation		January 1, 1996
Amendments to resource procurement mandates		January 1, 1996
Direct access for transmission customers	January 1, 1996	
Investigation into success of direct access program		July 1, 1996
Direct access for primary level consumers	January 1, 1997	
Direct access for secondary level consumers	January 1, 1998	
Direct access for all commercial consumers	January 1, 1999	
Direct access for all consumers	January 1, 2002	

Eligibility terms have not been determined by CPUC. Only the starting and the end-point of the transition have been yet defined. Beginning in January 1, 1996 all customers receiving service at the transmission level (≥ 50 kV) will be eligible and in 2002 open access will be available to all customers.

As a potential option for consumers, a bundled service package must be maintained. The utility will also remain the provider of last resort for all customers. For this case CPUC proposes to replace cost-of-service regulation through *performance based regulation*. CPUC will not implement a single rate for all utilities and instead recommend all utilities to develop individual performance-based rates.

The *duty-to-serve* will remain only for those customers choosing no direct access. According to CPUC's proposal, utilities are obliged to provide *non-discriminatory transmission and distribution* services to direct access customers. These services will include ancillary services, such as system control and coordination. In order to avoid cost shifting, caused by stranded investments (the stranded investment issue will lead to an unjust and unduly cost shifting between the customer classes, if privileged customers are permitted to bypass the host utility, leaving the captive customers with the unmarketable costs alone), CPUC proposes, that direct access customers will contribute to the recovery of the stranded investments through a *Competition Transition Charge*.

A short-coming of the Blue Book is that, it does address the role of *competitive wholesale markets* in a restructured electric industry only in a subordinate manner (Indeed the Blue Book mentions the Western Systems Power Pool, the development of Regional Transmission Groups and of price indices, but it states also that there are entry barriers, caused by a lack of transmission and pool access, preventing the development of competitive wholesale markets). Very soon utilities criticized this deficiency and emphasized that workable wholesale competition is a prerequisite for retail competition (see proposals of Southern California Edison and San Diego Gas & Electric below). In its Interim Order: Procedural Schedule, Call for Briefs, and Applicability of CEQA, Decision 94-10-027, December 7, 1994 CPUC ordered a Working Group, consisting of IOUs, POUs, state departments, cities and other associations, to describe and evaluate possible models for a restructured industry.

Since the Working Group does not offer unequivocal evaluations, the authors waive to render the findings. As a matter of interest, the Working Group introduced as another model the Community Access, in which communities would purchase electricity on behalf of ultimate customers. Unlike municipally-owned utilities consumer-owned utilities would not own distribution assets or any other physical assets. Instead COU would act as an intermediary, pooling individual loads.

The Development Since Filing the Proposal

Most probably the Commission cannot meet its own implementation schedule. The comment period and hearings took longer then expected. Due to the retirement of two commissioners the proposed final policy statement will be published not before mid of May, 1995. This will certainly delay the planned dates for the implementation of direct customer access.

Survey of viewpoints of involved parties

Table V.2: Survey of viewpoints of involved parties (Direct Access in California)

	Investor Owned Utilities	Public Owned Utilities	IPPs/QFs	Brokers/ Marketers	Consumers	Environmentalists
Retail Competition	support	skepticism/ refusal	unequivocal, some support DA, others prefer IRP	support	support	refusal (impact on DSM/IRP)
Wholesale Competition	desirable first step	support workable wholesale competition	mitigation of market power	not necessary for retail competition	only in connection with DA and after mitigation of market power	desirable
PoolCo	unequivocal/ see proposals of PG&E, SCE and SDG&E	unequivocal most support	skepticism/ refusal/not a prerequisite for wholesale competition	most reject, if introduced only on a voluntary basis	refusal	unequivocal more support
Unbundling	proponents of PoolCo implicit, opponents of PoolCo only separate accounting	separation of generation assets	corporate separation is desirable	at a minimum separation of generation assets	corporate separation is desirable	separation of generation assets
Transition Costs	dependent on the amount of stranded costs	should be borne by all customers	partly borne by shareholders	use divestiture to measure difference between market and book value	partly borne by shareholders	no statement
Performance based regulation	see proposals of PG&E, SCE and SDG&E	no statement	QF: include environmental cost risks in performance criteria, not in z-factor	support replacement of cost-of-service regulation through PBR	no price-cap, use instead benchmarks	include environmental cost risks in performance criteria, not in z-factor
DSM/IRP	market-based DSM/no IRP	market-based DSM/minimum of IRP	IPPs propose market-based design	market-based DSM/no IRP	market-based DSM/no IRP	retention

In the following sections, the reform models of California's major IOUs (PG&E, SCE and SDG&E) will be described in detail. While PG&E proposes a retail wheeling

system based on bilateral physical contracts, SCE and SDG&E prefer a PoolCo-model with "Efficient Direct Access", which means that retail customers have contractual access to the pool via financial arrangements. The reform proposals of SCE and SDG&E rely besides others (e.g. pool-model of *Southern California Public Power Authority; SCPPA)* more or less on foreign reform experiences, in particular the Pool in England and Wales.

