Asia-Pacific
Economic Cooperation

Training Program to Promote Economic Competition in APEC Economies
Competition and Regulation in Regulated Sectors

Proceedings of four seminars

May 30-31, 2002; October 19-20, 2002; September 11-12, 2003; November 17-18, 2003

Part I: Energy Seminar Papers

Competition Policy and Deregulation Group
Committee on Trade and Investment
March 2004

Prepared for:

APEC Secretariat

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COMISION FEDERAL DE COMPETENCIA
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Asia-Pacific
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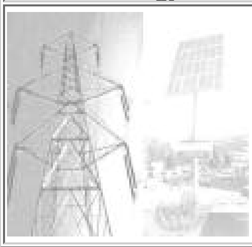
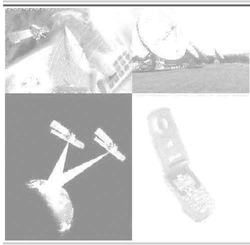
Home
Principal
Energy
Transport
Telecommunications
Financial Services

Energy	Transport	Telecommunications	Financial Services
			

Training Program to Promote Economic Competition in APEC Economies

Regulation and Competition in Regulated Sectors

Sponsored by the Asia

Organized by the Mexican Federal Competition Commission

In 2001, Mexico submitted to the APEC Competition Policy and Deregulation Group a short-term training course to be developed during 2002 and 2003. The project entitled "Training Program to Promote Economic Competition in APEC economies", focused mainly on regulated sectors and complemented existing projects dealing with competition and regulation issues that were successful in building capacity among member economies while providing general guidelines. The project comprised four seminars on specific sectors: energy, transport, telecommunications and financial services.

The purpose of these seminars was to exchange experiences and best regulatory practices in enforcing regulation and competition policies, as well as promoting knowledge and implementation of the 1999 APEC *Principles for Improving Competition and Regulatory Reform* among its member economies. The seminars counted with the participation of high level and experienced speakers in these matters, and were addressed to officials from regulatory bodies and other offices of the Federal Government, legislators, entrepreneurs, advisors, and academics that participate in these sectors.

The first of these seminars focused on the **Energy** sector, and was jointly organized by the Mexico's Federal Competition Commission (CFC or the Commission) and the **Mexico's Energy Regulatory Commission**. It was held on the 30th and 31st of May 2002, at the Fiesta Americana Grand Chapultepec Hotel in Mexico City.

Subsequently, the Commission organized, in coordination with the **Ministry of Communications and Transport**, the Seminar on **Transport**. It was held on the 19th and 20th of October 2002, at the Camino Real Hotel in Mexico City.

The CFC organized the Seminar on **Telecommunications**, which was held on the 11th and 12th of September 2003, at the Sol-Meliá Hotel in Mexico City.

Finally, the Commission organized a Seminar on **Financial Services**, held on the 17th and 18th of November 2003, at the Fiesta Americana Grand Chapultepec Hotel in Mexico City.

This page contains the programs and documents presented at these seminars.

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COMISION FEDERAL DE COMPETENCIA
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DE ENERGIA

Energy

Regulation and Competition in Electricity Markets

Sponsored by the Asia-Pacific Economic Cooperation

Organized by the Mexican Federal Competition Commission

And Mexico's Energy Regulatory Commission

Fiesta Americana
Grand Chapultepec Hotel
Mexico City

May 30th and 31st, 2002

At an international level, the electricity industry benefits from the introduction of competition mechanisms and the application of new technologies that allow it to achieve better efficiency indexes. Establishing and consolidating market mechanisms in this sector contributes to promote overall economic development.

The seminar involved discussions on specific themes such as design, regulation and competition in electricity energy markets. Themes included in the program covered issues relevant to the good performance of electricity markets. These issues are of interest to the bodies and entities of the Public Administration in charge of fostering the development of the industry.

Thursday, May 30th

The Architecture of Electricity Markets

	Speaker	Topic
09:00-09:30	Marcelino Madrigal Director of Research and Regulatory Development Energy Regulatory Commission MEXICO	The Design of Electricity Markets
09:30-10:00	**Steven Stoft** University of California Energy Institute USA	Transmission Planning in a Market Environment

10:00-10:30	**Harry Singh** Director - Market Economics PG&E National Energy Group USA	Alternatives for Capacity Payments: Assuring Supply Adequacy in Electricity Markets
11:00-12:00	**Ruben Flores** Commissioner Energy Regulatory Commission MEXICO	Regulation and Competition in Electricity Markets

Competition and Market Power in Electricity Markets

	Speaker	Topic
12:00-12:30	**Mark Frankena** Federal Trade Commission USA	US Federal Antitrust Agencies and Market Power in Electric Power Markets
12:30-13:00	**Frank Wolak** Professor Department of Economics Stanford University USA	Measurement and Mitigation of Market Power in Wholesale Electricity Markets
15:00-15:30	**Mario Pereira** Technical Director Power Systems Research Inc. BRAZIL	Competition Issues in Electricity Markets with Hydroelectric Production
15:30-16:00	**Salvador Apodaca** General Director of Privatization and Tender Processes Federal Competition Commission MEXICO	The Role of the State in the Protection of Competition
16:00-17:00	**Pascual Garcia Alba** Commissioner Federal Competition Commission MEXICO	Regulation of Competition in Transitional Periods

International Experience and Aspects of Regulation and Competition

	Speaker	Topic
17:30-18:00	**David Krause** Competition Bureau of Canada CANADA	Market Surveillance in Electricity Markets

18:00-18:30	**Michael Rawstron** General Manager Electricity Group Australian Competition and Consumer Commission AUSTRALIA	Electricity Markets in Australia

Friday, May 31st

International Experience and Aspects of Regulation and Competition (cont.)

	Speaker	Topic
09:00-9:30	**Juan Rosellon Diaz** Center for Research and Education in Economics MEXICO	Transmission Pricing in Markets: Price Regulation in Electricity Transmission
09:30-10:00	**Manuel Madrigal Martinez** Morelia Institute of Technology MEXICO	Energy Quality and its Regulation
10:00-10:30	**Odon de Buen Rodriguez** National Commission for Energy Saving MEXICO	Experiences with Renewable Energies in Electricity Markets
11:00-11:30	**Francisco de Rosenzweig** General Director Electricity Restructuring Unit Energy Regulatory Commission MEXICO	Electricity Regulation Trends
11:30-12:00	**Rodrigo Morales Elcoro** Coordinator of Public Policies Office of the Presidency MEXICO	Framework Design of the Public Policy: Electricity Sector Case
12:00-13:00	**Carlos Piña R.** Chief of International Affairs National Energy Commission CHILE	Regulation and Competition in Electricity Markets

Challenges of Regulatory and Competition Agencies Before Electricity Markets

	Speaker	Topic
	Carlos Arce Macias	

15:00-15:30	Head Federal Regulatory Improvement Commission MEXICO	**Some Problems to be Solved for the Improvement of Regulation of the Electricity Sector**
15:30-16:00	**Dionisio Perez -Jacome** President Energy Regulatory Commission MEXICO	**Challenges of the Energy Regulatory Commission**
16:00-16:30	**Fernando Sanchez Ugarte** President Federal Competition Commission MEXICO	**Challenges of the Federal Competition Commission**

Closing Remarks

Luis Ernesto Derbez

Minister of the Economy

Up

Design of Electricity Markets

Wholesale Markets

Dr. Marcelino Madrigal*

Electricity Restructuring Unit

Energy Regulatory Commission, Mexico

Regulation and Competition in Electricity Markets

Forum COFECO/CRE/APEC

Mexico City

30 and 31 May, 2002

* The CRE makes decisions in a colegiate manner. This presentation is not an official position.

Presentation

- Reasons for Re-structuring
- Markets structure and architecture
- Wholesale markets
- Design options
- Conclusions

Reasons for re-structuring

In developed countries

- Reduction of scale economies in generation technologies
- Differences in inter-regional prices
- Competition as a means of reducing long-term prices
- Competition as a means of improving efficiency

Reasons for re-structuring

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In developing countries

- Improving the efficiency of state-owned companies
- Releasing the governments' debt burden
- Re-organizing and modernizing the industry
- Re-organization to face growth

Re-stucturing objectives materialize if there is

Correct functioning of

- Market structure
- Market architecture
- Legal and regulatory framework

Conclusions

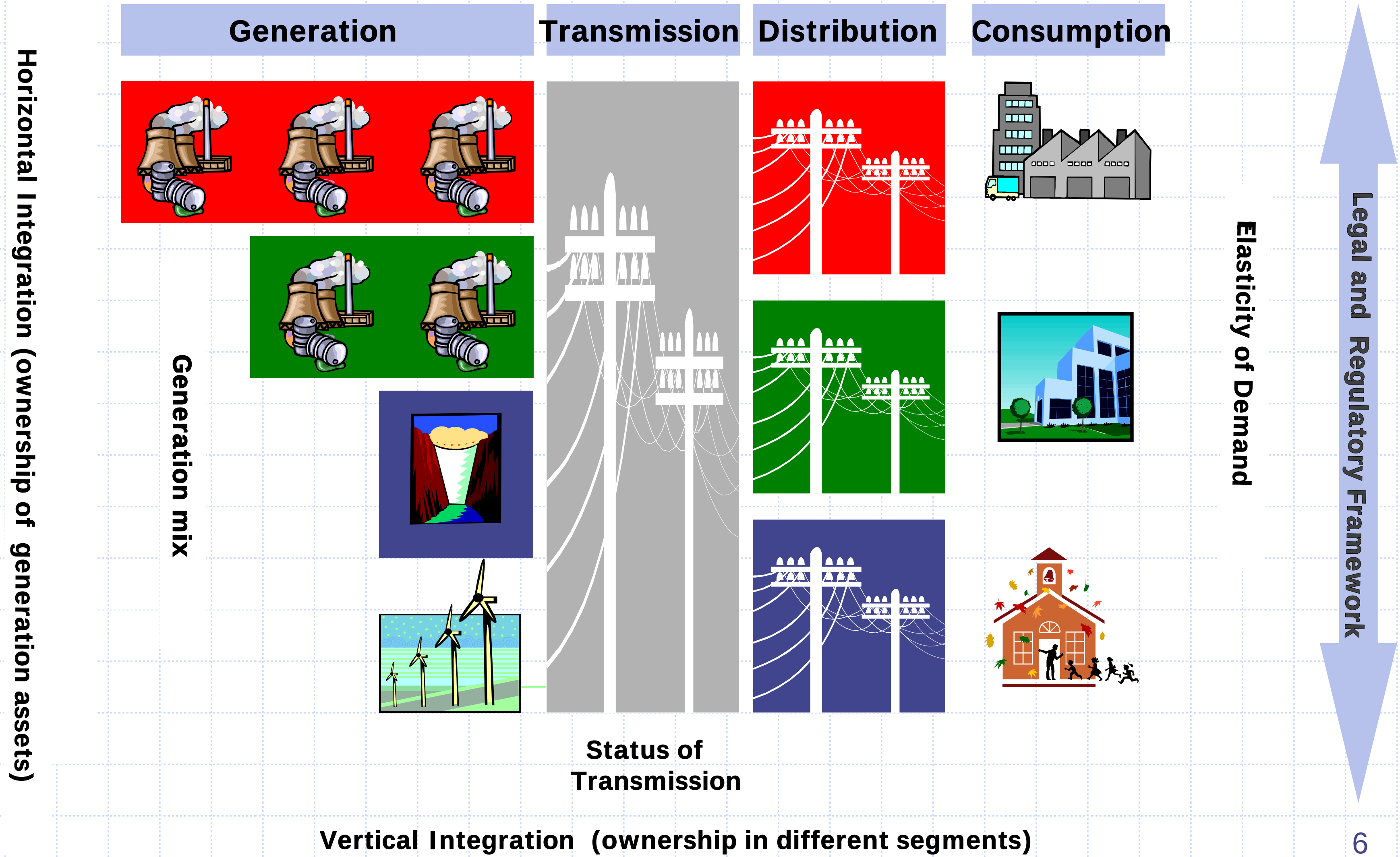
- In dispatch models costs and other complexities must be avoided unless the price allocation used is at the level of the model

- Decentralized architectures (PX – ISO) can work if they are well supported by infrastructure

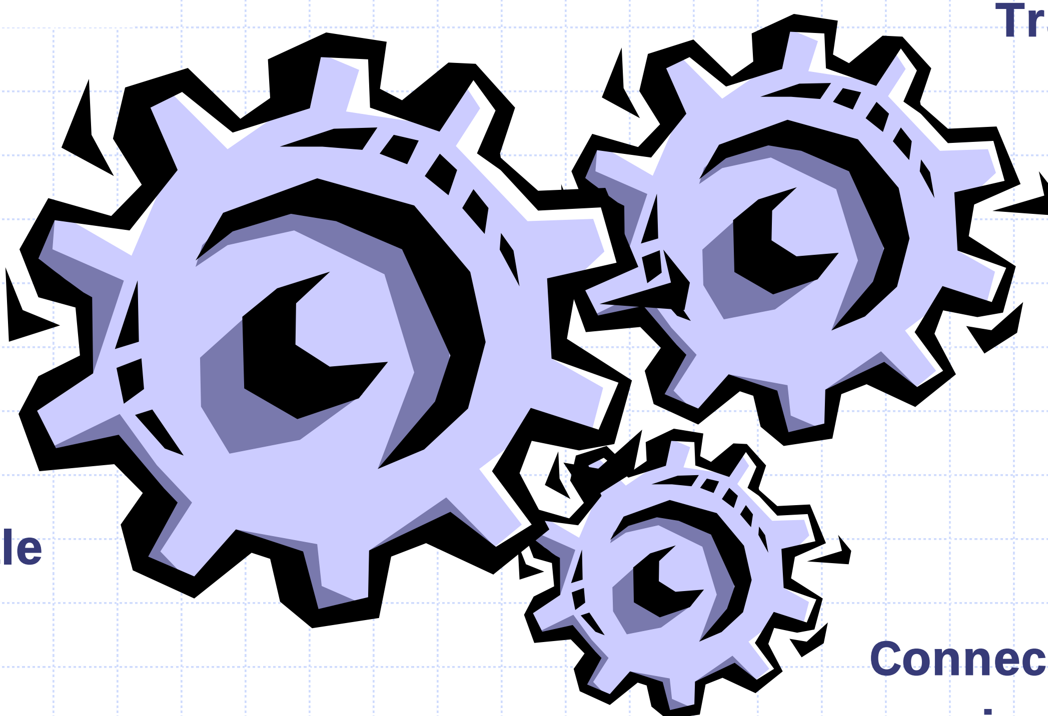
- Hybrid models represent a viable alternative with lower transition costs and adequate transparency levels in market operation

- Hibrid models support in a more adequate manner the operation of the Spot market combined with bilateral contracting.

Market structure



Market architecture



Transmission

- Free access tariffs
- Management of congestion
- Expansion

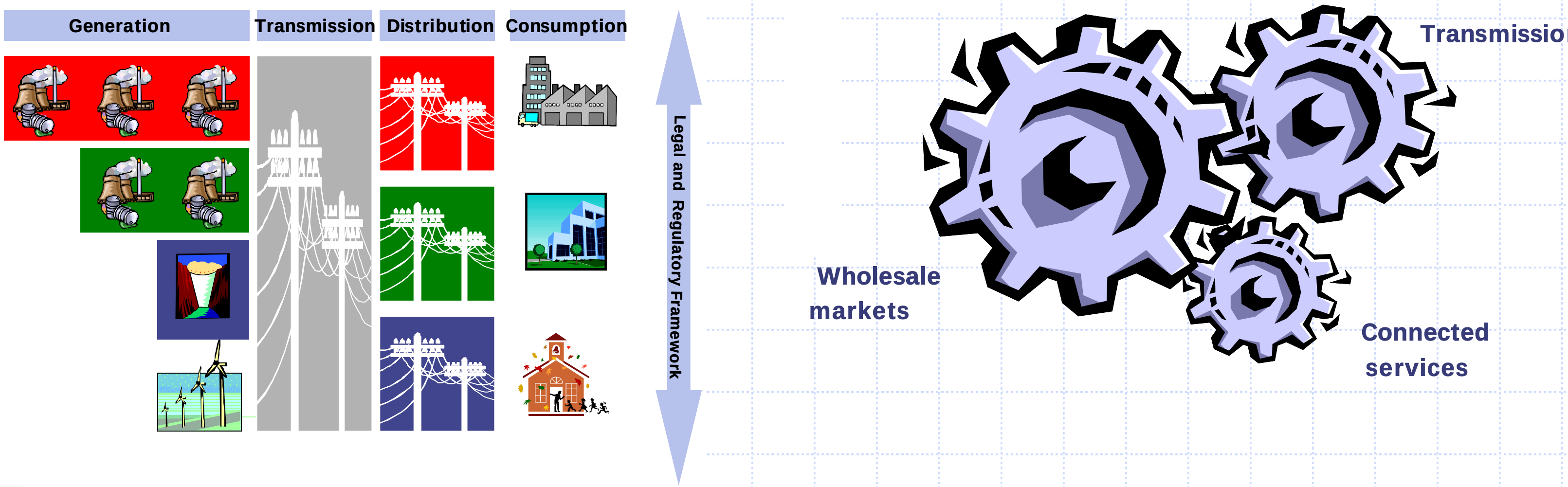
Wholesale markets

- Participants
- Supply formats
- Generation of prices
- Congestion in transmission
- Integration with connection services

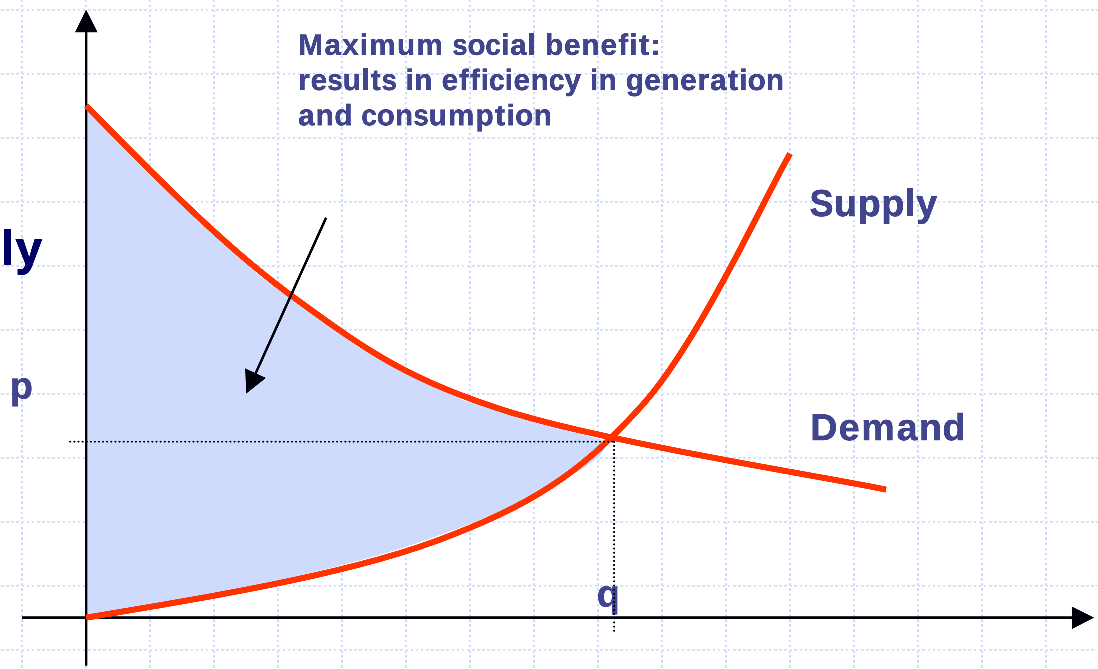
Connection services

- Real time operation
- Operative reserves
- Emergency services and guarantee of capacity

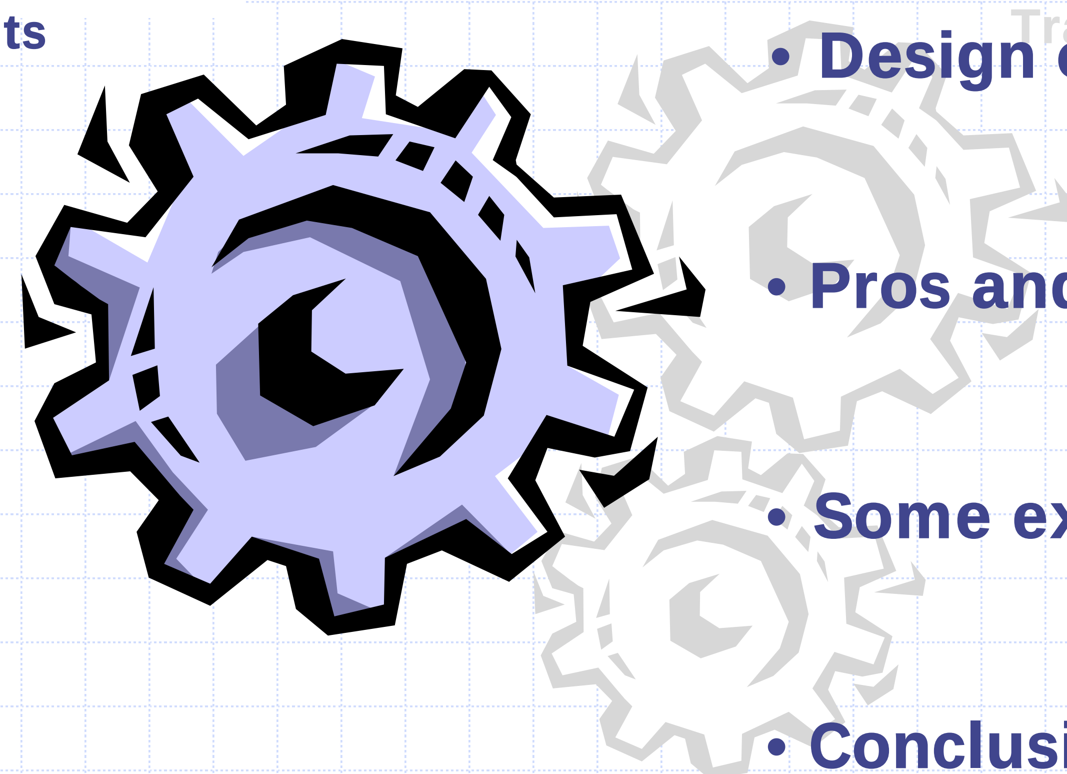
An adequate structure, architecture and legal and regulatory framework…