The Bilateral Retail Wheeling Model (PG&E)

Direct Access:

Pacific Gas & Electric proposes the introduction of direct access without implementing a new wholesale power pool. Starting in January 1996, large customers served at the transmission level have direct access. In 2008 DA will be available for all customers. Purchases of eligible direct access customers will be coordinated through a supply coordinator. Customers can act as their own supply coordinator or name one. The supply coordinator will procure power on behalf of the customers and coordinate transmission and delivery through the grid operator.

Wholesale Competition and PoolCo:

PG&E emphasizes that a workable wholesale market already exists in the west of the US. The California Power Pool and the Western Systems Power Pool capture all benefits available at the wholesale level. Additionally, PG&E is working with other industry participants to develop and publicize a real-time market-clearing price index to provide the basis for financial instruments. A government mandated pool would not provide additional benefits for consumers. Another short-coming of a pool is that it would delay direct access.

Grid access:

Grid access will be provided by an independent grid operator. Transmission rates will be cost-based. The grid operator will be responsible for maintaining system reliability, including the procurement of back-up services. The grid operator will dispatch plants centrally, subject to existing contractual and operational constraints. The grid operator will also be responsible for maintenance, operation and planning of the transmission and distribution grid.

Unbundling/Disintegration

In PG&E's proposal an independent system operator would dispatch transmission and generation facilities. PG&E announced that it will withdraw from generation business.

Treatment of stranded costs:

Shareholders would bear the risks associated with the costs of PG&E's generation facilities, including Diabolo Canyon. Costs of QF contracts and other environmental and social programs would be passed down to the ratepayers. The CTC should be included as an unbundled item in the customer bill. If a customer bypasses PG&E's transmission and distribution system, a exit charge would be necessary.

Performance based regulation:

PG&E's proposed PBR mechanism includes a base revenue index and financial incentives tied to performance standards. PG&E's PBR application will be considered in conjunction with PG&E's General Rate Case test year 1996.

The Modified Pool Model (SCE, SDG&E)

PoolCo:

Instead of beginning directly with open access/retail wheeling, *Southern California Edison Co. (SCE) and San Diego Gas & Electric Company (SDG&E)* propose the introduction of a competitive wholesale power pool (PoolCo). SCE and SDG&E emphasizes that all market participants should have equal access to a central coordination, dispatch or pooling process that manages real-time physical operations and reveals the price of the spot electricity and system services necessary to maintain system reliability; and the physical transmission grid. Central dispatch and access to the transmission grid will be performed by an Independent System Operator (ISO). This ISO would match generation and load according to a merit order, composed of the bids of generators. The marginal plant would set the market clearing spot price. The ISO would also purchase ancillary services such load following, spinning reserves etc. Besides its obligation to ensure reliability, ISO's role in the spot market will be that of an auctioneer and clearing house for spot electricity. Control over the transmission facilities will be transferred to the ISO. Participation in the pool will be voluntary. Each market participant will be free to operate independently from the pool. He can simply self-nominate (schedule quantities to be delivered at one point on the grid and

quantities to be removed at another point). In its scheduling process, the ISO will initially try to schedule all self-nominated quantities.

Direct access:

SDG&E and SCE proposes the "Efficient Direct Access" approach, introduced by Bill Hogan, instead of direct access. Once a wholesale spot market is operating, a state-regulated distribution company would divide its retail rates in two parts. One part would cover the expenses for purchases of the distribution company from the spot market. The other part would contain all other expenses: transmission and distribution costs, the "competition transition charge" and subsidies for DSM and low-income programs. Ultimate customers would be able to hedge against the spot price component through contracts for differences with a great variety of generators, suppliers etc. "Efficient Direct Access" could be implemented after the PoolCo has been established in 1998.

SCE states that direct access (retail wheeling) in an environment of excess capacity would lead to production inefficiencies, stranded costs and excessive use of natural resources. Implementation of direct access would require:

- elimination of the obligation to serve
- access to back-up and control area services
- assurance of stranded cost recovery

Unbundling/Disintegration

SCE and SDG&E recommend that the functions of transmission and generation dispatch should be separated from the other functions of the utility. An independent system operator performs these functions. Arms-length self-dealings between affiliated generators (Gencos) and distribution companies (Distcos) should be prevented by regulatory oversight and separate cost-accounting for both the competitive generation entity and the regulated distribution company. SCE and SDG&E have announced that they would voluntarily outsource their generation facilities and would not build new ones.

Transmission Pricing:

Congestion costs and line losses would be included in locational different spot prices. Fixed costs of the transmission grid will be paid by existing customers, which therefore

obtain transmission rights. The congestion prices would be set off against the fixed costs.

Settlement:

For transactions with the pool, the ISO would credit each sale in and charge each purchase from the pool according to the individual locational prices. Each holder of a transmission right would be paid a congestion premium. For a self-nominated transaction, any imbalance would be settled by the ISO at the spot market price.

Treatment of stranded costs:

SDE&E: estimates their uneconomic assets to be about $ 2.54 billion. Assuming a 12-year amortization, the Competition Transition Charge (CTC) would range from 2.1 cents to 3.9 cents/kWh for residential customers and from 2.0 to 3.7 for large commercial customers. The Competition Transition Charge, either through a demand charge or a volumetric rate, would be included in the second part of the retail rate and would be borne by all ratepayers.

SCE: quotes the value of their uneconomic assets and obligations to be approximately $ 10.8 billion. This would lead to CTCs for residential customers between 4.8 and 5.4 cents and for commercial customers between 3.1 and 3.5 cents. The CTC should be included in the transmission rate.

5. PERFORMANCE-BASED REGULATION

5.1 Overview

The focus on incentive regulation in the U.S. natural gas and electric utility industries is important as the Federal Energy Regulatory Commission (FERC) is moving to enhance competition in these industries. Incentive regulation is considered as a transitional structure designed to enhance the economic performance and pricing of utilities in a market structure where market-based price competition is not significant.

Historically, traditional cost-service (COS) rate regulation has been used as a regulatory tool by FERC to prevent abuse of "market" power in an environment characterized as either franchise monopoly or significant market power. As economic forces gradually move these industries toward increased competition, COS regulation has become

outmoded and comparatively inefficient in the modern customer oriented market environment. In order to enhance productive efficiency in non-competitive markets, incentive mechanisms have been designed to replace traditional COS.

The shift to incentive or performance-based regulation (PBR), as it is also called, can provide significantly stronger incentives for enhanced efficiencies in utility operations and investment and importantly, more competitive prices for end-users. PBR should also simplify the regulatory process. Incentive regulation in the U.S. is not intended for competitive markets, but rather for markets where suppliers have sustained market power.

The concept of efficiency as used in this context encompasses several dimensions. Utilities should operate at optimal levels, allocate services first to the highest valued uses, invest in new capital when economically justified, and increase market share in expanding markets.

Incentive regulation differs from traditional COS regulation in that it induces long-run efficiency gains. This is accomplished by: (1) making rates independent of the underlying COS, (2) increasing the time between general rate cases, and (3) sharing the benefits of cost savings between end-users and stockholders on a real-time basis.

Separating rates from costs gives the utility the incentive to aggressively reduce costs because it will keep a portion of the savings it attains. Increasing the time between rate cases increases the incentive for utilities to take risks associated with aggressive cost reduction measures.

The combination of the longer period between rate cases and separating rates from costs induces the utility to cut costs aggressively because it knows, ex ante, that it will permanently retain a share of the savings. This produces the incentive to undertake activities that will lead to gains in long-run productivity - the incentive that is lacking in traditional COS regulation.

Prior to evaluating incentive mechanisms in the natural gas and electric utility industries, it is essential to highlight the important distinctions between electric and gas markets.

First, gas pipelines are less vertically integrated than wholesale electric utilities. In today's pipeline environment, services offered by the pipelines have been unbundled to provide consumers with a portfolio of services from which to choose. Open-access

pipelines provide distinct transportation and sales services; they transport gas from a wellhead supplier to a downstream pipeline or local distribution company. Transportation revenues are recovered from all customers while revenues for sales gas are recovered only from sales customers. In an open-access environment, market forces will strongly discipline inefficient procurement activities independent of any incentive mechanism that FERC might implement.

By comparison, wholesale electricity sellers usually generate and transmit electricity to buyers. Consequently, wholesale rates include generation as well as transmission costs. However, open-access electricity transmission is still being debated, hence, market forces will be less effective in disciplining inefficient fuel procurement activities by electric utilities.

The second important difference involves the relationship between rate base costs and utility revenues. In the case of gas pipelines, they do not frequently add major capital plant to their asset rate base. When a new capital facility is approved by the FERC, rates for existing services remain unchanged and the revenue base from new customers is usually sufficient to cover incremental costs. Hence, pipeline revenues effectively remain in line with costs immediately after the costs for new plant are added to the rate base.