… lead to a market that functions efficiently and produces the expected benefits



Design of wholesale markets



- Design options
- Pros and cons
- Some examples
- Conclusions

Three types of designs

- Centralized models

Chile, England*, New York, PJM

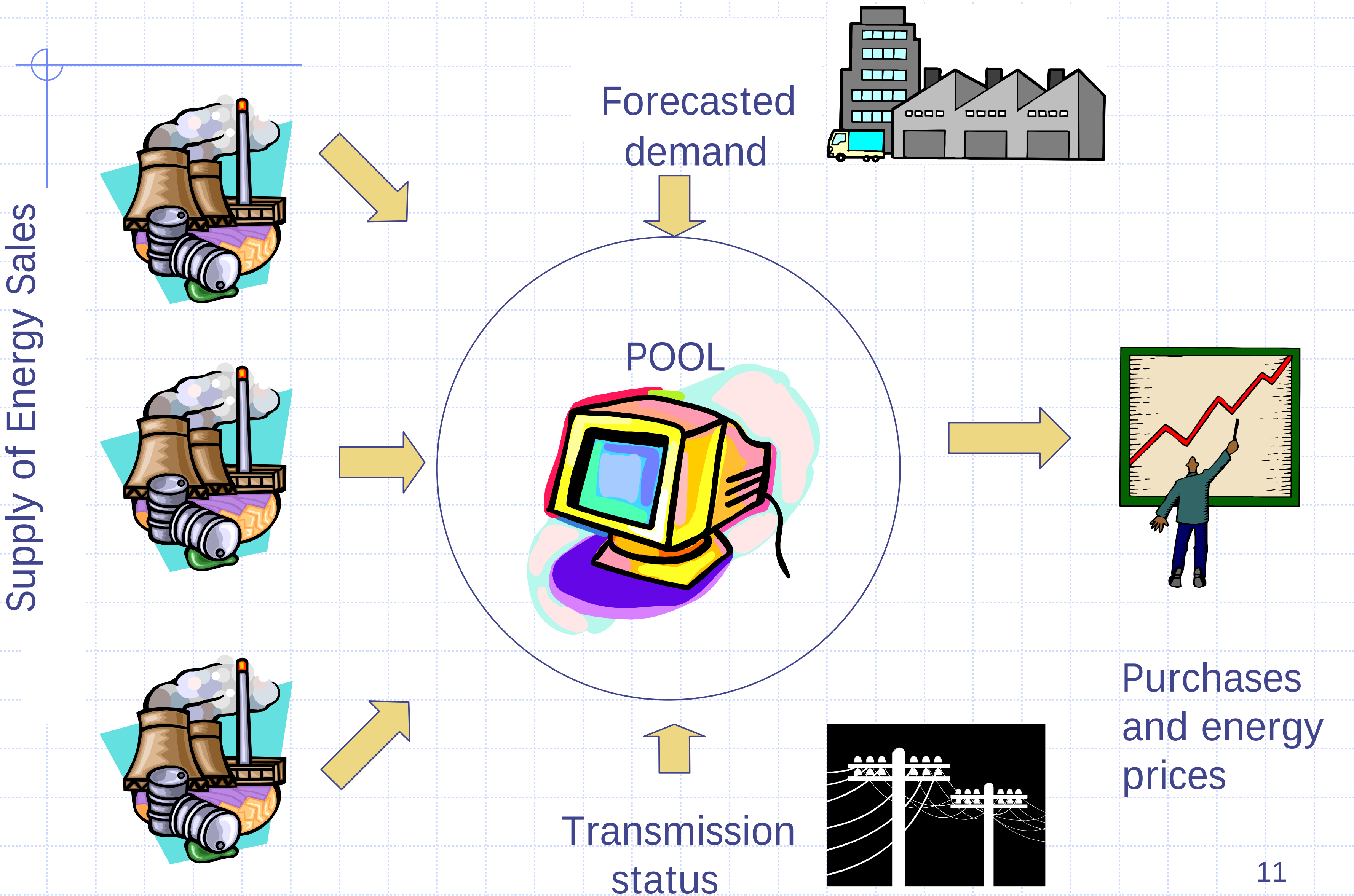
- Decentralized models

Spain, California*

- Hibrid models

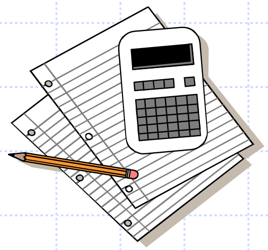
Ontario, N. Zealand

Centralized models **(Pool)**



Centralized resource optimization

Mathematical **Software to program power stations base on offers (dispatch)**



Pool

Price

Minimize	Supply cost
Subject to	Demand provision
	Quantities offered
	Operative restrictions of generators

Centralized optimization is more reliable for the system. But generation and operative restrictions define discontinuous regions in dispatching which complicate the determination of price

Determination of market price

"Marginal cost"	Average cost	Non-linear price
Dual variable (Δ$/ΔMW)	Maximum average cost of dispatch	Dual variable with adjustment due to a lack of equilibrium
Result of dispatch	Simple and understandable formula	Can be complicated
Cost may not be recovered and will be very sensitive to dispatch syntonization	Can cause large price variations	Combined with efficient dispatch techniques it solves the problems
Variation used in PJM and new Pools	Used in England's original Pool	Possibility under consideration

In Pool models the notion of "marginal cost" and "marginal unit" must be avoided to set equilibrium prices

Decentralized markets

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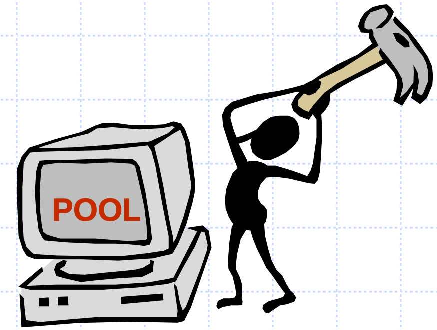
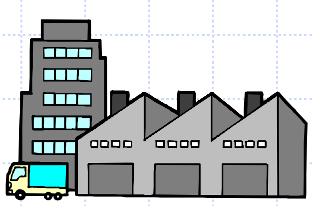
Extreme change: California Market

- **Criticism** to POOL model

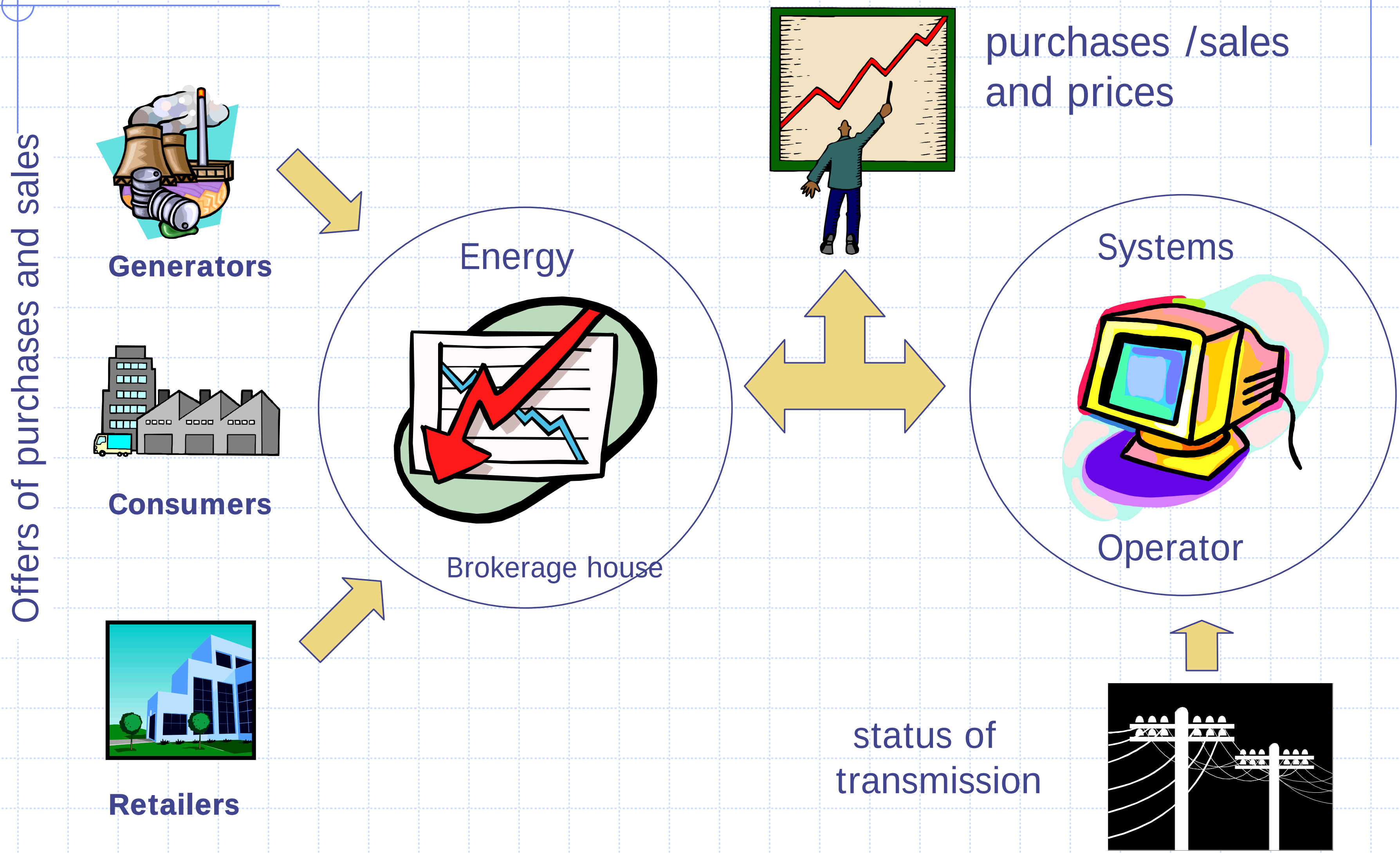


- Creating ‘transparent’ energy brokerage houses

- ✓ Consumers and retailers participate in brokerage houses

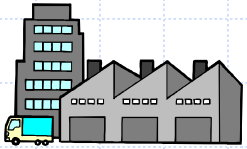


Decentralized Markets

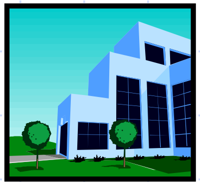


Energy brokerage houses (PX)

Generators

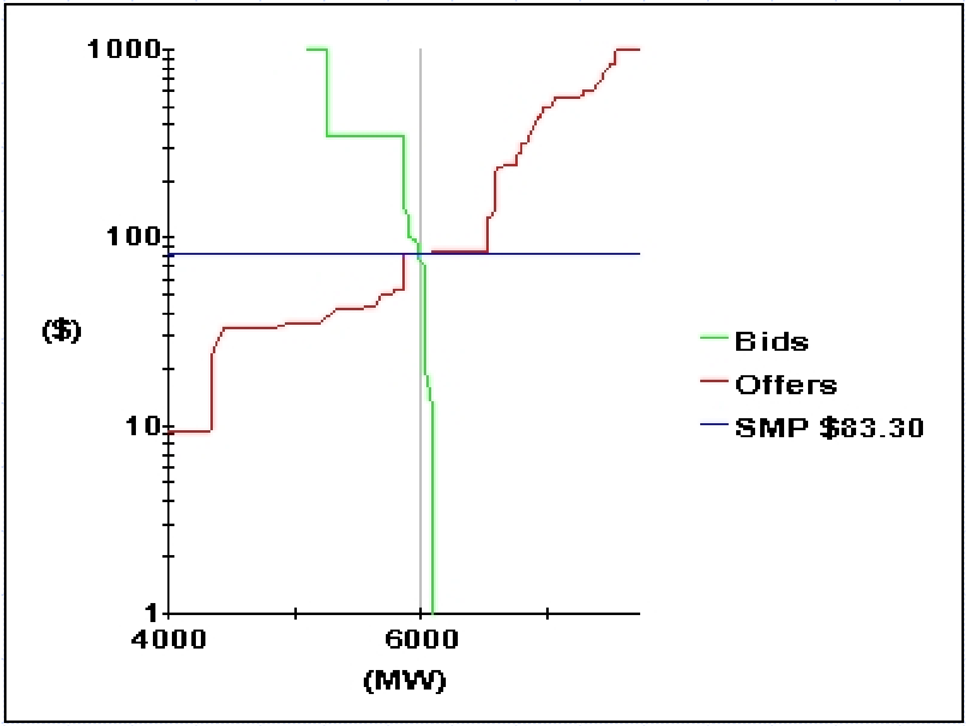


Consumers



Retailers

Simple supply/demand curve determines purchases /sales and price



Alberta Market 7:00 am, March 30, 2001

Interaction PX / ISO

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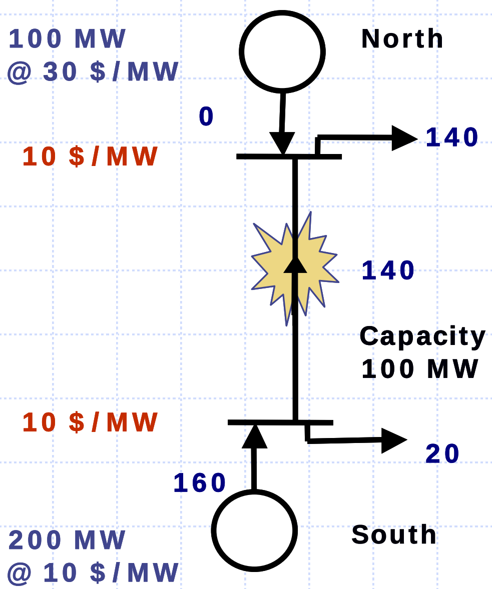
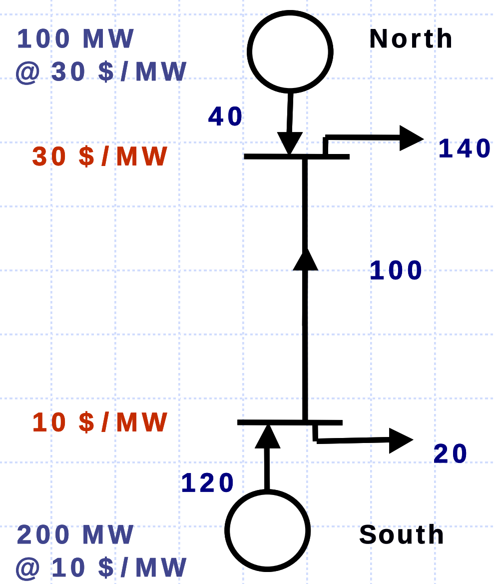
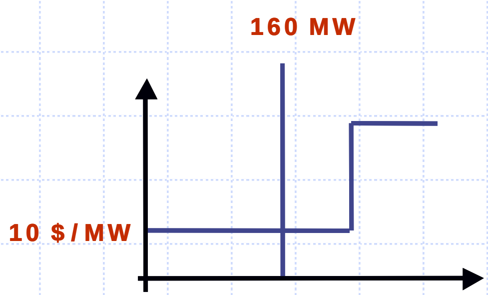
PX



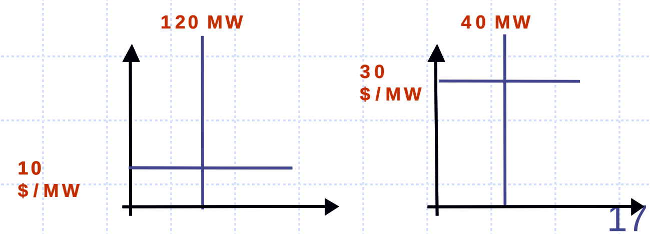
ISO



Price PX



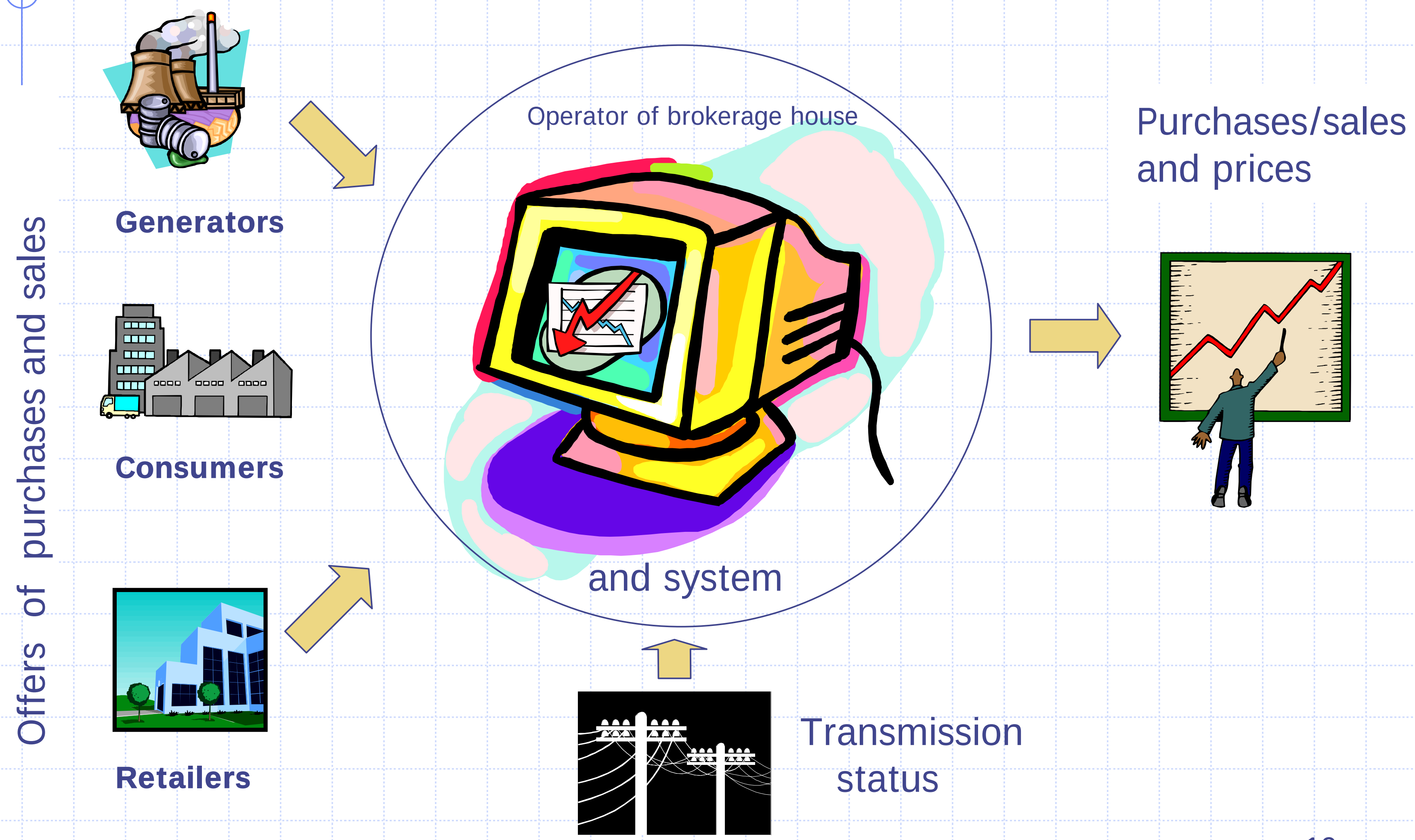
Nodal prices (by congestion)



Decentralized markets:
Some characteristcs

- ✓ Energy brokerage houses are very transparent markets
- × Market separation can bring some coordination problems, as well as greater transition costs
- ▪ The problems in California were not necessarily caused by the architecture but by structure. Spain has the same architecture.