Electric utilities are in a different situation. Historically, when utilities have added new plant to satisfy load growth, the costs of the new plant have been added to the rate base. However, given the comparatively large cost of the new plant relative to the existing rate base, utility revenues do not cover costs unless a timely rate case approves higher rates necessitated by the addition of new plant costs to the rate base.

Third, the degree of FERC control over transactions differs between the two industries. As the nature of competition in each industry evolves, the composition of transactions changes. Historically, sales transactions, regulated by FERC, dominated the gas industry. Now, transportation transactions dominate as Order 636 has been implemented. Pipelines must divest sales activities from transportation. Market-based rates for sales are to be implemented and the sales transactions are essentially unregulated.

The electric utility industry structure is evolving, following, where appropriate, the model of the gas industry. The growth of non-utility generation is impacting the nature of transactions in the industry. The efficiency of FERC regulation in wholesale

electricity markets is expected to become more important as wheeling proposals are implemented and as the growth of non-utility generation continues.

These major differences will influence the incentive strategies designed gas pipelines and wholesale electricity suppliers. These differences will affect incentive strategies in three ways: base tariffs and revenue requirements, fuel cost adjustments, and rate base additions.

Currently, most incentive programs implemented to-date have been fairly narrow in their focus, tending to emphasize specific aspects of a utility's performance. Several incentive programs in California - either pending or approved - is considered to represent the leading edge of comprehensive, integrated design.

5.2 San Diego Gas & Electric (SDG&E)

SDG&E's original goal in its Phase 1 incentive program application in June 1993 was to achieve a comprehensive and integrated restructuring of its utility operations in gas procurement, generation and dispatch, and long-term competitive electric resource procurement. In a Phase 2 application in 1994, SDG&E proposed a performance-based ratemaking mechanism. The Phase 1 decision in mid-1993 by the California PUC adopted experimental incentive mechanisms for SDG&E's gas procurement and electric generation and dispatch activities. Preliminary results from these experimental mechanisms are not yet available.

Phase 1 - Structure of the Gas Procurement Mechanism

SDG&E gas PBR mechanism has been designed for a two-year test period. In the GasProcurement Mechanism, SDG&E developed a two-part benchmark designed to measure its gas purchasing performance and to provide the utility positive incentives to pursue low-cost gas purchase and delivery. Part A of the mechanism, with equal sharing of "excess costs" and "savings" between shareholders and ratepayers, is designed to induce SDG&E to minimize its gas acquisition costs. Part B of the mechanism provides SDG&E incentives to reduce its total delivered cost (commodity and transportation) of gas by allowing shareholders to keep a percentage of the cost "savings".

Part A is designed to measure how well SDG&E does in purchasing gas in its relevant supply markets, i.e., the commodity cost of gas. The design of Part A does not provide

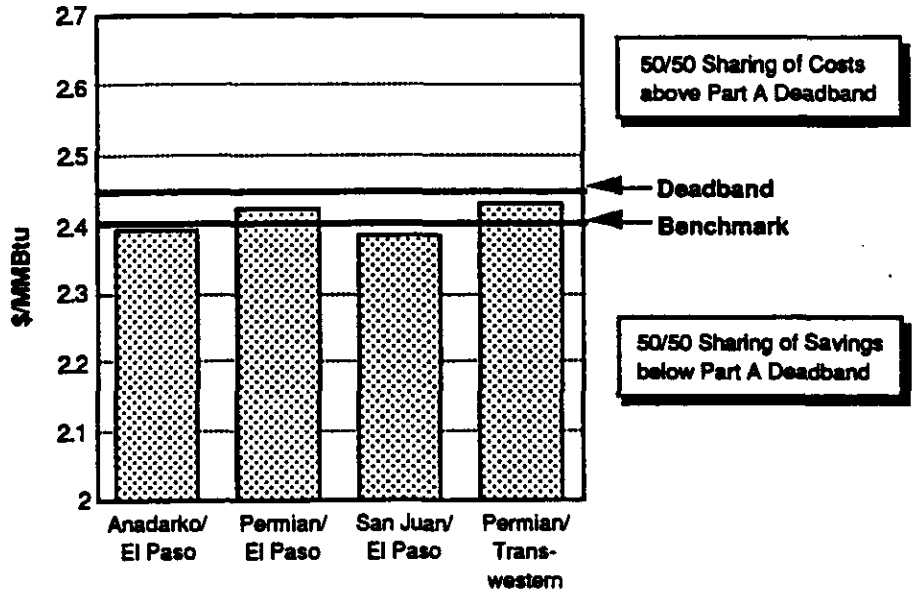
any incentive for SDG&E to reduce the interstate transportation component of its purchased gas costs. Part B is designed to provide SDG&E incentives to obtain least-cost gas supplies based on available supply and transportation alternatives.

Both parts of the mechanism have monthly benchmarks against which SDG&E's actual purchase cost of gas is compared. For each part, the variance between the market-based benchmarks and actual costs for each 12-month period determines the shareholder reward or penalty for that year. Currently, the benchmarks are based on calculations of the 30-day spot market price for gas. SDG&E will have the ability to procure gas at its discretion; only the total cost of gas will be compared against the benchmarks. Figures V.1&2 graphically represent the sharing mechanisms for Parts A and B, respectively. The terms Benchmark and Deadband, used by SDG&E in the figures, refer to the lower and upper limits of the cost range in which no sharing occurs.

The benchmark is designed to reflect the market price of available spot gas supplies. The deadband total incorporates a 2% deadband over this market price, i.e., SDG&E's gas costs can exceed the benchmark market price by 2% before the shareholders must share in the excess costs.

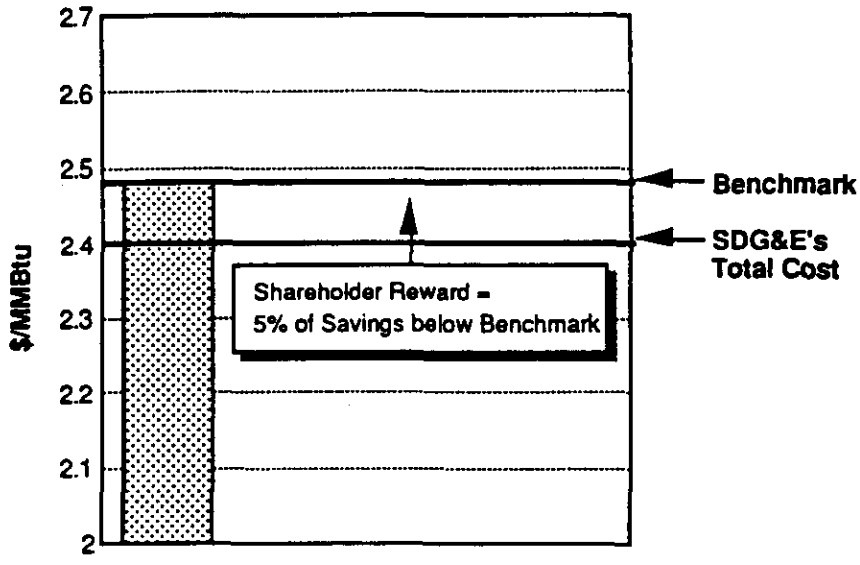
Whenever SDG&E's total gas acquisition cost is more than the deadband total, the difference between those two amounts represents the shared costs. The shared costs/savings are allocated equally to shareholders and ratepayers. The reward allocated to the shareholders, 50% of shared savings, is included as part of the total acquisition cost of gas. Likewise, the penalty, 50% of shared costs, is used to reduce the gas acquisition cost recoverable through rates. The values used in determining the benchmark and deadband total appear reasonable at this time given the experimental nature of the gas PBR mechanism.

Figure V.1 SDG&E gas procurement gas purchase within basins



* Unit price is used for illustrative purposes only. Sharing calculations are based on total annual costs.

Figure V.2 SDG&E gas procurement total delivered gas costs



* Unit price is used for illustrative purposes only. Reward calculations are based on total benchmark and cost for the year.

Anticipated Benefits of Gas Procurement Mechanism

The traditional COS regulation for gas procurement was based on dollar-for-dollar recovery of costs accompanied by a reasonableness review of utility expenditures. This approach has been criticized as constraining the utility's productive efficiency.

Specifically, incentives based strictly on exposure to after-the-fact penalties could cause utility management to focus on defending costs rather than promoting efficiency and minimizing risk rather than improving performance. If utilities have no upside earnings resulting from successful innovations but only downside cost risks from unsuccessful innovations, the utility will opt for traditional COS regulation. Also, traditional COS regulation may induce the regulator to focus only on performance criteria applied to specific activities and miss the success of an overall utility procurement strategy.

Under the gas PBR mechanism, the utility would reap financial gains if it succeeds in lowering gas costs for its ratepayers. Likewise, with performance below the market-based benchmark, the utility would incur financial penalties. This experimental mechanism should provide the appropriate incentives necessary for improved utility performance.

Phase 1 - Structure of the Generation & Dispatch Mechanism

SDG&E's generation and dispatch (G&D) mechanism is highlighted in Figure V.3 and the associated cost/savings sharing structure graphically represented in Figure V.4. If SDG&E's performance during the 12-month period covered by regulatory energy cost adjustment period is within plus/minus one percent the performance benchmark, the "excess" costs/savings above/below the benchmark would be shared by the ratepayers (70%) and the shareholders (30%).