Hybrid Markets



Determination of prices in hybrid wholesale markets

Dispatch model simpler than POOL, but more complete than PX

Maximize	**Demand benefit - Supply cost**
Subject to	**Offered quantities**
	Some operative restrictions of generators and transmission network

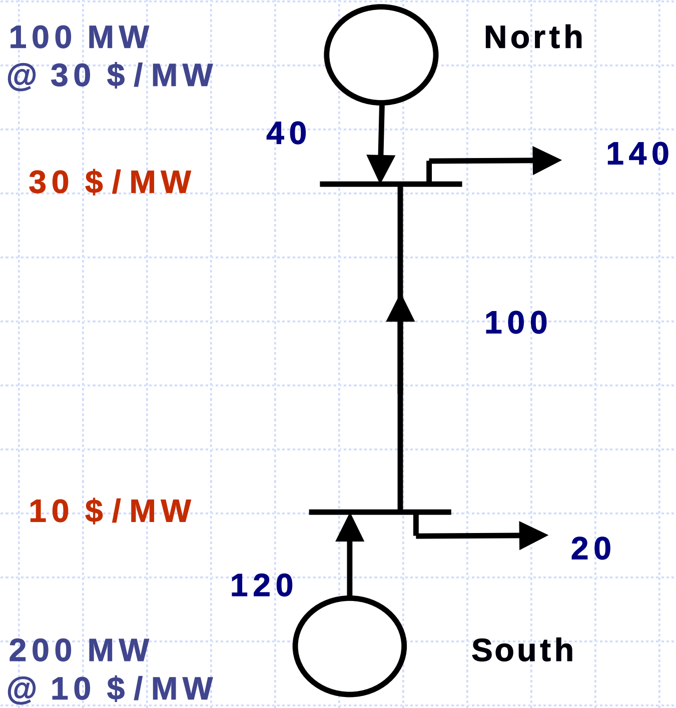
Finds purchases /sales of energy

Demand participates in auction

Nodal prices implicitly determined (dual variables)

Compatible with management of bilateral contracts

Hybrid Markets



- Only one PX/ISO operator
- Generators do not specify all their complex cost components
- Dispatch always generates equilibrium nodal prices, it is not as complex as Pool.
- Different bilateral contracts are compatible with the model

Conclusions

- The success of the new industrial structure depends on the adequate functioning of the following three aspects : (i) structure, (ii) architecture and (iii) legal and regulatory framework

- Within architecture, design of primary market is one of the principal elements, there are several design options

- A traditional Pool can have several complications in price setting

- Pool models and variations, lead to a more reliable system operation

Transmission Planning in a Market Environment

Steven Stoft

updates available on

www.stoft.com

Mexico City, May 30, 2002

The Three Big Markets

- The Market for Energy (save a little soon)
- The Market for Generators (save a lot later)
- The Market for Transmission Lines (lose a little later)

"Deregulation," if it works, will save a lot of money by building better generators in better places with better operation. (This takes decades.)

It will save a little money on better dispatch and more efficient end use.

It will waste a little money building extra wires to make the other two markets work better.

Transmission (Tx) Investment is Difficult

- Generation has most of the qualities needed for a competitive market.   Transmission does not.
- Integrated generation and transmission is relatively easy to regulate.
- The output of an integrated system is “delivered electricity.” We can measure that very accurately.
- The output of a transmission system is   . . . ????
- Transmission investment:
  1. Is very “lumpy.”   (Efficient projects are huge.)
  2. Has strong externalities.   (Interactions.)

Three Approaches

- A Non-Profit Transmission Administrator (TA)
  Pro: No complex new regulatory problems.
  Con: Planning Tx is difficult without planning generation.
- A For-Profit Transmission Company (Transco)
  Pro: Might be able to harness profit motive.
  Con: Requires a new form of monopoly regulation.
- A Transmission Market
  Pro: Can utilize knowledge and motivation of generators.
  Con: Tx does not have the cost structure required for perfect competition. So far, such markets have not worked well.

Theory of Optimal Transmission

- Build Tx to save generation costs.
- If a Tx upgrade saves more than it costs,

  Build it.
- If it saves less, Don’t build it.
- One exception: It may be needed to reduce market power.

The Units of Cost

- Say a transmission line costs

  $100,000,000 + $500,000 T

  where T is the line capacity in MW.

- With a 10% cost of capital, the carrying cost is

  ($10,000,000 + $50,000 T) per year

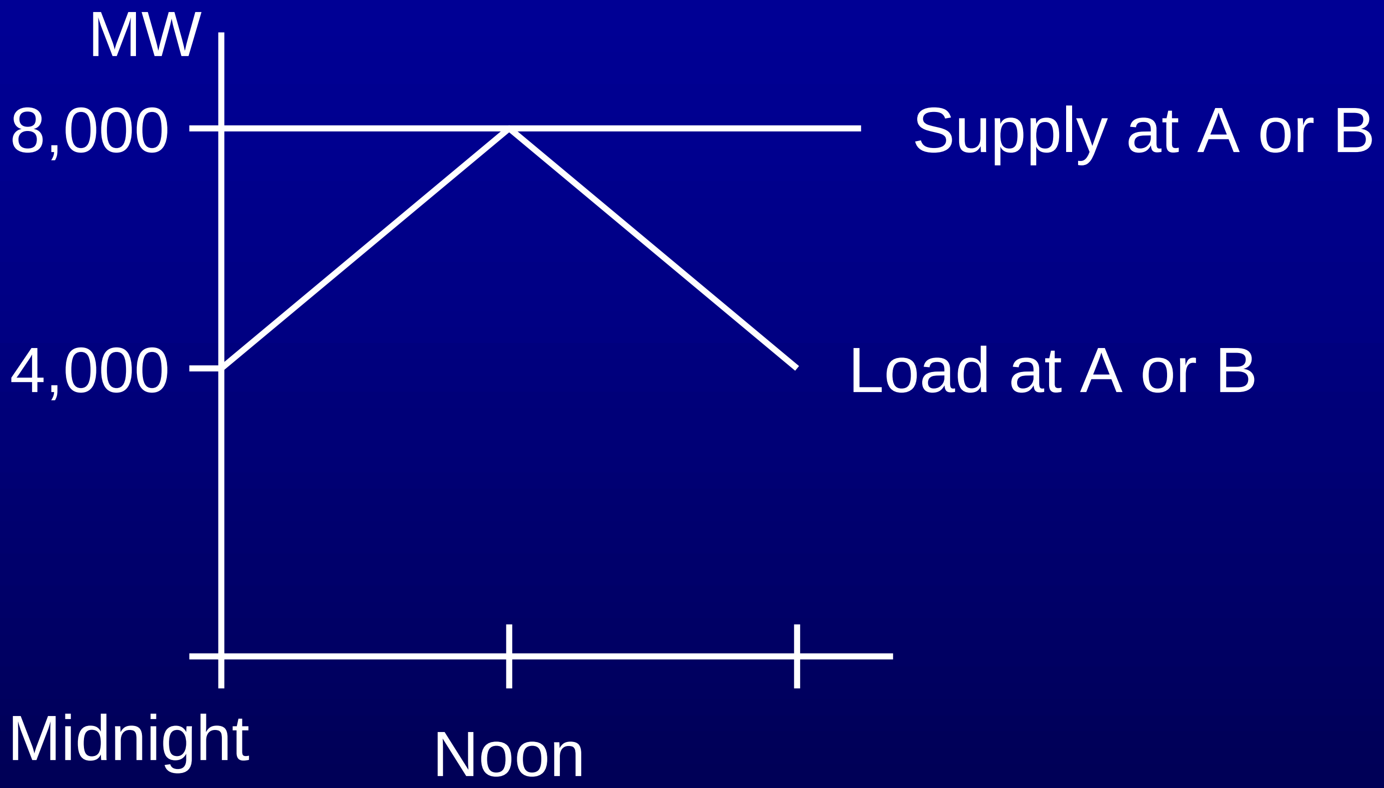
- Assuming (roughly) 10,000 hours / year, the carrying cost is

  ($1000 + $5 T) per hour

  = $1000/h + $5/MWh

- To understand the cost of a power line, think of renting one by the hour. To rent a 100 MW line there is a fixed cost of $1000/h and a variable charge of $5/MWh × 100 MW. (When planning, the line capacity is variable.)

An Example


MW
8,000
4,000
Supply at A or B
Load at A or B
Midnight
Noon


A
B
$30/MWh
$40/MWh

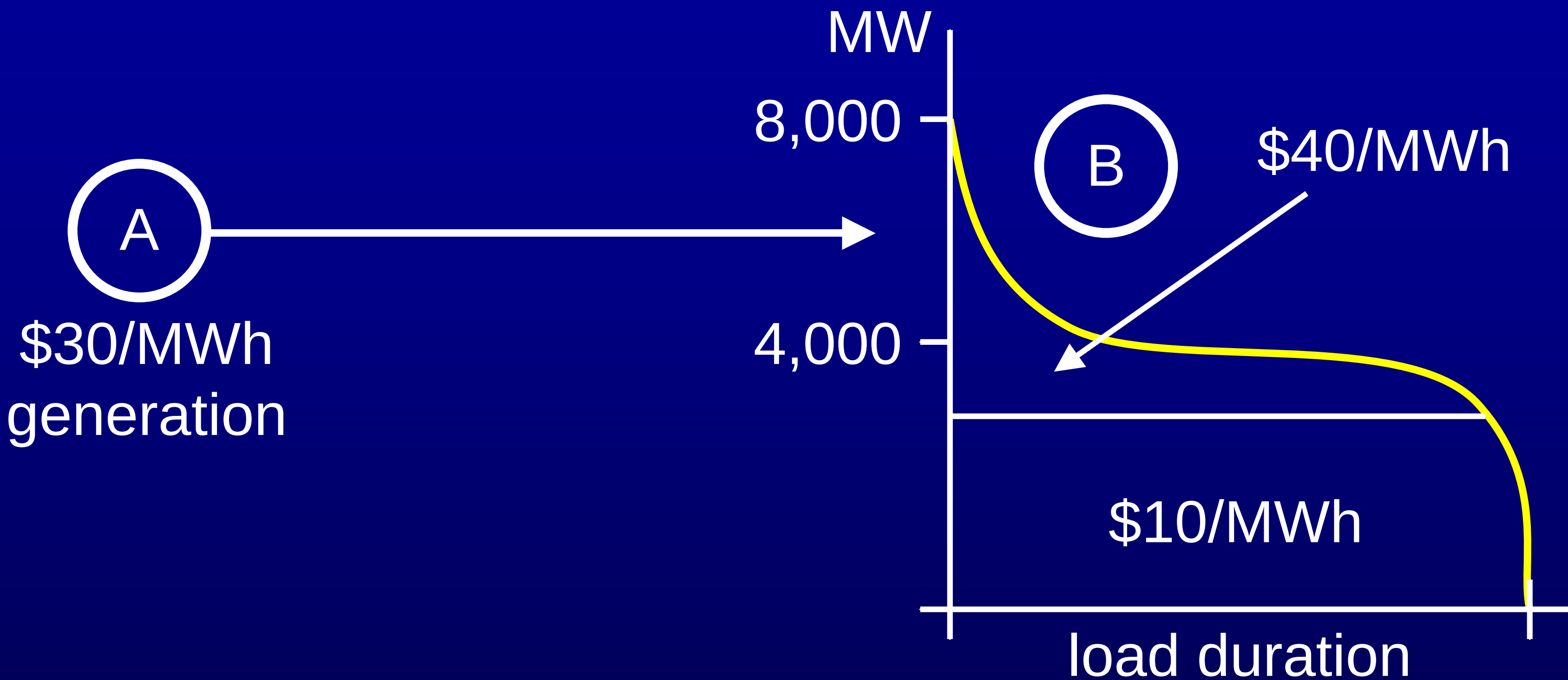
Peak Load vs. Peak Use of Lines

- At midnight the total load is only 4,000 MW.
- There is 8,000 MW of cheap ($30) generation at A.
- At maximum load, there is no extra capacity at A or B and so no possibility of trade.
- Maximum line use occurs at minimum load.
- In the first year of PJM's market, there was never any congestion when the price was $1000/MWh.

Congestion

- If the line is smaller than 4,000 MW, then some cheap A-generators would like to sell to B at midnight, but cannot because the line is too small. This is congestion.
- Congestion means: More trade is desired than can be supported by the lines.
- Congestion does not mean: (1) a reliability problem, or (2) the lines are overloaded.
- If the line is 3,000 MW and the system operator tells 1,000 MW of A-generators not to run, this does not mean congestion has been eliminated ! ! ! There is still 1,000 MW of congestion.

An Simpler Example

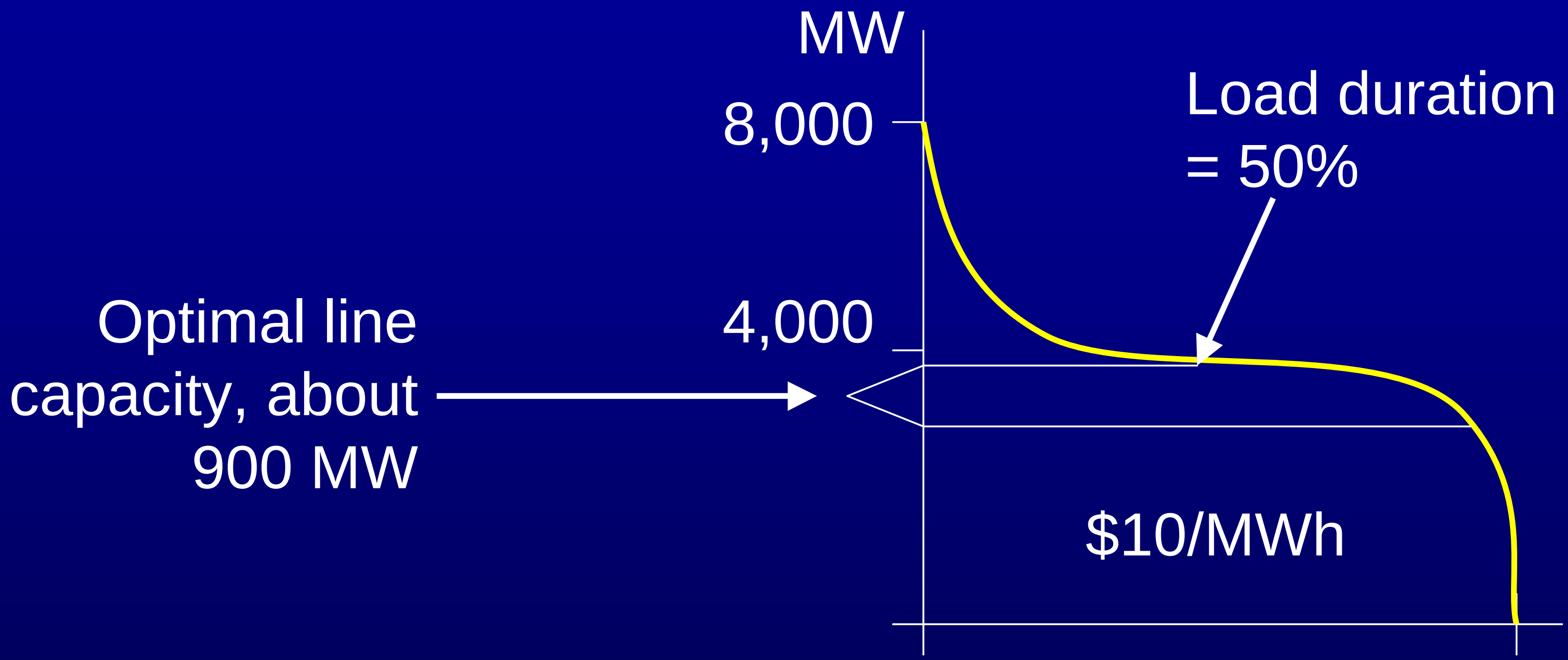


B has cheap base-load generation, but A is cheaper for mid and peak load.

Optimal Line Capacity

- **The marginal cost (rent) of the line is still $5/MWh.**
- **The savings from using the line is $10/MWh.**
- **If the last MW of line capacity is used half the time, the savings is $5/MWh. This is the break-even point.**
- **If the line is used less, its cost is greater than its savings and it should not be built.**
- **Generation at B should only serve load with a duration of 50% or more.**

Optimal Line Capacity (#2)



- **Serving peak load over an expensive line wastes money because the line is used very little.**
- **To eliminate congestion, build another 4,100 MW of line.**

The Zero Congestion Approach

- Alberta has a One-Price Pool.
- To help support this approach the for-profit Transco has proposed to build enough lines to eliminate all congestion.
- It has said it would build a $500,000,000 line even if the price difference were just one penny !
- It estimates that this could double the cost of wires in Alberta.
- The Transco has just learned its contract will not be renewed.

Politics

- But NOT because of its bad economics.
- The Alberta government actually wants these wires built and is going to install a non-profit TA appointed by the government.
- They want to sell power from Northern Alberta to Los Angeles and make lots of money.
- Unfortunately, California already spent all of its money and bought very expensive power for the next 10 years. (It paid about $13 billion too much.)

Approach 1: (A Non-Profit TA)

The Objective:

- **Build the lines for a minimum-cost power system.**
  Minimize cost of   Wires + Generators + Fuel
- **Congestion pricing (competitive locational pricing) will induce generators to locate efficiently.**
- **Building the right wires + competitive locational pricing is enough.**

Approach 1: Paying for Lines

- **Since competitive locational prices are optimal, demand charges and peak-use charges reduce efficiency.**
- **The lines should be paid for with**
  1. Congestion charges, plus
  2. A flat per-MWh charge to loads.
- **Congestion charges are not enough. The remaining cost of wires must be paid for with a "tax."**
- **A flat per-MWh charge is the "tax" that causes the least distortion.**
- **Loads must pay all costs anyway.**

Approach 1: When to Build a New Line

- Lines save different amounts at different times of the year.
- Compute the carrying cost of the new line for 1 year.
- Compute the energy-cost savings from having the line in place for each year.
- The line should go into service the first year it saves more than its carrying cost.

Approach 1: How Big a Line to Build

- This is the difficult planning problem.
- It requires predicting what generation the market will build.
- It requires comparing different possible lines over a long time horizon.

Approach 2: A For-Profit Transco

- A Transco is a monopoly and must be regulated.
- This approach has great potential.
- Some of the best economists are trying to solve the problem of how to regulate a Transco: Joskow, Tirole, Vogelsang, Wilson.
- So far they have not solved the problem, although they have many good (and complicated) ideas.
- When they do, it will take 30 years to explain it to FERC.
- Don’t rush into this.

Approach 2: A For-Profit Transco

- If you want to try this approach, . . .
- If the Transco keeps the congestion rent, it will deliberately cause congestion.
- The congestion rent should be subtracted from the Transco's profit.
- One method of regulation is to pay a large annual sum (determined for many years at a time) and subtract from it the cost of losses and congestion.
- Wilson has some good ideas about reliability insurance and charging the transco for blackouts.

Approach 3: A Market For Wires

- A generator that wishes to locate 100 km from the transmission grid should pay for its radial connection.
- That line is just like an extension of its power plant.
- Similarly, a generator that wishes to locate on a line that is fully utilized, should pay for the non-radial upgrade.
- This is not different from the radial-line case as long as this generator, and only this generator, gets to use the line.
- Transmission rights help turn non-radial upgrades into private property without causing market power.

Two Main Problems with a Market for Wires

1. A generator may need only a 100 MW upgrade, when a 300 MW upgrade would be much cheaper per MW and useful to others. (Lumpiness)
2. If a generator builds a line the power of other generators may flow on it. (Externalities / Interactions)

- These are basic problems with the cost-structure of the market.
- Economics predicts a market with this cost structure will NOT be efficient.
- Designing a successful transmission market requires fixing these structural problems.

Solving the Cost-Structure Problems

- **A transmission market needs a non-profit TA to solve these problems.**
- **The non-profit TA should**
  1. Smooth out the lumpiness of costs.
  2. Provide a system of transmission rights.

"Solving" the Lumpiness Problem

- **Say a new generator needs a 100 MW upgrade to a shared radial line.**
- **Say a 100 MW upgrade costs $50,000,000.**
- **Say a 200 MW upgrade costs $60,000,000.**
- **Say the extra 100 MW will probably be needed soon.**
- **The non-profit TA should**
  1. Build the 200 MW upgrade.
  2. Charge the generator $30 million.
  3. Give that generator 100 MW of transmission rights.
  4. Withhold the extra 100 MW of line capacity until it can sell it for $30 million to the next generator.

Transmission Rights Help with Externalities

- Physical transmission rights are very complicated.
- Financial transmission rights are simpler and are well defined.
- A typical financial transmission right (FTR) from A to B, pays the congestion charge from A to B.
- If the price is $10 at A and $25 at B, a 100 MW FTR from A to B pays $1500/h.
- It pays this whether or not you send any power.
- This gives you the right to transmit at no cost, or you can sell it and make money when you do not need it.

Rewarding Investment with FTRs

- There is a well-known rule: The Feasibility Rule.
- Think of FTRs as power flows.
- The set of all FTRs must be feasible (a safe flow of power).
- A transmission upgrade allows more power to flow, so more FTRs are feasible.
- Someone who pays for a Tx upgrade should be given FTRs for the increase in feasible flows.
- This guarantees they can use their own upgrade at no cost.

Approach 1: A Non-Profit TA

- **The TA works beside the ISO under the energy minister. The ISO handles the short run, and the TA handles the long run.**
- **Goals:**
  1. Minimize cost of Wires + generators + fuel.
  2. Collect cost of wires and avoid distorting the dispatch.
  3. Maximize competition.
- **Do Not attempt to reduce the average retail price except by 1 & 2 above.**

  (Any other method is an exercise of monopsony power and will cause inefficiency and higher prices in the long run.)

Approach 1: A Non-Profit TA (#2)

- **Build extra lines for competition (How many ??).**
- **A “load pocket” is a where all incoming lines become congested.**
- **Generation in the load pocket has no competition from the outside.**
- **Transmission is a very effective way to reduce market power in a load pocket, but . . .**
- **A little extra transmission is cheap because it saves energy costs. A lot extra can be very expensive.**

Approach 3: A Transmission Market

- **An Non-Profit TA is still needed just as in Approach 1.**
- **The TA would still handle reliability upgrades.**
- **The TA would**
  1. approve commercial upgrades.
  2. give out transmission rights.
  3. solve the lumpiness problem.
- **The goals would be the same as Approach 1, but instead of always computing the least-cost lines, the TA would often let the market choose them.**

Recommendations

- Start with Approach 1 (non-profit TA)
- Slowly add Approach 3 (include more of a market).

  (If you have a One-Price Pool, you need Approach 3 and physical rights. So don't use a One-Price Pool).
- Wait until the wholesale power market is working well before experimenting with Approach 3.
- The NY-ISO has been trying Approach 3 but without solving the lumpiness problem. In three years, one transformer has been added and one DC line has been started. We do not know if this market will work.

Alternatives for Capacity Payments: Assuring Supply Adequacy in Electricity Markets

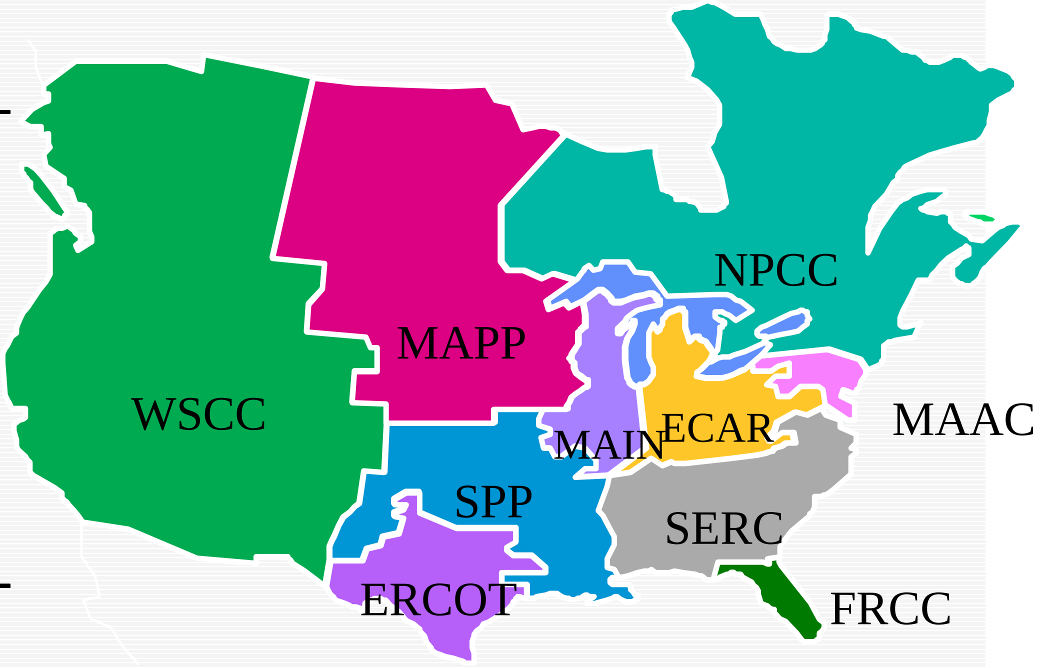
Harry Singh

Regulation and Competition in Electricity Markets

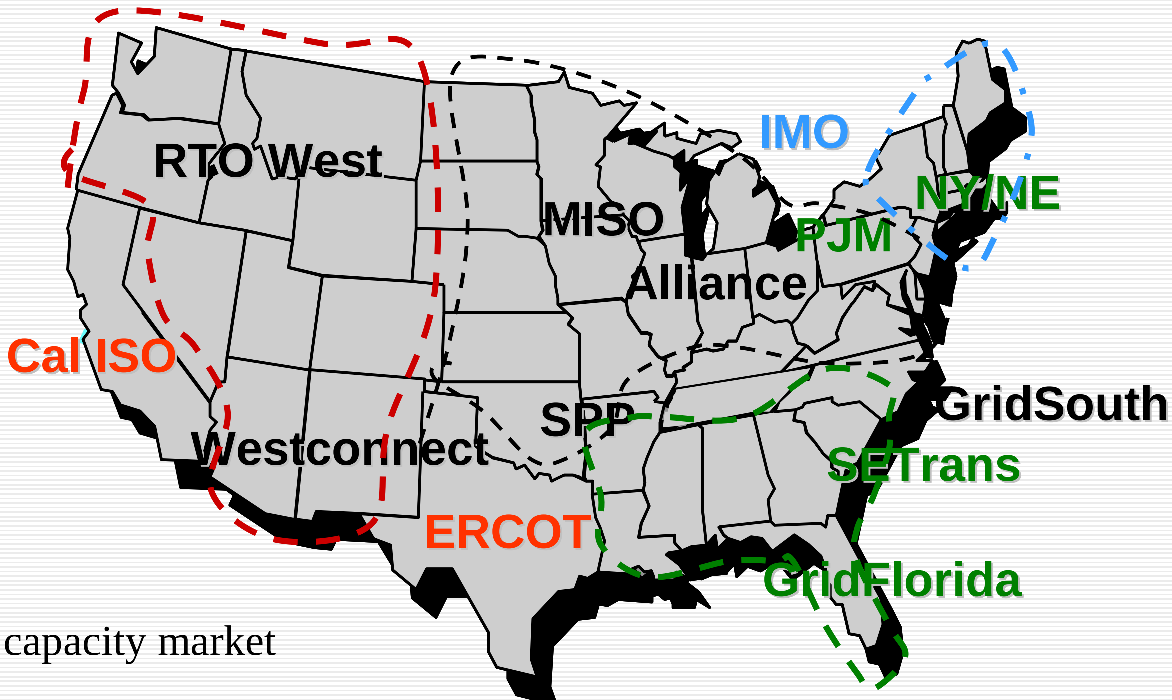
May 30, 2002

NERC Regions

	Summer 2001 MW	Percent
ECAR	102,161	14.4%
FRCC	38,478	5.4%
MAAC	52,977	7.5%
MAIN	55,368	7.8%
MAPP (US)	29,814	4.2%
NPCC (US)	54,351	7.7%
SERC	159,930	22.5%
SPP	40,522	5.7%
WSCC (US)	118,887	16.8%
ERCOT	56,759	8.0%
	709,247	100.0%



Existing and Emerging RTOs



ICAP or other capacity market

Considering capacity market

No ICAP market

Reliability Standards

- Reliability = Adequacy + Security
- Example of an Adequacy Standard
  - "Each areas resources will be planned in such a manner that, after the allowance for scheduled outages and deratings, forced outages and deratings, assistance over interconnections with neighboring regions, and capacity and/or load relief from operating procedures, the probability of disconnecting non-interruptible customers will be no more than once in ten years." -*NPCC criteria on generation adequacy*
- Adequacy is generally associated with a long-term timeframe (although RTOs must also deal with short-term adequacy)
- Security is associated with a short-term timeframe

Is Adequacy a Public Good?

Basic Definitions

- A “*public good”* is *non-rival* and *non-excludable*
- A good is *non-rival* if its consumption by one person does not preclude its consumption by others
- A good is *non-excludable* if it is impossible too preclude someone from consuming it

Ensuring Generation Adequacy

- Basic assumptions
  - Demand and Supply must be balanced at all times
  - If there is inadequate generation capacity, new supply cannot be brought forth regardless of price (in the absence of demand elasticity); cause for market failure
  - A need to ensure generation adequacy and guarantee of supply
- Who is responsible?
  - Prior to restructuring and retail competition, individual utilities were responsible for ensuring that there is sufficient capacity to meet future load
  - With vertical disintegration and retail competition, who should be responsible?
  - Who has the obligation to serve?

Generation Adequacy Approaches

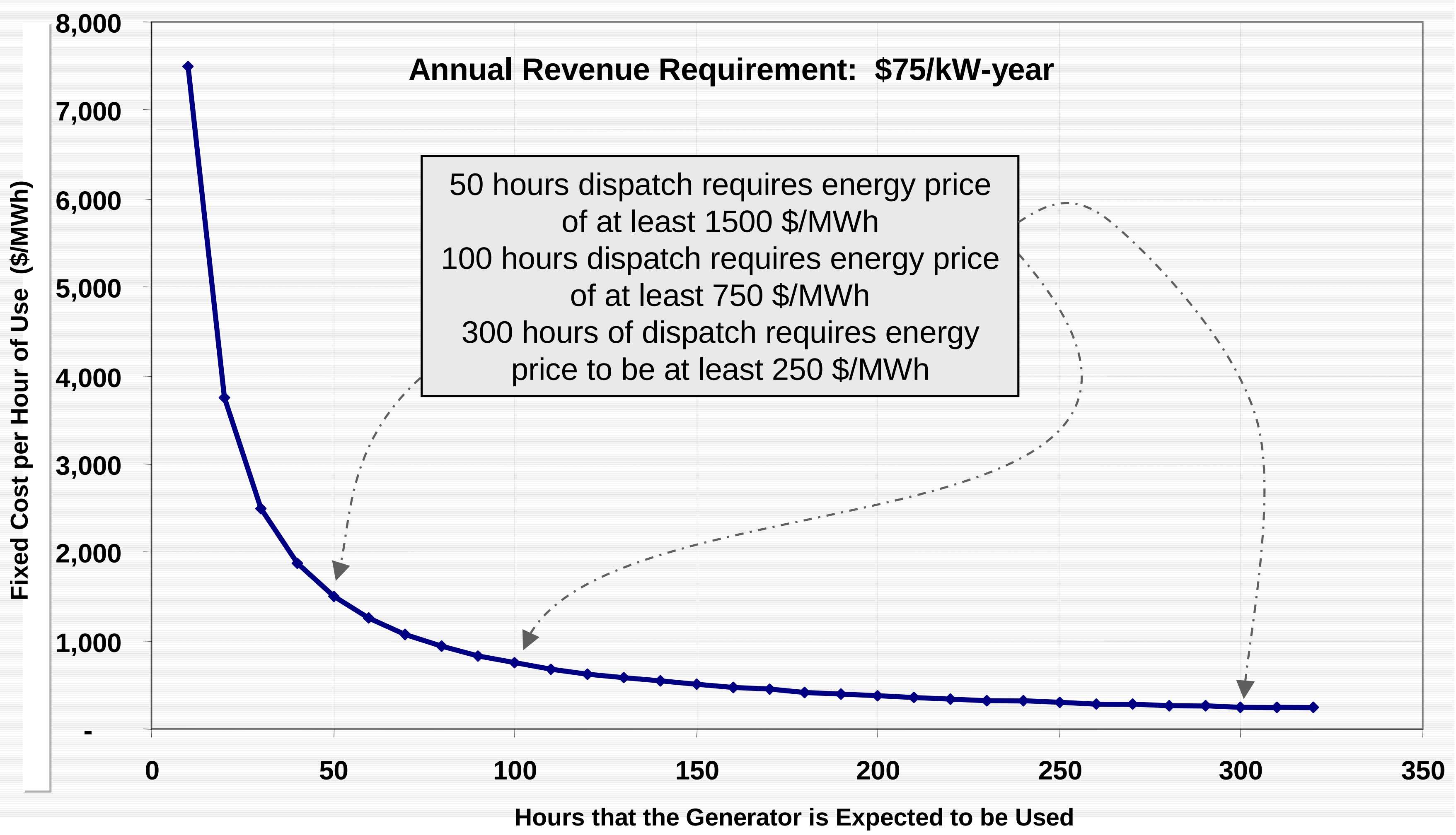
- *Approach 1: Capacity Payments*
  - Establish a capacity payment (used in Latin America, Spain)
  - Setting correct level of capacity payments can be difficult

- *Approach 2: Installed Capacity (ICAP)*
  - All Load Serving Entities (LSEs) should share the responsibility
  - This can be done by imposing an obligation to arrange for Installed Capacity (ICAP) (used in PJM, NY, NE)
  - Can sometimes be similar to Approach 1 (if prices equal administratively set “deficiency charge”)
  - May fail to provide investment signals when they are most needed (if implemented incorrectly)
  - Current variations on ICAP use UCAP (Unforced Capacity) where UCAP = ICAP x (1-Effective Forced Outage Rate, EFORd)

Generation Adequacy Approaches

- *Approach 3: "Energy Only" Markets*
  - Market prices for energy (forward and spot) should be the primary signals for new generation investment
  - Assumes absence of regulatory intervention through price controls
- *Approach 4: Mandatory Call Options*
  - Bundles generation adequacy with price insurance

Energy Prices and Fixed Cost Recovery



Perspectives on Capacity Payments

- Historical reasons
  - Generator fixed costs difficult to recover from prices based on variable energy costs
  - Does not apply under market based pricing and uniform price auctions
- The generator's view
  - The "energy only" paradigm requires energy prices to reflect scarcity rents
  - If prices do not reflect scarcity rents (e.g., due to price controls) an alternative mechanism is needed to recover fixed costs
- The trader's view
  - ICAP is one more product to trade
  - Capacity payments may decrease volatility of energy prices

Perspectives on Capacity Payments

- The ISO's view
  - Support for ICAP stems from short-term adequacy concerns rather than long-term adequacy concerns
  - Allows for a mechanism to compensate curtailed exports (albeit there have been some notable exceptions)
  - Value of ICAP is based on spread option on price difference across adjacent markets

Perspectives on Capacity Payments

- The LSE view
  - Higher energy prices can provide incentives for shifting demand from peak to off-peak hours, helps improve short-term adequacy
  - Separate capacity and energy payments are analogous to separate demand and energy charges. Hourly energy prices make demand charges antiquated.
  - Higher volatility in energy prices creates more opportunities for LSEs to offer products that insulate customers from volatility to the extent they so desire. *To dampen volatility artificially penalizes the customer who is willing to trade uncertainty for lower expected costs.*

Design Issues for Capacity Markets

- Default price/ choice of “CDR” (fixed/variable, high/low)
- Choice of capability period (annual, seasonal, monthly)
- Forward looking vs. current year markets
- Transmission constraints and “deliverability” standards
- Allocation of deficiency charges
- ICAP vs. Unforced Capacity
- Ability to recall exports
- Merchant transmission

Alternatives to ICAP: Mandatory Call Options

- A market based approach for generation adequacy that uses mandatory *energy call option* purchases by LSEs
- Combines generation adequacy with price insurance
- LSEs may choose call option strike prices that suit their risk tolerance; high strike prices have small premiums, low strike prices have higher premiums
- Option premiums serve as a substitute for price signals currently generated through ICAP
- Call options provide LSEs with price hedges that substitute for price caps
- Sellers of call options have strong financial incentives to guarantee resource availability and strengthen system reliability
- Payoff to load/Lost profit for supplier = $\sum_i \max\{0, (p_i - s)\}$ where p_i is spot price in hour i

FERC, SMD and ICAP

FERC SMD Paper

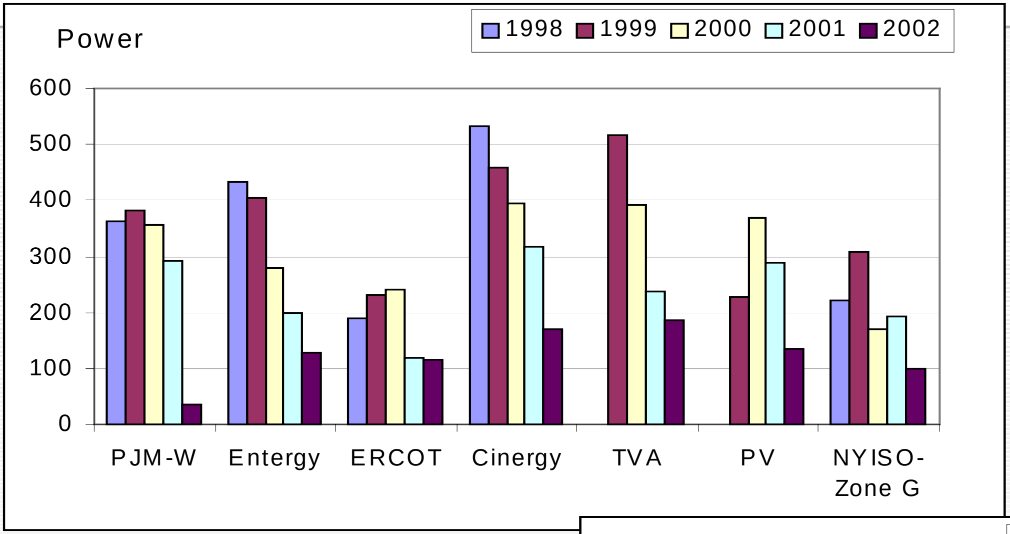
- Standard market design may include measures to ensure adequate long-term generation supplies. Any such measures should be forward-looking and flexible enough to accommodate changing load obligations
- Preferably, state and regional reliability authorities will coordinate with one another to set a regional, long-term reserve margin to be maintained by LSEs subject to their jurisdiction
- When load must be curtailed due to insufficient generation, the transmission provider should avoid curtailing LSEs that have procured sufficient generation, if operationally possible

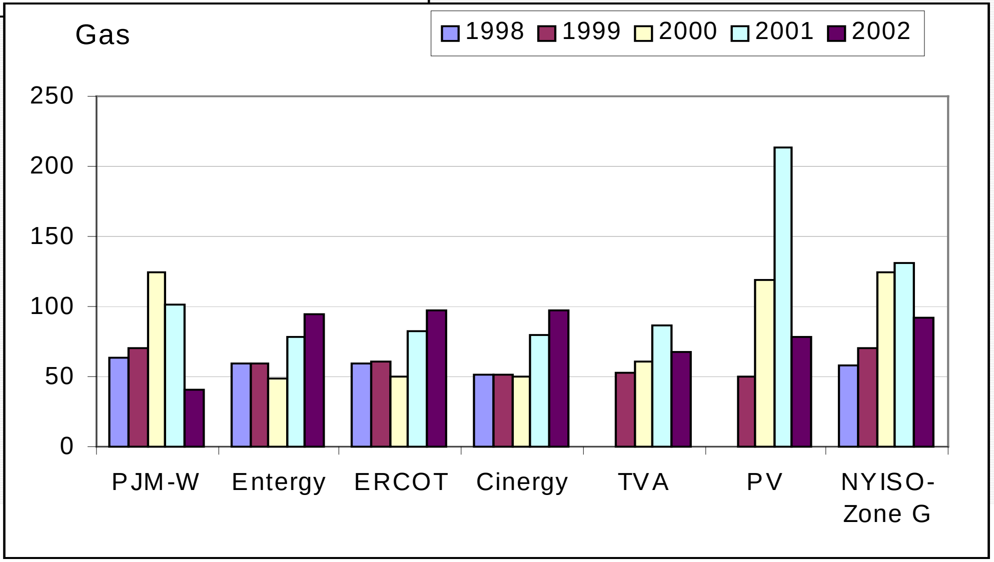
FERC, SMD and ICAP (cont.)