For performance greater than the benchmark (>1% and <6%), the costs in this range would be shared equally by ratepayers and shareholders. For costs below the benchmark (>1% and <6%), the savings in this range would be shared equally by the ratepayers and shareholders.

If SDG&E's costs are greater than the benchmark (>6%), then the ratepayers will pay costs in this range, subject to CPUC review. Likewise, if SDG&E's costs are below the benchmark (<-6%), then ratepayers will receive all the benefits of the cost savings in this range.

Figure V.3 SD&G generation and dispatch mechanism

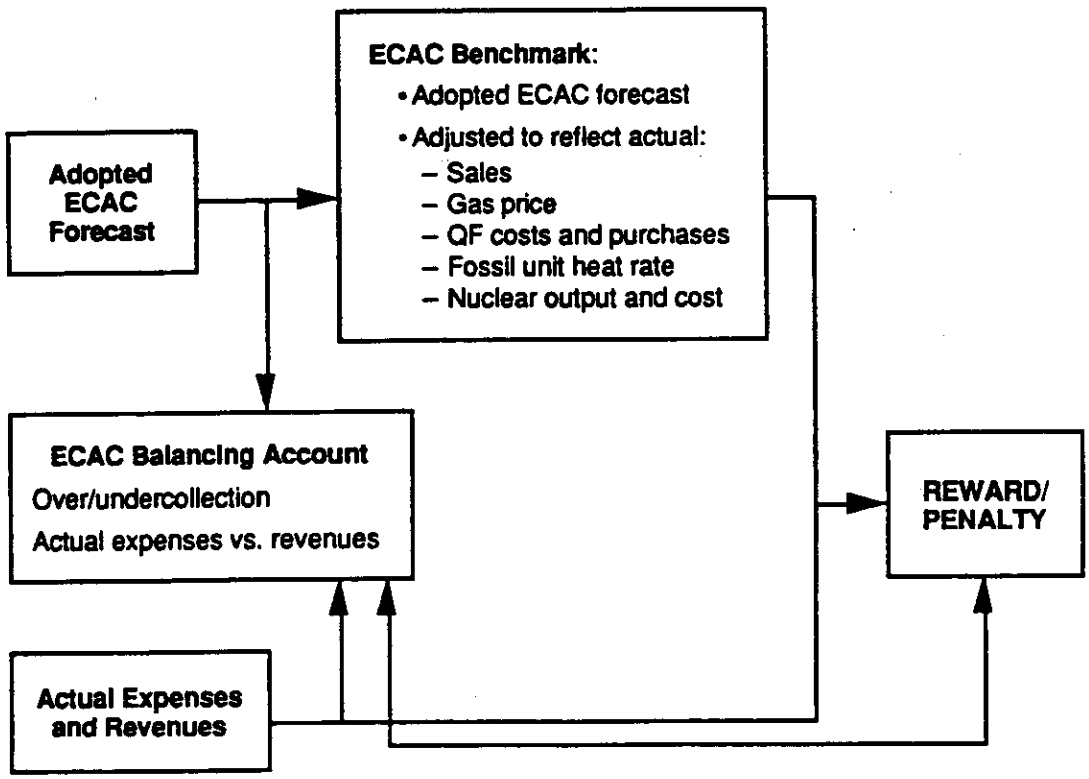
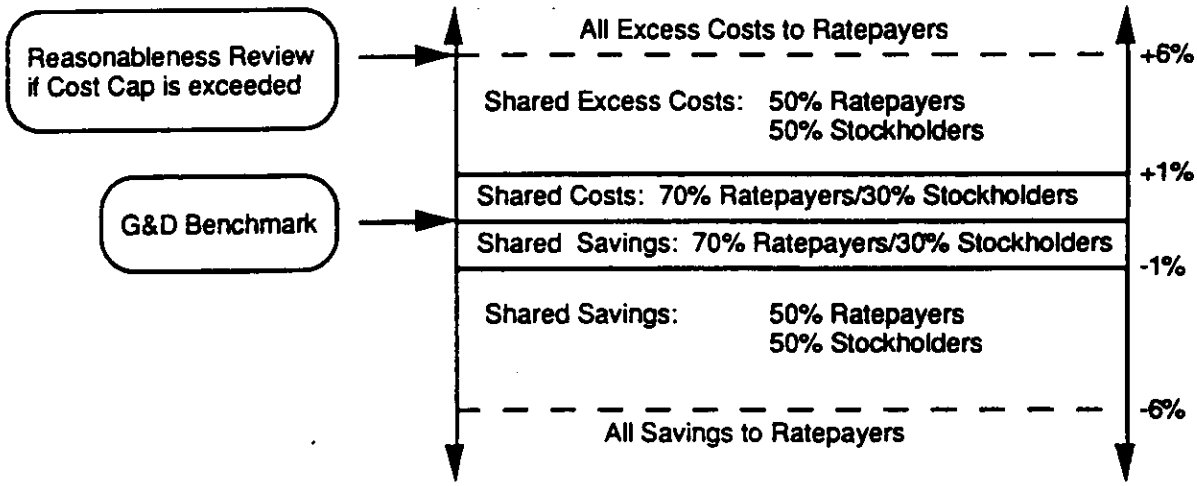