Design choices in “options” paper

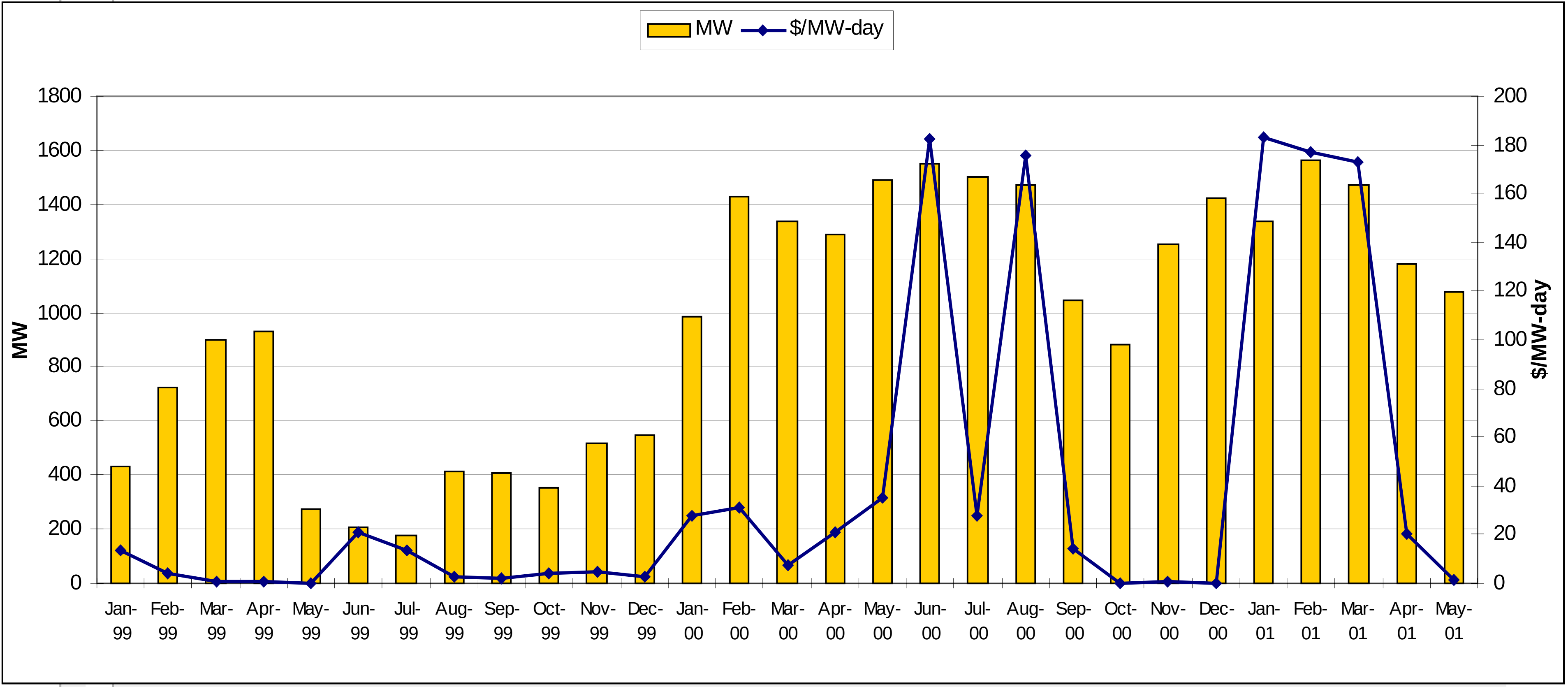
- Option 1: Rely on energy prices and information on projected supply/demand situation
- Option 2: Require a regional supply obligation
- Option 3: Require a regional capacity obligation
- Option 4: Impose a supply obligation on load serving entities only if projected reserves fall below a trigger level
- Option 5: Capacity obligations for operating reserves only – forward reserves contracts

Volatility Comparison

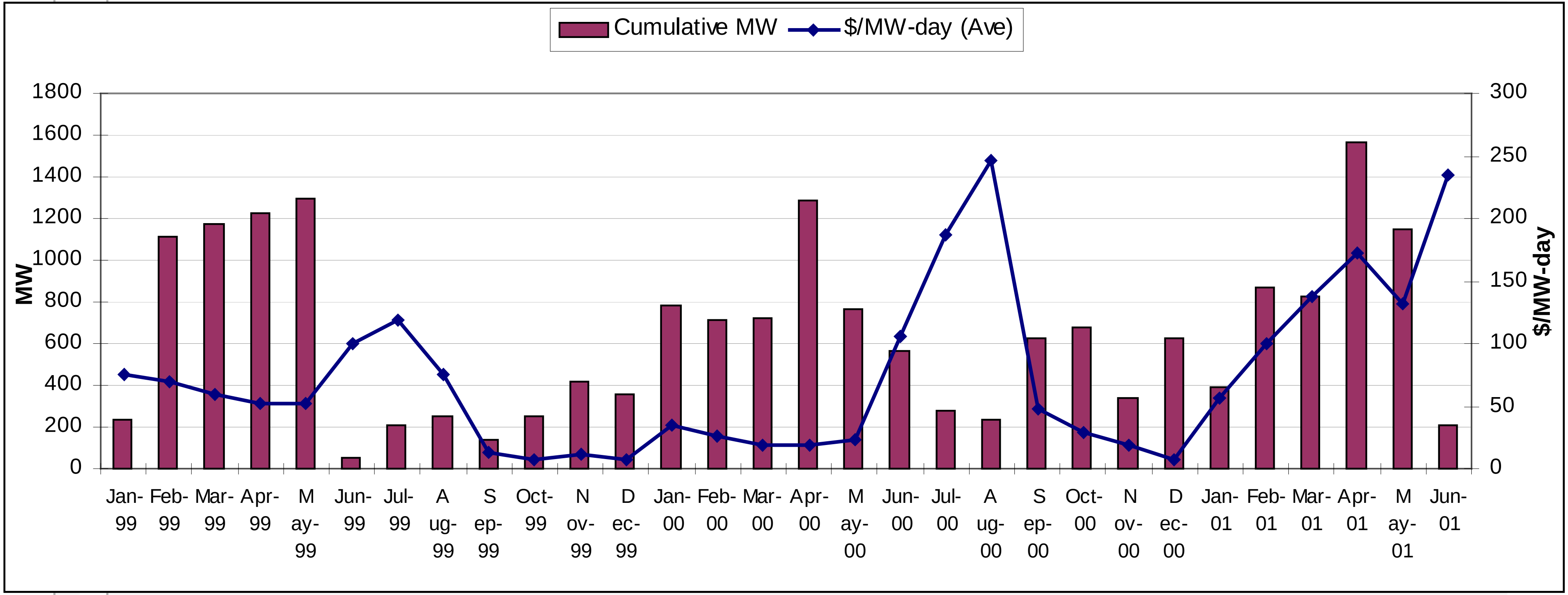




PJM Daily ICAP Market



PJM Monthly ICAP Auction



Some (Real and Perceived) Factors in the California Power Crisis

- Significant dependence on hydro
- Significant interconnections and dependence on imports
- Lengthy permitting procedures for new plants
- Excessive reliance on spot market
- Retail rate freeze
- Regulatory action/inaction
- Market rules

Would the existence of a capacity market have changed the outcome in California?

Summary

- The cost of under-investment in generation can far exceed the cost of over-investment in generation, may bias capacity payments to be set too high
- Energy only markets can work but only if prices are allowed to reflect scarcity rents, may not be politically viable
- Capacity markets are one possible approach to address supply adequacy without relying on an administratively set capacity payment
- Implementation details on capacity markets vary and can be critical

Regulation and Competition in Electricity Markets

The Mexican Electricity Sector: Regulation and Perspectives

Regulation

- It is State intervention in public and private economic activities, based on the concept of "Public Interest".
- The role of regulatory intervention must be to keep participants within a framework that allows the market to perform its role, encourages participation, and eliminates or diminishes competitive market imperfections wherever possible.
- In no way does regulation substitute competition.

Characteristics of Regulated Entities

- Lies not only in their size, but also their influence as an essential input in other industries as well as their impact on society and economic growth in general.
- They are natural monopolies.
- For diverse reasons competition does not work well or there are hindrances to its appearance.
- Total deregulation may destroy quality, reliability, and insured service with unacceptable consequences for consumer groups.

The Purpose of Deregulation

- Protect buyers against monopolistic power.
  - High prices
  - Bad quality service
- Avoid destructive competition.
- When competition is missing, its effect is simulated through rules that set:
  - Rules of participation.
  - Prices.
  - Quality conditions.
  - Compulsory character of the service.

Evolution of the Legal Framework of the Mexican Electricity Industry

Important Dates in the Development of the Mexican Electricity Industry

• **1879**	• **First Station (1.8 KW)...Textile Industry**
• **1930**	• **There were more than 100 companies that produced or sold Electricity power.**
• **1937**	• **The *Comisión Federal de Electricityidad-CFE* (Federal Commission of Electricityity) is created "to organize and lead a national non-profit system of generation, transmission, and distribution."**
• **1960**	• **The Constitution is ammended to establish the State as sole provider of the public service.**
• **1992**	• **The Law's scope is narrowed, it defines public service and private sector participation.**

Important Dates in the Legal Framework of the Mexican Electricity Industry

1st May 1926	**Electricity National Code**
18th January 1934	**Decree by which CFE is created**
24th August 1940	**Law by which CFE is created**
11th February 1939	**Electricity Industry Law**
28th August 1940	**Regulation of the Electricity Industry Law**
29th December 1960*	**Ammendment to paragrah 6, Article 27 of the Constitution**
22nd December 1975	**Law of Public Service in Electricity Power**

Important Dates in the Legal Framework of the Mexican Electricityity Industry

27th December 1983	**Reform to the Electricity Energy Public Service Law**
23rd December 1992	**Reform to the Electricity Energy Public Service Law**
31st May 1993	**Regulation of the Electricity Energy Public Service Law**

Paragraph 6, Article 27 of the Constitution

"... The generation, conduction, transformation, distribution, and supply of Electricity energy intended to render a public service corresponds solely to the Nation. In this regard, no concessions shall be made. ..."

Reform to the Electricity Energy Public Service Law (27th December 1983)

Article 36

SEMIP, hearing CFE, will grant permits regarding self-sufficiency in electricity energy to meet the needs pertaining to natural or legal persons individually considered. To grant these permits, an indispensable condition will be the impossibility or inconvenience to supply the electricity energy service by the CFE. …

Requirements for self-sufficiency

d) "…that the applicant agrees to grant the necessary facilities to CFE so the latter may use the electricity in excess of that required for self-sufficiency…"

"In the agreements quoted held between CFE and applicants, the fee corresponding to the contribution of electricity must be agreed upon. …"

Proposal of Definition of a Political Party's Public Service

"The body of activities organized and addressed to ensure the satisfaction of present and future electricity needs of the Mexican society, in a sufficient, continuous, uniform, and regular way, without damaging the environment and taking rational advantage of energy resources, fostering access of all inhabitants in the country to electricity with high quality standards, without favoritism or discrimination, at the lowest cost in the short, medium and long terms."

Implications of the Definition of Public Service

- **If the activities do not ensure present and future electricity needs of the Mexican society, then WOULD IT NOT BE A PUBLIC SERVICE?**
- **Neither would it be if the service was not continuous and regularly provided.**
- **Neither if it affects the environment.**
- **Neither if resources are not rationally exploited.**
- **Neither would it be a Public Service if "it does not foster access of all inhabitants in the country to electricity with high quality standards, without favoritism or discrimination, and at the lowest cost in the short, medium, and long terms.**

By Law, when Public Service is provided, it is automatically done with the attributes and advantages noted in the law!

Trends
at the End of the 20th Century and
Beginning of the 21st Century

Past

- ?**Intensive use**
- ?**Fragmentation**
- ?**Local vision**
- ?**Environmental neglect**
- ?**Statism**

- ?**R&D**
  - **Increased efficiency and improved control and reliability (HVDC, FACTS, SMES, BES, WAMS, HTSC, WPG, etc.)**
- ?**Globalization**
  - **Integrated energy markets**
  - **International energy organizations**
- ?**Fuel diversification**
- ?**Decentralization**
  - **(Energy generation, distribution, storage)**
- ?**Clean technologies**
- ?**Social and economic imperatives**

REGULATORY FRAMEWORK

Future

- ?**More rational use**
- ?**More cohesion**
- ?**International Law**
- ?**Laws on emissions**
- ?**Competitive open markets**
- ?**Consumer Selection**

"In 10 years, the European Electricity Industry we know will no longer exists.

An inevitable wave of changes, driven by the need to cut prices and triggered by technological innovation, is already in motion, transforming the industry and electricity companies."

Ten Lessons for the Changing European Electricity Landscape
Gill Rider

The Electricity Journal, p. 13, April 1999

Although the way of organizing and doing things may have had positive effects in the past, the world is changing in such a way that such structure may be inhibiting its own development.

The Intelligence Advantage
Organizing for Complexity
Michael D. Mc Master
Butter Worth Heinemann, 1996

Chiron's Dilemma

"How to make an organization change or reinvent itself while everything seems to be going well."
A company that does not face death does not see the need to reinvent itself.
A company that faces death realizes the need to reinvent itself, but it is too late because in that moment it does not have the resources to do what it had to do.

Lois Gertner,
Director General,
IBM

The Innovator's Dilemma
Christansen Clayton M.
Harvard Business School Press
Boston, Massachussets, 1967

Mexican Reaction before the New Paradigm

"We are in favor of progress as long as we make it without changes."

Excelsior, Sunday 19th May 2002 (Comments by Democratic Representative Bob Filner)

“Disaster, Privatizing the Electricity Sector”

- **In the United States, privatizing the Electricity Sector was a disaster. Only in California the Electricity cartel made the local government lose 50 billion dollars.**
- **...while in Mexico they are talking about going private, the US is considering a return to the previous situation, i.e. when the State controlled the Electricity Industry.**
- **He also pointed out that private electricity companies in his country will resort to blackmail, manipulation of information, and increasing rates up to 200% in this item.**
- **Filner stated that in California, the local government still has a 20bn dollar deficit due to the privatization of electricity.**

Confusion of Terms

Deregulation.- **To eliminate regulations.**

Re-regulation.- **To change regulations from one form to another (to deregulate and then regulate again with different parameters.)**

Liberalization.- **The act of eliminating restrictions to competition. (Some authors also refer to this as <u>Deregulation</u>.)**

Privatization.- **Selling national industry capital by the government to private investors. Private participation in activities reserved exclusively for the State. (Liberalization) even though no assets are sold.**

The Electricity Industry as a Regulated Industry

- The electricity industry is evidently an industry that must be regulated.
- Since its nationalization, the electricity industry became a de facto authority, and self regulated.
- With the opening of the electricity industry to private capital, arises the need of new regulations adequate to the new industry´s structure.

Alternatives Before the Power of the Market

- Measures to introduce competition (if possible).
- Price regulation.

  Sometimes regulation and competition are in conflict, e.g. price regulation may inhibit new competitors from entering.

Regulating Monopolies by Cost of Service

"Sensible and Reasonable" Expenses

		Cost of	
Income from	**Income**		**(Net Asset)**
Tariffs	**= Requirement**	**= O&M + Depreciation +**	**Rate of Return + Tax**

In Mexico

- 9% rate of return
- Investment budget approved by Finance Ministry
- Law on Public Service of Electric Energy
- Law on Public Works and Rendering of Related Services
- Law on Federal Income
- Organic Law on Federal Public Administration
- Federal Law on Public-Sector Entities
- Law on Acquisitions, Leasing, and Services by the Public Sector

International Experience Shows that in Electricity Reforms the Following Three Major Concepts Must Be Considered (Truisms)

- The competitive market produces lower prices only when there is competition.
- Investors will take all economic rents that regulation allows them to.
- If electric energy is wanted, it is necessary to have Electricity Stations and the indispensable inputs for its production.

Competitive Markets Produce the Best Prices when Competition Is Effective

- When there is no competition, as in a vertically integrated monopoly or in a market with dominant participants, there are functional inefficiencies that yield economic rents.
- Regulation must have tools to intervene when there is no effective competition.

Investors Will Take All Economic Rents that Regulation Allows Them To

Regulation must prevent:

- Manipulation of prices (gouging)
- Exercising Market Power (Market Power Mitigation)
- Degradation of service quality and reliability
- Collusion of participants

To Have Electric Energy, Requires Necessary Infrastructure and Inputs

- Supervise that the necessary investments are being performed.
- Monitor the availability of primary energy, and its infrastructure.
- Tools that allow governmental intervention (Indicative Planning).

California’s Experience

California's Experience

- Please refer to page 28 in the Spanish version of this presentation.

California’s Experience

- Please refer to page 29 in the Spanish version of this presentation.

Mexican Electricity Reform

- Adapting to legal framework
- Structure of the industry
- Market rules
- Regulatory surveillance

Markets: Standard Design

- **Energy Market**
  - **Day in advance**
  - **Real time**
- **Reserve Margin**
  - **Regulation**
  - **Operational reserve**
- **Capacity Reserve**
  - **Installed capacity**
  - **Available capacity**
  - **Obligation to serve**
- **Market Monitoring**
- **Managing Network Congestion**

Change the Reliability Paradigm in Electric Energy Service?

- **Since the 1960's, reliability in the Electricity energy service was established as an obligation.**
- **From the point of view of generation, building up reliability of the electric service is related to the capacity margin (In Mexico, 27% according to CFE studies).**
- **One day of scarcity in ten years (2.5 hrs a year) was the common index set as a goal or LOLP = .1 (This index has no economic justification).**
- **Problems arise when the same level of reliability is sought in one market.**

Possible Organization of the Mexican Electricity Sector with Public and Private Participation

Challenge: Regulating Energy in Mexico

Users

Regulation

Public Enterprises

Private Enterprises

Harmonize interests among public sector, private investors, and users so that necessary investment is provided for the sound economic development of the country.

Investors Require CONFIDENCE to Invest

(Investors do not invest if they cannot tell what the rules of the game are and do not perceive that those rules are fair and will be respected.)

Regulatory Decisions: Transparency

Under the proposed scheme, decisions taken are required to be absolutely transparent and honest so investors feel confident.

- **Transparency means that the whole regulatory process is accessible and understandable to all participants, sellers, buyers, users, and service providers.**

(1) Critical aspects of transparency in Regulation.

- **Regulator integrity.**
- **Honesty and logical reasoning behind each decision.**
- **Comprehensive study of facts and arguments before taking decisions.**
- **Taking decisions openly.**
- **Clear and verifiable rules.**
- **Financial transparency.**

(1)Transparency in Regulated Industries
Ashley C. Brown
Harvard Electric Policy Group
20 May 1996

Conclusions

- Privatization is not necessary to modernize the Mexican Electricity Industry.
- A clear Legal and Regulatory Framework is required for private investment to flow without governmental guarantees.
- The success of regulatory reforms depends on industrial structure, and government regulation and supervision.

Mexico City May 30, 2002

US Federal Antitrust Agencies and Market Power in Electric Power Markets

Mark W. Frankena

Disclaimer

Dr. Frankena is Economic Assistant to the Director of the Federal Trade Commission's Bureau of Competition, Washington, DC. Dr. Frankena's comments reflect his views and do not necessarily reflect the views of the Federal Trade Commission or individual Commissioners.

Introduction to Market Power

Ability of one or more sellers profitably to raise price above the competitive level by reducing supply to the market.

- Reduce the company’s own supply to the market
- Reduce supply to the market by rivals
  - Raise rivals’ costs
  - Exclude potential rivals from the market

Market Power Issues in Electric Power ~ 1

Entity Responsible	Unilateral Exercise of Existing Market Power
Fed Energy Reg Comm	Wholesale power, transmission
RTOs & Market Monitors	Wholesale power, transmission
State Utility Commissions	Retail electricity, distribution
Dept of Justice & FTC	Not in general
State Attorneys General	Not in general

Market Power Issues in Electric Power ~ 2

Entity Responsible	**Monopolization & Anti-Competitive Agreements**
Fed Energy Reg Comm	Wholesale power, transmission
RTOs & Market Monitors	Refer to antitrust agencies
State Utility Commissions	Retail electricity, distribution
DOJ & FTC	All
State Attorneys General	All

Market Power Issues in Electric Power ~ 3

Entity Responsible	Competitive Effects of Mergers
Fed Energy Reg Comm	Most electric mergers
RTOs & Market Monitors	None
State Utility Commissions	Most electric mergers
DOJ & FTC	All electric mergers
State Attorneys General	All electric mergers

Relationships between Federal Antitrust Agencies and FERC ~ 1

- Separate statutes
- Different types of investigations
- Different analytical methods

Relationships between Federal Antitrust Agencies and FERC ~ 2

- Potentially different conclusions on market power
- Different perspectives on remedies for market power
- Regulators can reject mergers but antitrust agencies must challenge them

Federal-State Relationships

- State utility commissions and state attorneys general may participate in FERC proceedings, just as other parties may.

- State attorneys general and federal antitrust agencies may share information from merging parties and cooperate on other aspects of investigations.

Merger Review by Antitrust Agencies

- Issue: Whether a merger is likely to reduce competition and lead to higher prices

Electric-Electric Mergers May Reduce Competition ~ 1

- **Generation Market Power**
  - Effects of increased concentration in ownership and control of generating capacity
  - Hourly energy markets are evaluated using traditional ***Merger Guidelines*** methods and computer simulation models

Electric-Electric Mergers May Reduce Competition ~ 2

- **Strategic Generation**
  - Combination of one company’s generating capacity in a market with the other company’s control over strategic generators that can be operated to congest the transmission system that is used by rivals to reach the market

Electric-Electric Mergers May Reduce Competition ~ 3

- **Transmission Market Power**
  - Combination of one company's generating capacity in a market with the other company's control over the transmission system used to reach the market
  - Concern addressed by independent regional transmission organizations

Electric-Gas Mergers May Lead to Higher Wholesale Electric Power Prices

- **Raising Rivals' Costs**
  - Combination of one company's generation and the other company's control over pipelines used to deliver natural gas to competing generators

Electric-Gas Mergers May Lead to Higher Retail Electric Prices

- **Evasion of retail rate regulation**
  - Combination of an electric utility for which prices are regulated based on cost of service and a supplier of fuel used by the utility
- **Elimination of electric-gas competition**

Competition Advocacy by Antitrust Agencies in Regulatory Proceedings

- Eliminate unnecessary regulatory barriers to construction of additional generators
- Facilitate efficient demand-responses to higher prices
- Ensure efficient pricing, operation and expansion of the transmission grid

Further Information

- Binz and Frankena, *Assessing Market Power: The Next Step in Electric Restructuring*, download from http://www.cpi.org/marketpower.pdf
- Frankena, *Fusiones de Empresas de Servicios Eléctricos: Perspectiva Estadounidense del Poder Sobre el Mercado*, prepared for the Spanish National Electric Regulatory Commission, 1997.

Measurement and Mitigation of Market Power in Wholesale Electricity Markets

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Outline of Talk

- Definition of Market Power
- Determinants of Market Power Unique to Electricity Supply Industry
- Measuring Firm-Level market power
- Measuring Market-Level market power
- Application to California Electricity Market
- Methods for Market Power Mitigation
  - Local Market Power Mitigation
  - Guardrails for Competitive Market
  - Symmetric Treatment of Load and Generation

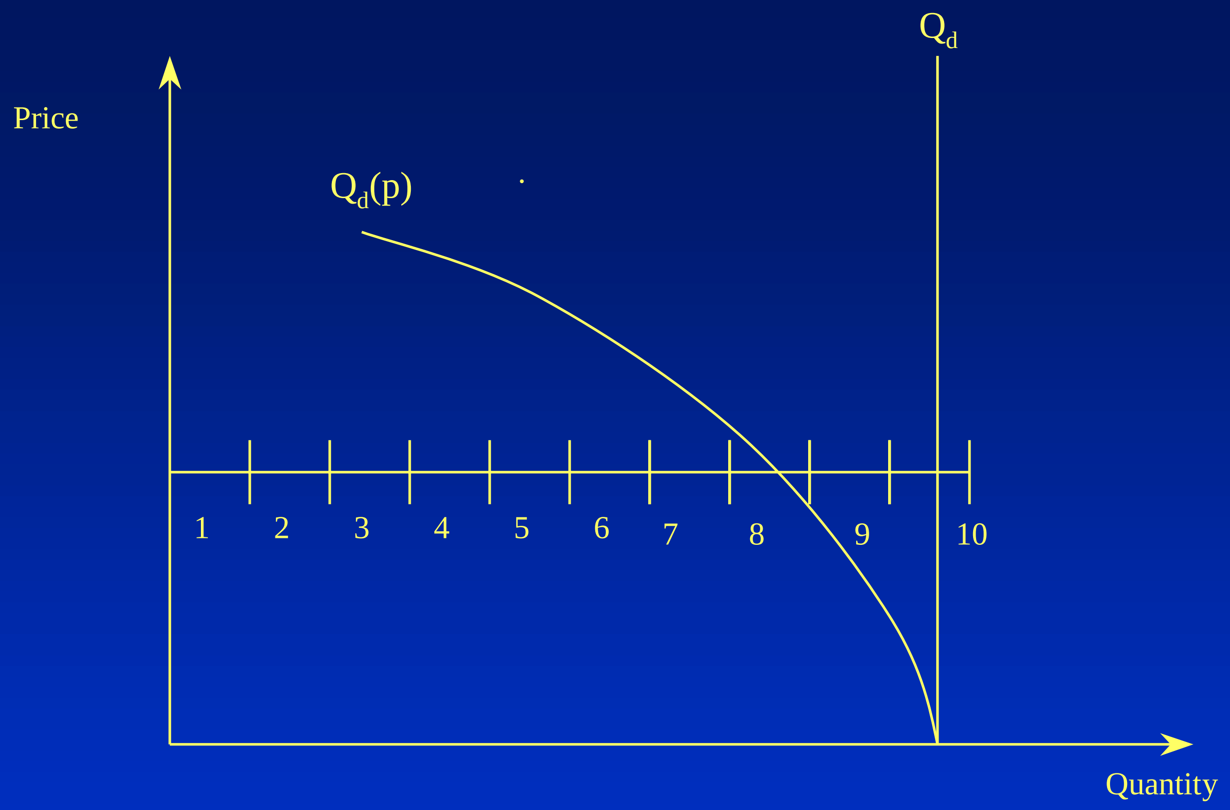
What is Market Power?

- Ability of a firm to increase the market price and profit from this price increase
- In all markets, privately-owned firms continually attempt to exercise market power
- Desire to attract and maintain shareholders provides a strong incentive to exploit profitable opportunities
- Competitiveness of market judged by how fast potential or actual competitors and/or consumers respond to foil these attempts

Structural Measures of Market Power

- Particularly for electricity, market power cannot be assessed based on market structure alone
  - Using concentration measures to assess market power exposes consumers to large potential harm
    - Ask California consumers
- Standard indices of concentration
  - Hirshman-Herfindahl Index (HHI) = $\sum_{i=1}^{n} s_i^2$
  - s_i = market share of firm i
- Large values imply significant market power
  - HHI denotes market-wide market power
  - Market share denotes firm-level market power

Market Power Problems without Price-Responsive Demand



10 Firms--Each own one MW, Market Demand is 9.5 MWh

Assume variable Costs = $0/MWh, Price Cap of $10,000/MWh

Market Equilibrium

- 9 firms all bid $0/MWh for one 1 MWh
- 1 firm bids $10,000/MWh for 1 MWh
- Equilibrium price is $10,000/MWh
- Each of 9 firms bidding $0/MWh has no incentive to unilaterally change its bid
  - Earns highest possible profit given capacity
- 1 firm bidding $10,000/MWh has no incentive to unilaterally change its bid
  - Cannot increase price
  - Decreasing price only reduces profit
  - Reductions in quantity can only reduce profit

Structural Measures of Market Power

- Concentration indices miss key aspects of electricity supply industry which enhance ability of firms to exercise market power
  - Level of hourly demand
  - Transmission congestion
  - Non-storability of product
    - Supply must equal demand at every instant in time at every location in network
- Implication--Firms can exercise enormous amounts of market power in electricity markets in very short time

Direct Measures of Market Power

- Unnecessary to rely on these extremely misleading indices of market power in a bid-based electricity market
- Directly measure market power using bids submitted, market prices and output
  - Firm-level
  - Market-level
- Other data required
  - Generation unit-level heat rates and capacity
  - Market prices for input fuels

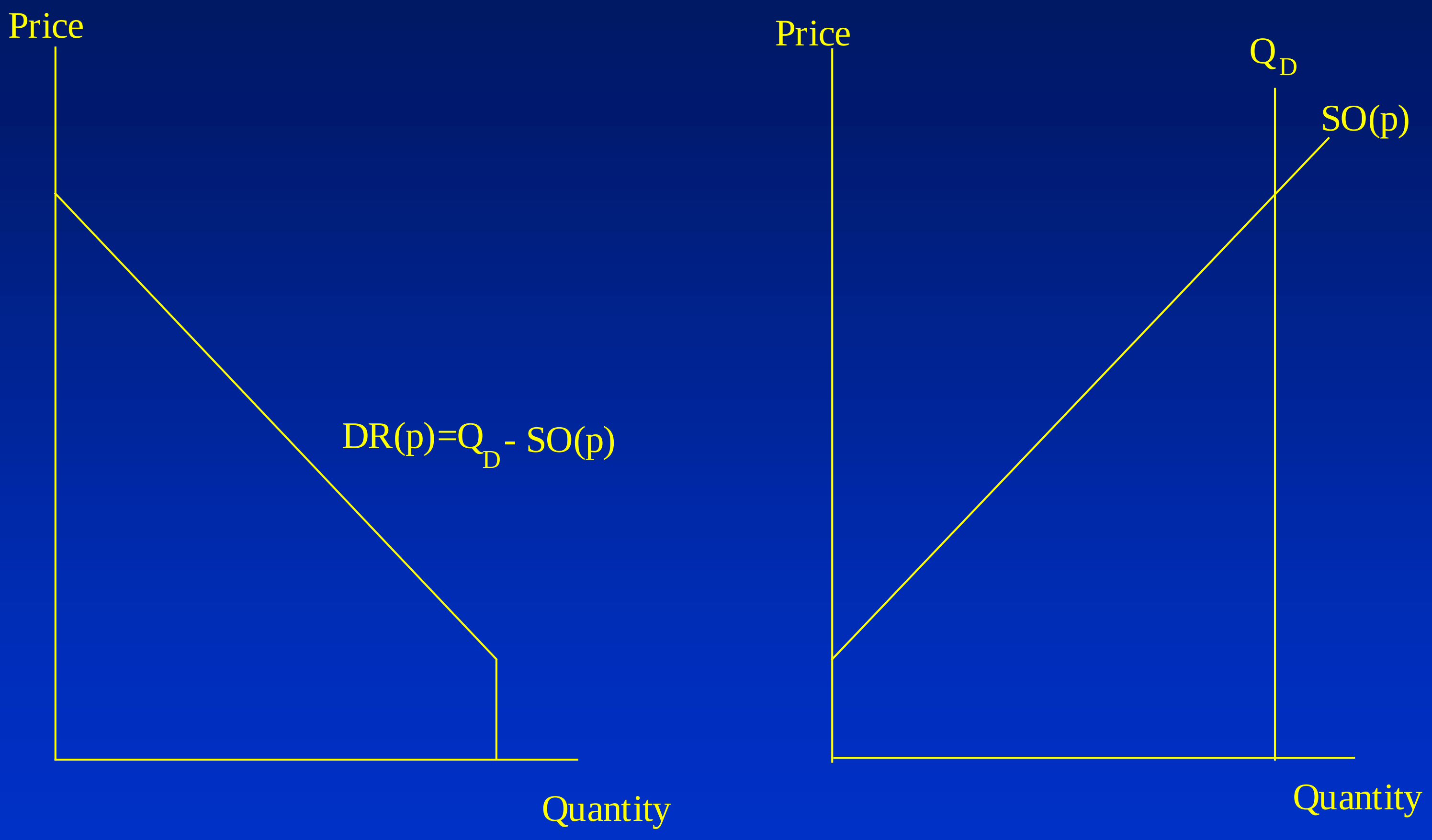
Direct Measures of Market Power

- Direct firm-level measures of market power
  - Pivotal bidder frequency
  - Price elasticity of residual demand
- Direct market-level measures
  - Market price minus competitive benchmark price
  - Total amount of payments in excess of payments under competitive benchmark pricing
- Describe how to compute both measures
  - Application of market-level measure to California electricity market

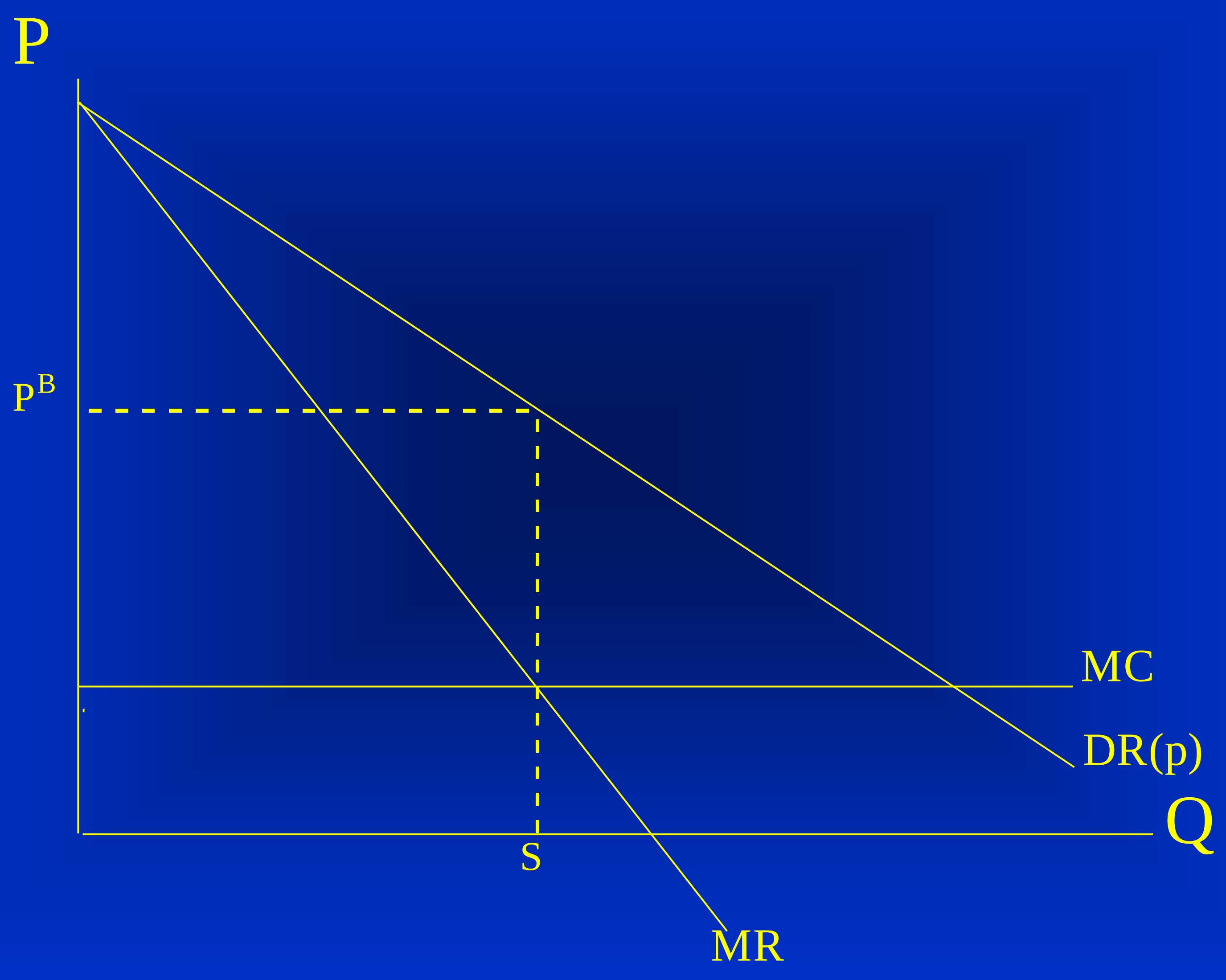
Bidding in Competitive Markets

- Optimal bidding in electricity market
- Q_{id}: Total market demand in load period i of day d
- $SO_{id}(p)$: Amount of capacity bid by all other firms besides Firm A into the market in load period i of day d as a function of market price p
- $DR_{id}(p) = Q_{id} - SO_{id}(p)$: Residual demand faced by Firm A in load period i of day d, specifying the demand faced by Firm A as a function of the market price p
- 👌$_{id}$(p): Variable profits to Firm A at price p, in load period i of day d
- MC: Marginal cost of producing a MWH by Firm A

Residual Demand Curve faced by Firm



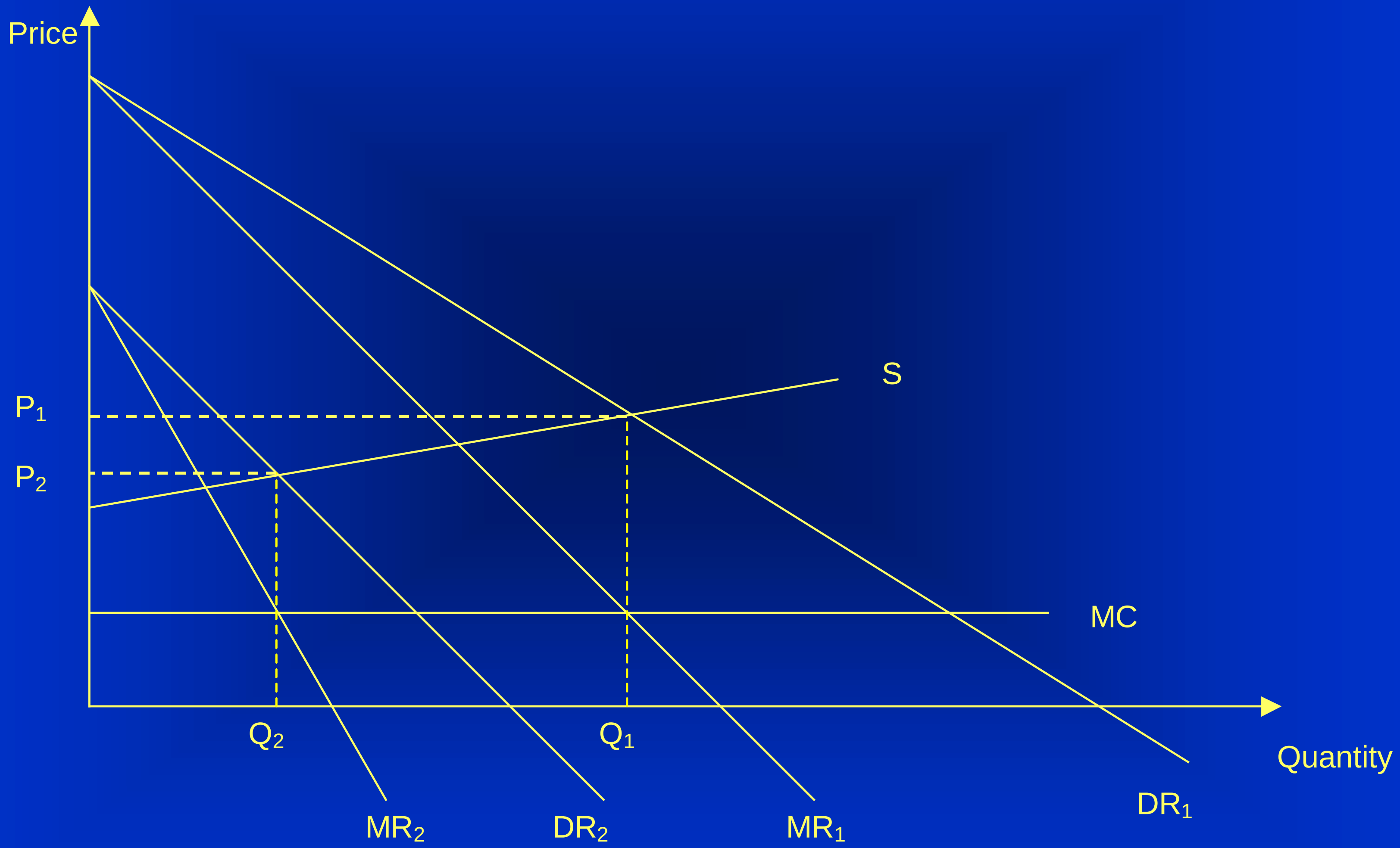
Bid to Maximize Profits Subject to Residual Demand



Profit-maximizing behavior implies an optimal bid price above marginal cost

- Residual Demand Curve unknown at time generator submits bids
  - Demand uncertainty
  - Uncertainty about actions of other suppliers
- Optimal bid curve depends on distribution of elasticities of residual demand function
- If firm faces a very elastic residual demand distribution, then its optimal bid curve is not economically different from marginal cost

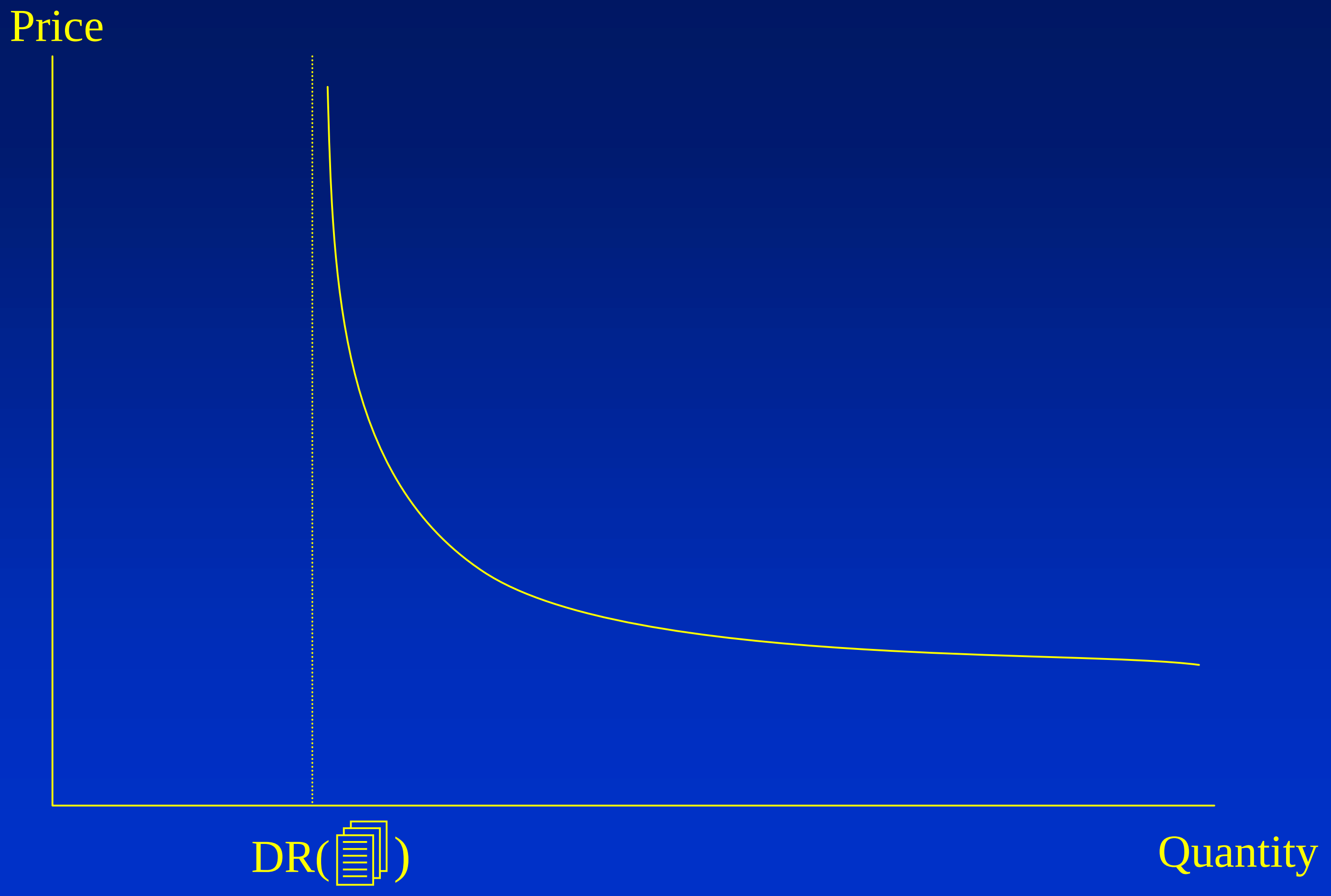
Bid to Maximize Expected Profits



Firm-Level Market Power

- Given bids submitted by competitors and aggregate demand can compute residual demand curve faced by each firm
  - Slope of residual demand at production level is firm's market power for that demand realization
  - Distribution of slopes of residual demand curves for given hour quantifies market power
- Given a marginal cost curve for firm can compute profit-maximizing price for this residual demand curve