Figure V.4 SDG&E sharing mechanism



The performance benchmark is calculated using the ELFIN™ economic dispatch model in a comprehensive analytical process.

SDG&E's original proposal was rejected by the CPUC, mainly because of its treatment of risks. In the original proposal, SDG&E divided into two approximately equal parts the electric service cost categories traditionally reviewed by the CPUC in the energy cost adjustment clause proceedings. In effect, a benchmark cost would be established for one cost category and similar to the benchmark and deadband structure of the gas PBR mechanism. In the other cost category, SDG&E would bear no risk for cost recovery, i.e., it was assumed that these costs were driven by exogenous factors over which management had minimal or no control.

Several elements of the benchmark are subject to incentive treatment: nuclear fuel carrying costs; forced outages; maintenance outages; fuel inventory costs; economy energy availability and price; wheeling and transmission costs; purchases of short-term firm capacity and long-term firm capacity.

For nuclear operations, the target capacity factor (TCF) and reasonableness reviews of SONGS 2 and 3 are retained. The TCF has a floor of 55% and a ceiling of 80%. If operation is between these values, there is no reward or penalty. If the plant operates at a capacity factor less than 55%, a penalty is determined based on the decrement below 55%. Conversely, if the plant operates at a capacity factor greater than 80%, the reward is determined based on the increment above 80%.

In addition to the TCF, the CPUC reviews the reasonableness of other factors in nuclear operations such as outages and the duration of fuel cycles.

Phase 1 - Evaluation of the Gas Procurement and G&D Mechanisms

The evaluation of the SDG&E's Phase 1 mechanisms is to be performed by the Commission of Advisory and Compliance Division at the completion of the two-year experiment. A monitoring plan has been established to track the progress of the two experiments. The objective of the evaluation plan is to measure the successes and failures of the experiments with respect to the regulatory objectives.

The evaluation procedure is the same for both mechanisms and should address considerations such as the following:

- Did the mechanisms alter the way SDG&E procures gas and generates and dispatches its energy resources?

- Did SDG&E's energy portfolio change as a result of this mechanism? Did its gas portfolio change?

- Did the mechanisms encourage and result in operational innovations in SDG&E generation and dispatch? In gas procurement?

- Did the gas mechanism's focus on beating spot priced gas affect SDG&E's supply reliability? Did the G&D mechanism's focus on beating short-run avoided cost benchmarks affect SDG&E's willingness or ability to reduce long-run avoided costs?

- Did demand-side management programs suffer as the result of implementation of these mechanisms?

- What unintended consequences, both positive and negative, result from implementation of these mechanisms?

- What were the impacts of the mechanisms on regulatory processes?

- How did the mechanisms affect the financial community's perception of SDG&E's financial stability and investment risk?

Phase 2 - The Base Rates Mechanism

The primary regulatory objectives of Base Rates PBR mechanism are:

- To provide a greater incentive than traditional COS regulation to reduce rates

- To improve management incentives to take reasonable risks and control costs in both the short-and long-run. This includes extending the current planning horizon and reducing the incentives to add to the rate base

- To prepare for competition in the energy utility industry. This includes linking earnings to performance instead of capital invested, providing greater flexibility for management to take risks, and increasing management accountability

- To reduce the administrative cost of regulation

Phase 2 - Structure of the Base Rates Mechanism

The structure of the Base Rates PBR is based on the elimination of SDG&E's scheduled general rate case for 1996, which extends the cycle from three to six years. The basic model of future test year ratemaking remains unchanged. However, interim calculation of expenses and rate base between 1994-1998 incorporates enhancements designed to improve accuracy in predicting reasonable revenue requirements.

The determination of revenue requirements is based upon a revenue cap formula which incorporates escalation factors with a productivity offset. The revenue cap is determined for each year of the experiment by escalating the prior year's cap for inflation and customer growth, with an offset for productivity.