Pivotal Firm’s Residual Demand

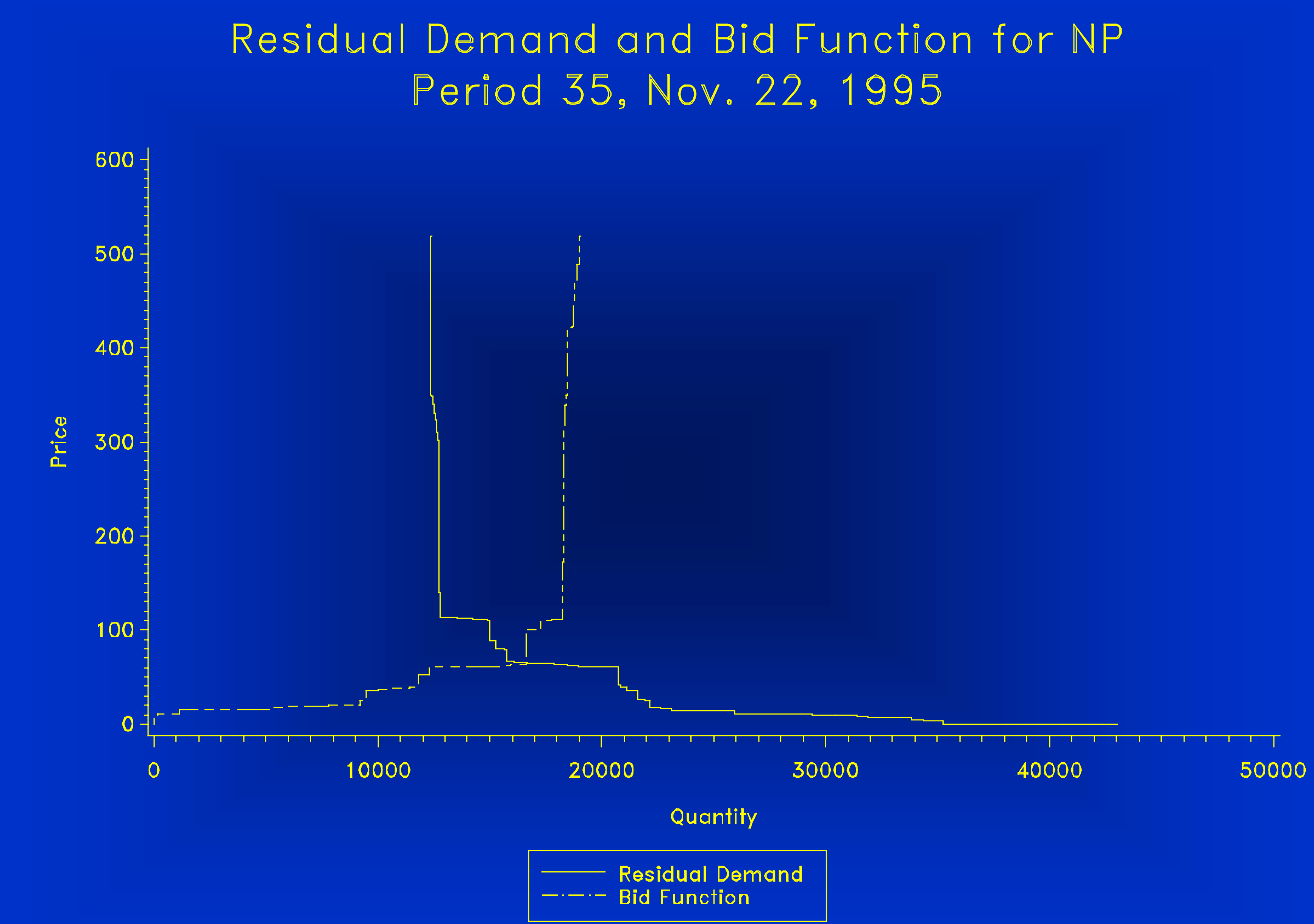


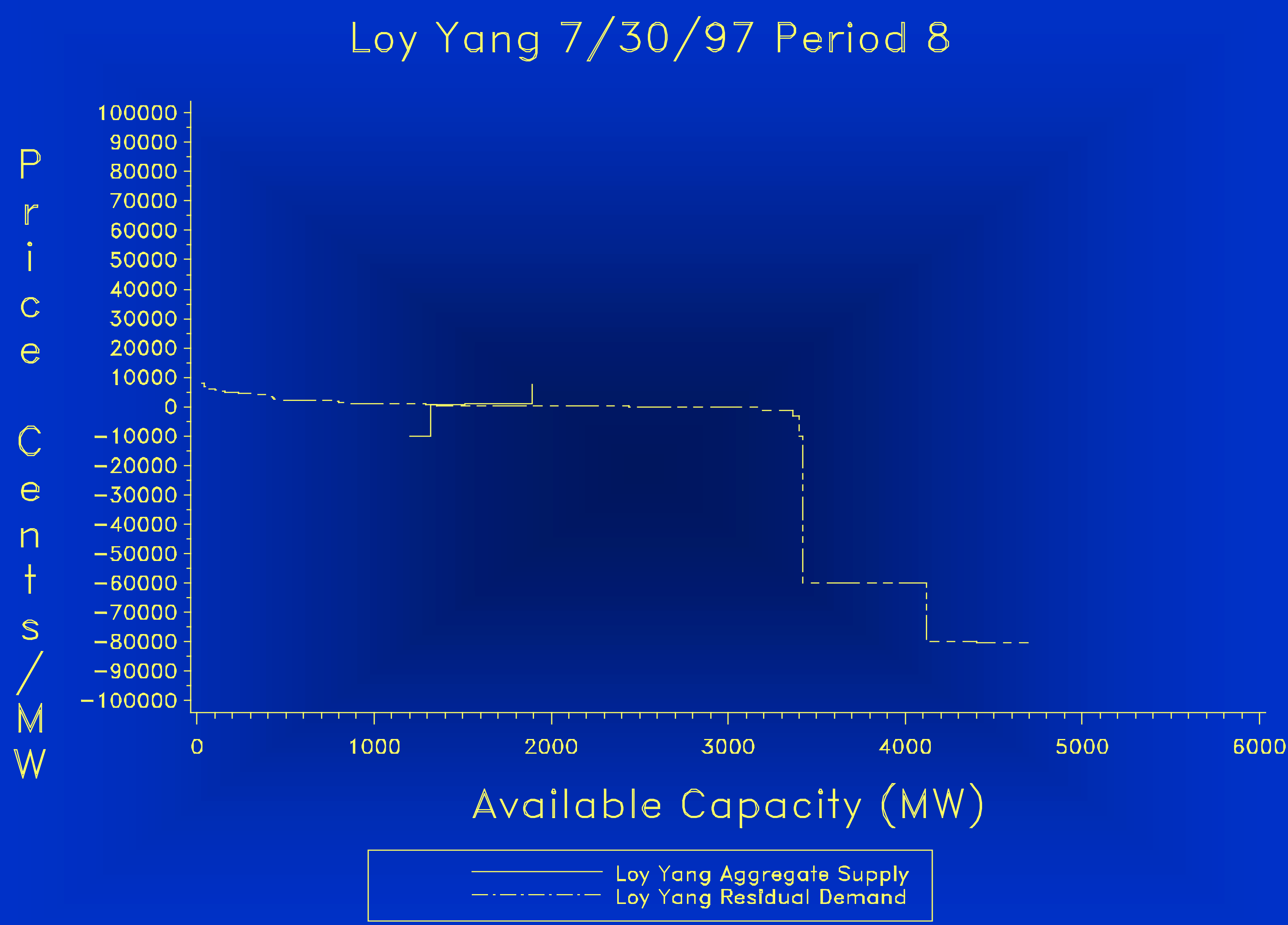
Pivotal Firm is Local Monopolist

- Slope of residual demand curve is infinite for pivotal quantity
  - Firm can name any price it would like for pivotal quantity of demand
  - Regulatory intervention needed to set price in these circumstances
- Frequency that firm is a pivotal bidder in a given market is a measure of its market power
  - Low frequency of being a pivotal bidder implies that firm possesses limited market power

Advantages of Pivotal Bidder Frequency

- Pivotal bidder frequency can be computed without actual bids, production or prices
- Use each firm's capacity and duration curve for aggregate demand
  - Compute pivotal bidder frequency assuming all firms besides firm under consideration bids all or a fraction of its capacity into the market
  - Can incorporate transmission path outage distribution with load duration curve in analysis
    - Crude model of impact of transmission constraints on extent of market power firm or generating unit possesses


Residual Demand and Bid Function for NP
Period 35, Nov. 22, 1995
Price
600
500
400
300
200
100
0
0
10000
20000
30000
40000
50000
Quantity
Residual Demand
Bid Function


Loy Yang 7/30/97 Period 8
Price Cents/MW
100000
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
−10000
−20000
−30000
−40000
−50000
−60000
−70000
−80000
−90000
−100000
0
1000
2000
3000
4000
5000
6000
Available Capacity (MW)
Loy Yang Aggregate Supply
Loy Yang Residual Demand

Competitive Benchmark Price

- If firm faces sufficiently elastic distribution of residual demand curves it will bid its marginal cost curve
- For all realizations of residual demand
  - Marginal Revenue = Average Revenue = Price
- Monopoly solution (produce where MR = MC)
  - Bid Price = MC for relevant range of output
- Optimal selling rule--supply a unit if the price is above the marginal cost of providing that unit.

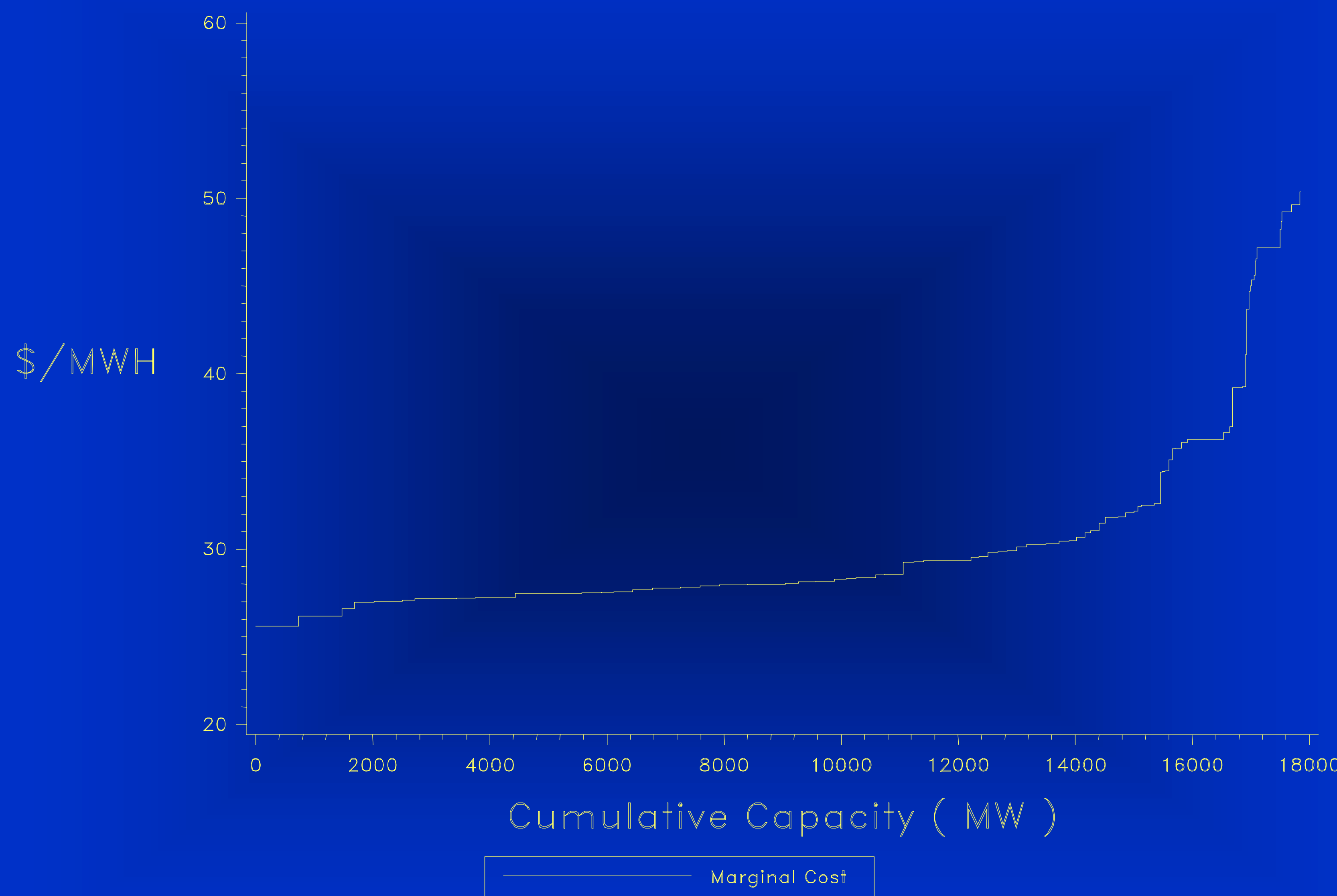
Competitive Benchmark Price

- Marginal cost curve must be properly calculated
  - Includes fuel, variable O&M
  - excludes fixed costs and sunk costs
- Marginal cost must reflect all opportunity costs
  - Forward contract price of input fuel is not opportunity cost of fuel, current spot price is
- Competitive market price should be
  - no lower than MC of most expensive unit operating
  - no higher than MC of least expensive unit not operating

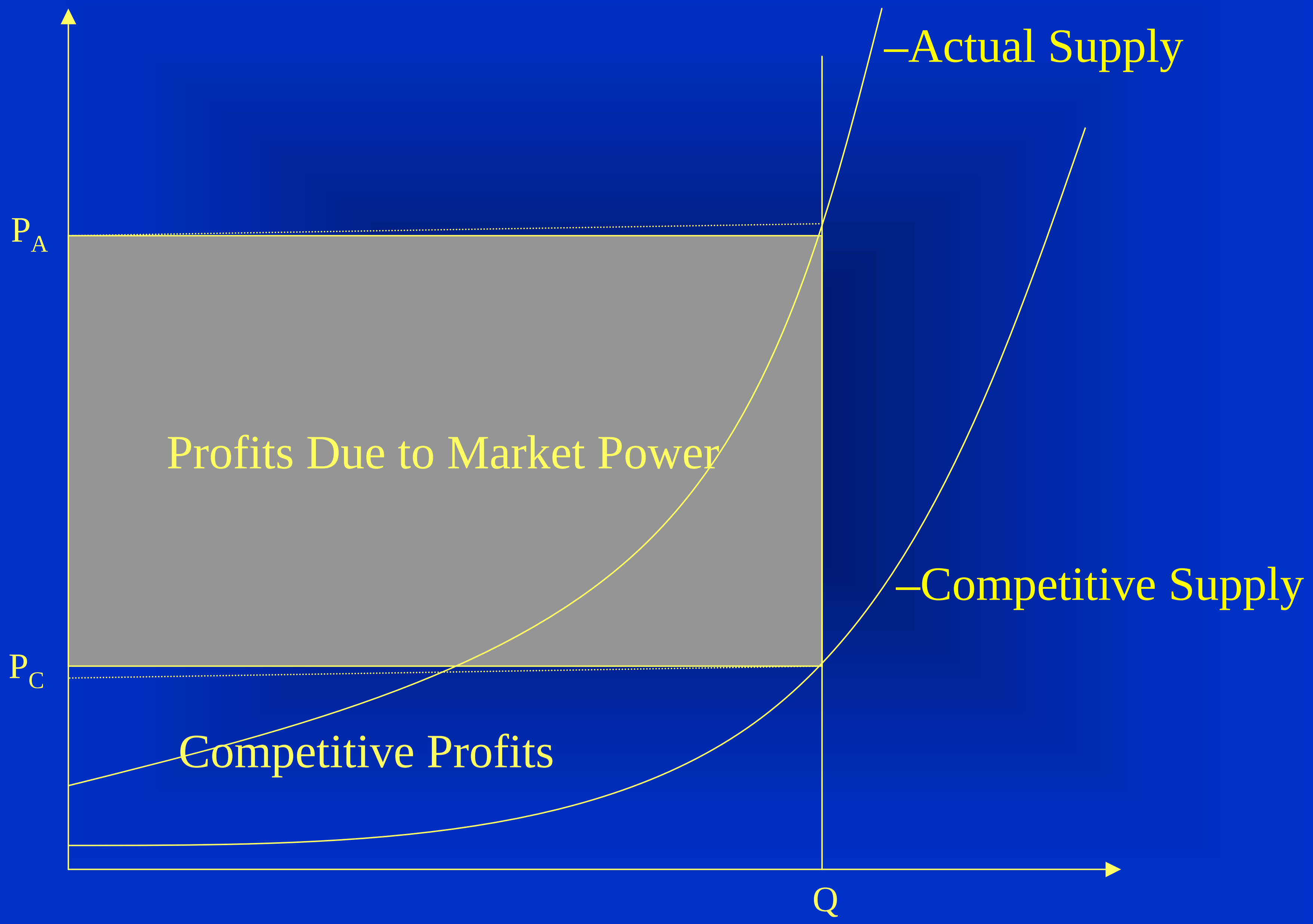
Measuring Industry-Level Market Power

- Measure extent of market power by comparing actual prices with the prices that would result if all firms were willing to sell each unit of output at a price at, or above, that unit's marginal cost.
- Intuitive view market power measure--Compare actual market price to market price that would result if all firms behaved as if they had no ability to raise market price (no market power)
  - Industry supply curve is aggregate marginal cost curve.

Figure 3 : Marginal Cost Curve of Instate Fossil Units



Competitive Profits versus Profits Due to Market Power



Supply Side Complications

- Account for forced outages by probabilistic simulation of forced outages at all plants.
  - Forced outage rates for each technology from NERC
  - For each realization from joint (over all plants) forced outage distribution, compute marginal cost of supplying market for that hour
  - Average these realized marginal costs over a large number of draws from the forced outage distribution to get the expected marginal cost for that hour
- Account for import supply response due to competitive bidding by instate units.