The 1993 general rate case revenue requirement is the starting point for the PBR experiment. The principal factors that influence O&M expenses are inflation in the input prices and real growth in the quantities of inputs. Inflation is captured through the use of labor and non-labor escalation indices. The customer growth and productivity adjustment (GPA) ensures that O&M expenses accurately reflect both customer growth and productivity. Customer growth increases O&M costs and productivity drives them down. The adjustment factor utilizes customer growth as a real world proxy for real growth of inputs. The resulting formula is: GPA=0.75×(Customer Growth-1.5%), where 1.5% is the external benchmark for productivity from other PBR formulas approved by the CPUC.

For the electric utility operations, net capital plant additions are divided into three components: (1) gas and electric network plant additions less retirements; (2) generation-related plant additions; and (3) nuclear generating plant additions. SDG&E's rate base will be adjusted each year for the net plant additions used to determine capital-related requirements.

The revenue-sharing mechanism is "regressive" in nature. The rate of return is a composite of gas and electric returns adjusted for any shared returns. The sharing between ratepayer and shareholder starts between 1.0% and 1.5% above the benchmark with a sharing of 2.5% to the ratepayer. Between 1.5% and 3.0% above the benchmark, the ratepayer share is 5.0%. Any rate of return below the benchmark is allocated to the shareholder.

Annual returns at least 1.5% below the benchmark could trigger a review or a general rate case. Conversely, returns greater than or equal to 3% above or below the benchmark would automatically trigger a review or general rate case.

The Base Rates PBR also incorporates performance incentives for price and non-price performance factors. The non-price factors reward or penalize the utility's ability to control employee safety, system reliability, and customer satisfaction. There is also a price performance factor which sets rewards and penalties based on the utility's system average rate as compared to a national average of investor-owned utility rates. The maximum annual reward is $19 million and the maximum annual penalty is $21 million.

There is also a two-way conditionality factor which mitigates rewards for price performance if there is a penalty for non-price performance and vice versa. This conditionality mechanism is intended to counterbalance any incentive for the utility to focus all of it efforts on any one goal while neglecting other areas.

The PBR mechanism is neutral in terms of its potential impact on DSM programs. There is a DSM/PBR adjustment mechanism which adjusts reported on-system revenues to reflect a constant level of DSM program spending and earned rewards based on the amounts adopted by the CPUC.

Phase 2 - Evaluation of the Base Rates Mechanism

The evaluation of this PBR mechanism is closely tied to the performance benchmarks. As much quantitative criteria as feasible are utilized. Evaluation is an ongoing process throughout the PBR experiment. There are also two major checkpoints - a midterm evaluation in January 1997 and a final evaluation in May 1999. The evaluation criteria are very similar in structure to the criteria previously discussed in the Phase 1 Gas and G&D PBR.

5.3 Southern California Edison (SCE)

SCE filed an amended PBR application with the CPUC in August 1994. This PBR is the Non-Generation Phase 1 of SCE overall PBR. The Generation Phase 2 proposal is to be filed after an initial decision on Phase 1 which is pending. SCE's non-generation PBR proposal is designed to meet the two main criteria outlined in the CPUC's Industry Restructuring Report, commonly referred to as the "Blue Book". These criteria

are: (1) replacement of traditional COS regulation with performance based regulation for those functions which remain utility service functions; and (2) replacement of regulated market activities with the discipline of market competition.

The basic foundation of the Non-Generation PBR is a flexible formula for indexing authorized revenues that allows for changes including the structure of the industry. As in the SDG&E's PBR mechanism, the SCE mechanism decouples authorized revenues from actual costs for a long time period. This provides the incentive for SCE to reduce costs and to focus shareholder value on improved cost performance and not on capital additions to the rate base.

The basic elements of the Non-Generation PBR are as follows:

- a Revenue Indexing Mechanism
- a Cost of Capital Mechanism
- a Net Revenue Sharing Mechanism
- "Z-Factors" for externalities
- a Service Quality Performance Mechanism
- a National Rate/Bill Performance Mechanism

Structure of the Revenue Indexing Mechanism

The Revenue Indexing Mechanism will be used to determine non-generation O&M-related and capital-related rate base revenues after SCE's 1995 general rate case. This mechanism will be used until the next rate case in 2001. The simple indexing formula incorporates a base rate productivity pledge of 1.4% per year, an allowance for general price inflation, and a specific incremental revenue per new customer.

The Revenue Indexing Mechanism formula is as follows:

$$NIBRR_t = NIBRR_{t-1} \times (1 + \Delta\ CPI\text{-}1.4\%) + CGA_{t-1} \times \Delta\ Customers_{t-1} \times (1 + \Delta\ CPI\text{-}1.4\%)$$

where:

NIBRR = non-generation indexed base rate revenue

t = years 1996-2000, successively