Supply Side Complications

- Account for daily fluctuations in prices of natural gas and other fossil fuels in California
- Extremely important to analysis for Autumn and Winter of 2000
  - Natural gas prices where more than four times higher than in two previous years
- Account for fluctuations in daily costs of NOx emissions permits to produce electricity for units in emissions-constrained areas
  - Primarily LA Basin--Could add more $50/MWh to variable cost of production for some units

Empirical Results

For various sets of days, D, and sets of hours ,H, compute

PCOMP(D,H) = Average competitive price

PACT(D,H) = Average actual price

MP(D,H) = PACT(D,H) - PCOMP(D,H)

$$PCOMP(D,H) = \sum_{d\in D}\sum_{h\in H} \mathrm{E}(c_{hd})(Q_{hd}^{ISO} - Q_{hd}^{MT}) / (\sum_{d\in D}\sum_{h\in H}(Q_{hd}^{ISO} - Q_{hd}^{MT}))$$

$$PACT(D,H) = \sum_{d\in D}\sum_{h\in H} P_{hd}(Q_{hd}^{ISO} - Q_{hd}^{MT}) / (\sum_{d\in D}\sum_{h\in H}(Q_{hd}^{ISO} - Q_{hd}^{MT}))$$

Energy, A/S Costs and Market Power Markup from 4/98 to 12/00

Month	Energy Cost $/MWh	A/S Costs $/MWh of Load	Total Costs per MWh	MP(S) $/MWh
Jun-98	13.52	2.95	16.47	-9.39
Jul-98	35.85	5.18	41.03	8.48
Aug-98	44.04	6.18	50.22	16.31
Sep-98	37.62	4.37	41.99	11.53
Oct-98	27.43	2.69	30.12	1.63
Nov-98	26.65	2.24	28.89	-0.62
Dec-98	30.17	2.99	33.16	4.88
Jan-99	21.73	1.75	23.48	-0.78
Feb-99	19.70	1.14	20.84	-1.65
Mar-99	19.40	1.51	20.91	-1.53
Apr-99	24.80	2.1	26.90	0.39
May-99	24.91	2.37	27.28	-0.46
Jun-99	25.85	2.26	28.11	-0.07
Jul-99	31.84	2.6	34.44	3.95
Aug-99	35.13	1.85	36.98	0.63
Sep-99	35.46	1.52	36.98	5.25
Oct-99	49.40	2.28	51.68	15.24
Nov-99	38.35	1.19	39.54	9.90
Dec-99	30.35	0.55	30.90	2.93
Jan-00	31.85	0.62	32.47	4.61
Feb-00	30.49	0.58	31.07	1.30
Mar-00	29.49	0.06	29.55	-1.92
Apr-00	27.76	0.95	28.71	-5.00
May-00	51.81	3.16	54.97	10.88
Jun-00	141.40	20.19	161.59	85.52
Jul-00	121.93	5.71	127.64	42.14
Aug-00	181.59	12.18	193.77	101.71
Sep-00	122.85	7.39	130.24	43.96
Oct-00	103.84	2.95	106.79	35.55
Nov-00	172.29	6.13	178.42	60.66
Dec-00	388.21	22.65	410.86	143.50

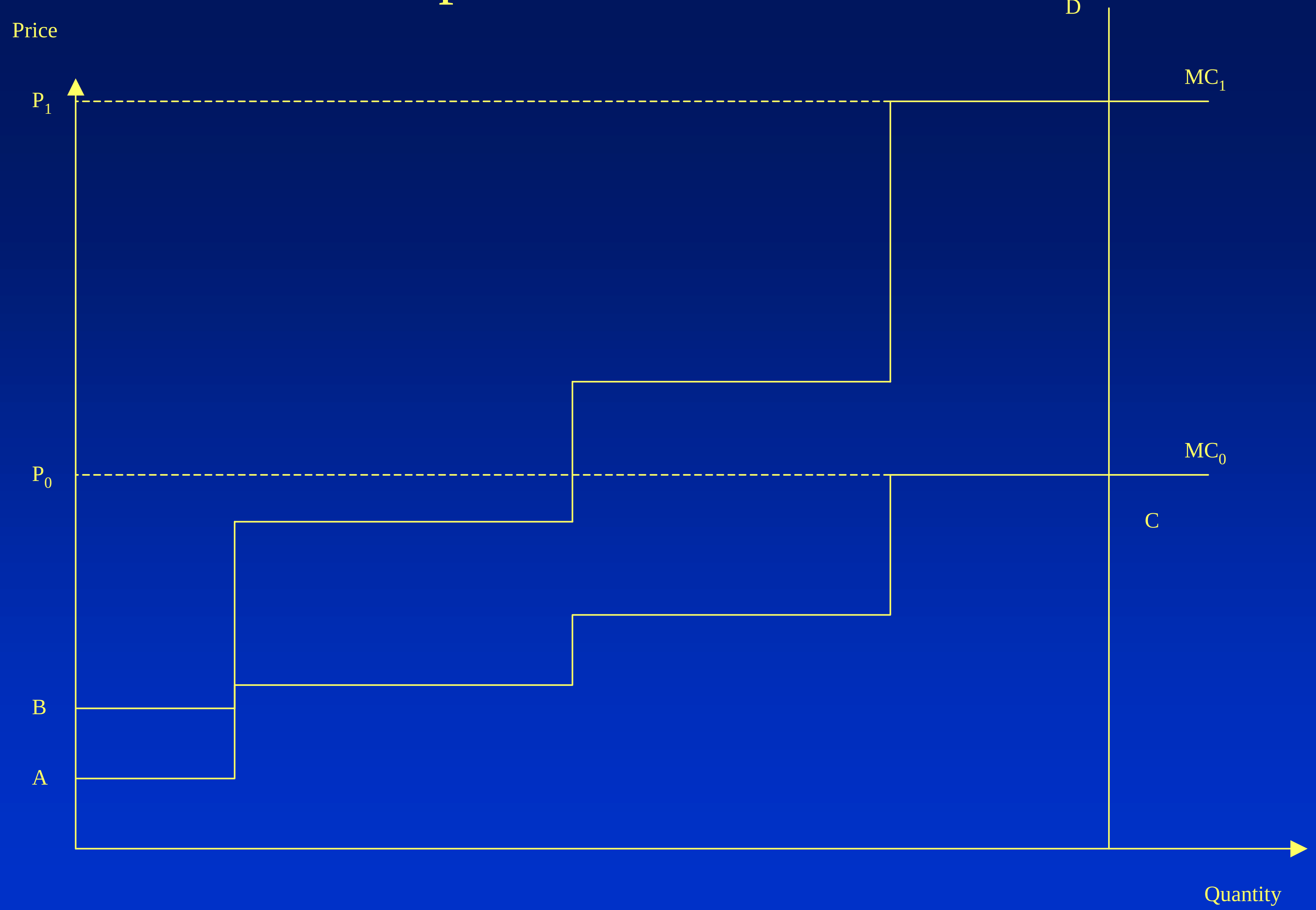
Implications of Results

- Results *do not* imply that any company is taking actions that violate the antitrust laws
- Imply large deviations from competitive behavior exist in this market particularly from summer of 2000 onwards
- Start-up costs can explain only a fraction of the pricing in excess of marginal cost
  - Very generous estimate of total annual start-up costs for all California units is $20 million
  - Total overpayment during 2000 is ~$7 billion

Distribution of Rents

- Because of huge run-up in price of natural gas during 2000
  - Competitive benchmark profits increased enormously
  - Unit-level heat rate times almost four times larger price of natural gas
    - Difference in steps of aggregate marginal cost curve 4 times greater
- Run-up in NOx emission prices also intensified steepness of aggregate marginal cost curve

The Impact of Input Fuel Price Increases on Competitive Market Profits



Distribution of Rents

- From 1999 to 2000 competitive rents
  - More than quadrupled because of gas price and NOx price increases
- Monopoly rents
  - Sum of (PACT - PCOMP)(Q(ISO) - Q(MT))
  - Increased 20 times between 1999 and 2000
- Generators in California were quoted as saying 1999 was a good year
  - What were they saying about 2000?

Measuring Industry-Level Market Power

- For more details
  - Market power measure calculation
  - Deadweight loss and other rent distribution calculations see
- Borenstein, Bushnell, and Wolak (2002) “Diagnosing Market Power in California’ Re-structured Electricity Market”
- Available from http://www.stanford.edu/~wolak

Local Market Power Problem

- Because of the way retail electricity is priced to final consumers hourly wholesale demand is virtually inelastic
  - During certain system conditions, a single firm may be only one able to meet a given locational energy need
  - This firm is monopolist facing completely inelastic demand with no limit to price it can bid for this locational energy
- No locational-pricing scheme can solve local monopoly problem
  - Under nodal-pricing scheme generator would receive at least its bid price for this amount of locational energy

Solution to Local Market Power Problem

- Congestion management or locational-pricing scheme does not solve locational market power problem
  - ISO must have the ability to mitigate bids of units that it determines possess local market power
- FERC gave Eastern ISO's ability to mitigate to cost the bids of any market participant the ISO perceives as having local market power
  - Local Market Power = Pivotal Bidder or close to it for local energy
  - CAISO applied 3 times to FERC for this right, but was denied.
- FERC required CAISO to pay generators with local market power as bid, rather than cap their bids
  - FERC required pivotal bidders to be paid as-bid in California
  - If required to pay generators with local market power as-bid, it is hard to control local and global market power.

Guardrails for Competitive Market

- Compare 12-month rolling average actual price to 12-month rolling average benchmark price
  - Take rolling average of hourly market prices over entire 12-month period and compare this to average hourly competitive benchmark price over same 12-month period
  - If difference in P(actual) and P(benchmark) exceeds some critical value then automatic regulatory intervention occurs to protect consumers
- Requires less hour-to-hour regulatory intervention by ISO
  - Can set high bid cap or price cap and therefore allow hourly price signals
- Consumers protected from excessive market power
    - Recommended level--$5/MWh difference between 12-month average P(actual) - P(benchmark)
    - This would have not triggered regulatory intervention until June of 2000 in California

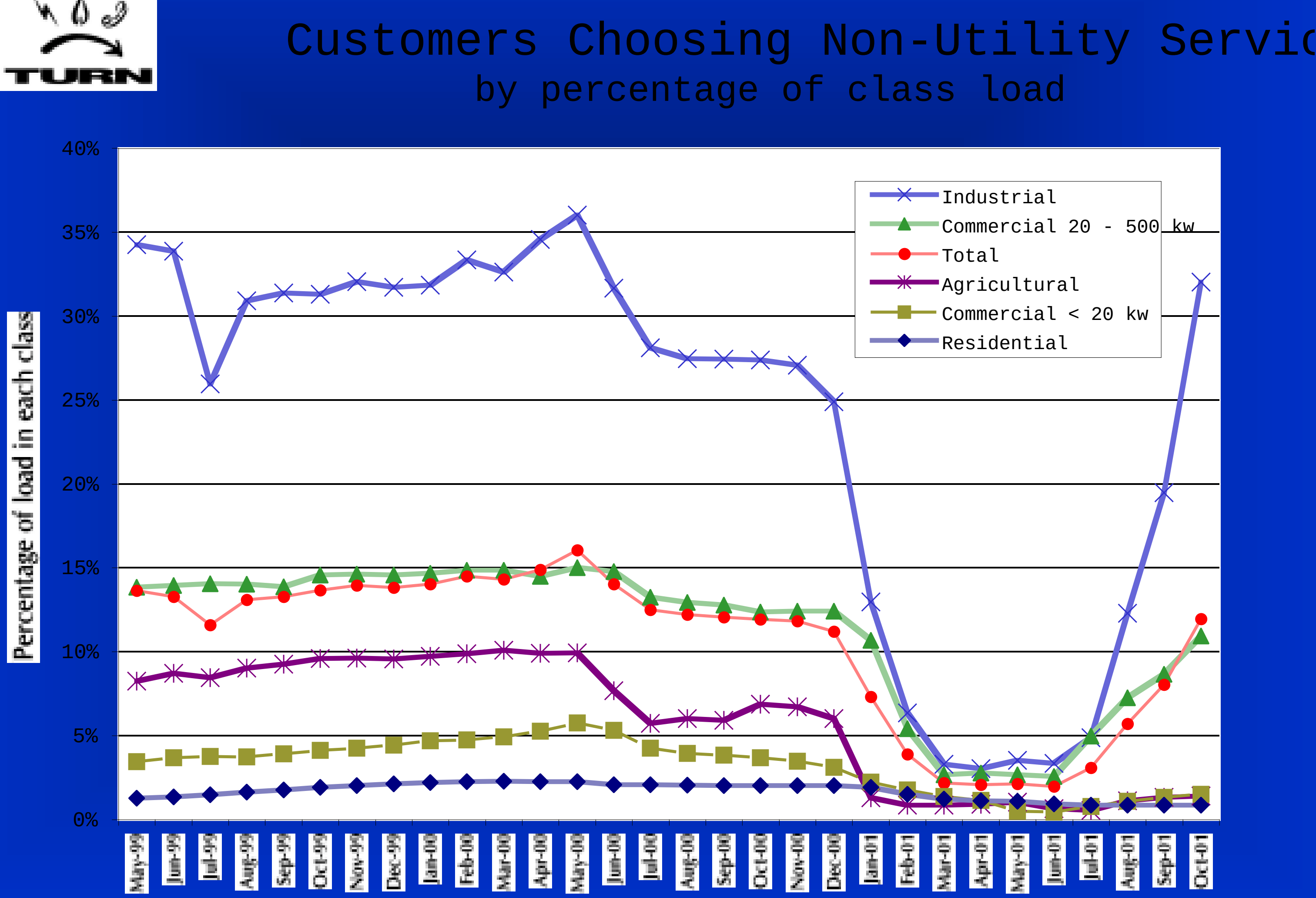
Guardrails for Competitive Market

- Recommended intervention if index is exceeded
  - All market participants must submit cost-based bids and be paid the resulting market-clearing price
  - Any unit earning insufficient revenues to cover total costs under this scheme must cost-justify its annual cost shortfall to regulator
  - Payment scheme must be sufficiently unattractive to generation unit owners so that they do all they can to avoid triggering its imposition
- This scheme creates a self-regulating market
  - Generators want to work to fix market rather continue to exercise unilateral market power
  - Prevents a California market meltdown yet still provides hourly price signals needed to
    - Simulate development of price-responsive demand
    - Provide incentives for load-serving entities to hedge spot price risk
  - Goal of setting this compensation scheme is to provide strong incentives for generators to avoid implementing it

Symmetric Treatment of Load and Generation

- Asymmetric treatment of load and generation
  - Default price loads pay for wholesale energy in virtually all US states is constant over time and space
    - At any time a load can switch to and from this default price
  - Default price generators receive in all of US markets is hourly wholesale spot price at their location
    - Generators must sign a hedge contract to receive pre-specified fixed price for its output
- Option for loads to buy at default price at any time can be extremely valuable to consumers
  - Creates a potentially enormous obligation for load-serving entities that can arise with high probability during certain system conditions
- Solution: Default price for all final consumers must be hourly wholesale price
  - Must sign hedge contract to buy at pre-specified fixed price

Consumers very sophisticated to the extent they are allowed



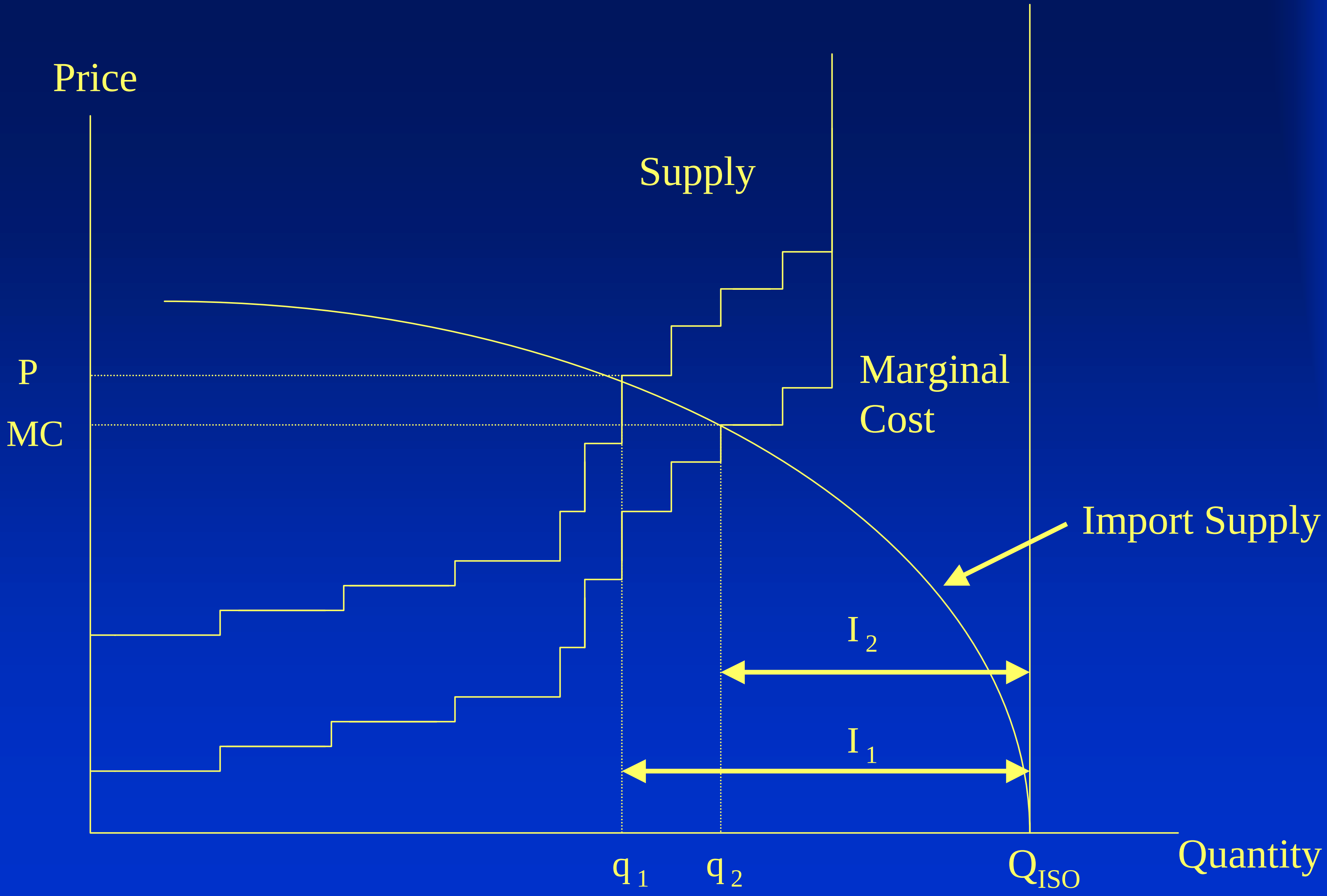
Symmetric Treatment of Load and Generation

- Question: Which retail pricing scheme is more likely to prevent the exercise of market power?
  - Retail price at each node equal to expected annual average hourly price at that node
  - Retail price each hour set equal to the average (spatial) average hourly at each node
- Answer: Hourly pricing of retail electricity far more important to preventing exercise of market power
- Best market power mitigation measure is symmetric treatment of all consumers and producers
  - Conclusion---Don't re-structure unless you are willing to treat consumers and producers symmetrically

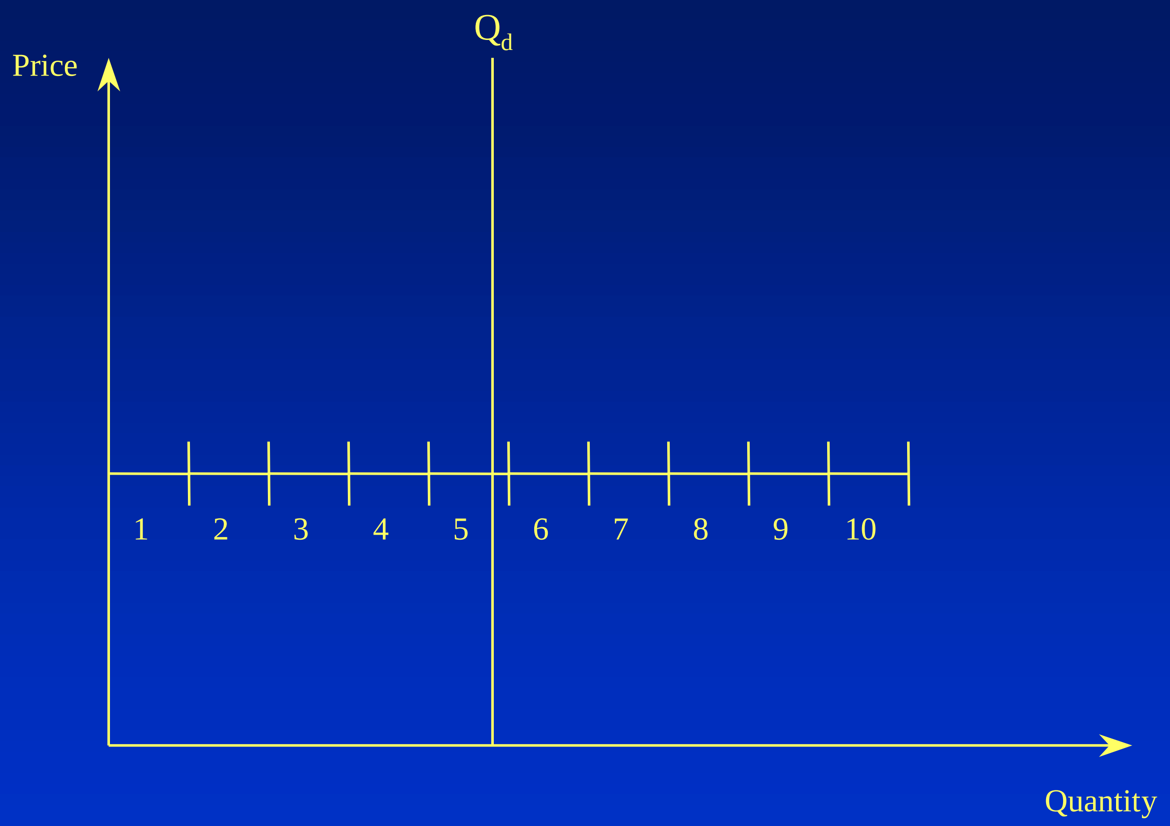
Import adjustment to lower prices for no market power scenario

- All generators and importers submit adjustment bids along with day-ahead energy schedules
  - Willingness to reduce and increase imports as a function of market price
  - Bids used to manage transmission congestion
- Use these bids to compute import supply curve at each tie point
  - Predicts import reduction in response to lower market-clearing prices

Import reduction due to marginal cost bidding



Significant Excess Capacity Can Solve These Problems



Reported Capacity Outages (1999 to 2001)

Average Megawatts of Capacity Off-line (Planned or Unplanned)			
Month	1999	2000	2001
January	3068	2423	9940
February	5096	3243	10895
March	5740	3389	13737
April	5739	3329	14911
May	3032	4012	13431
June	1216	2683	6758
July	963	2233	5044
August	878	2434	4229
September	1195	3621	5278
October	1761	7633	8805
November	2988	10343	12199
December	2569	8988	11112

Competition Issues in Electricity Markets with Hydroelectric Production

Mario Pereira
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Forum on Regulation and Competition in Electricity Markets

Mexico City, May 30-31, 2002

Outline

- The Brazilian system
- Hydro-related Issues
    1. Spot price volatility
    2. Hydro production variability
    3. Risk Management
    4. Price Bidding
- Conclusions

Brazilian system

Surface area: 8.5 million sq km

Amazon forest = 50%

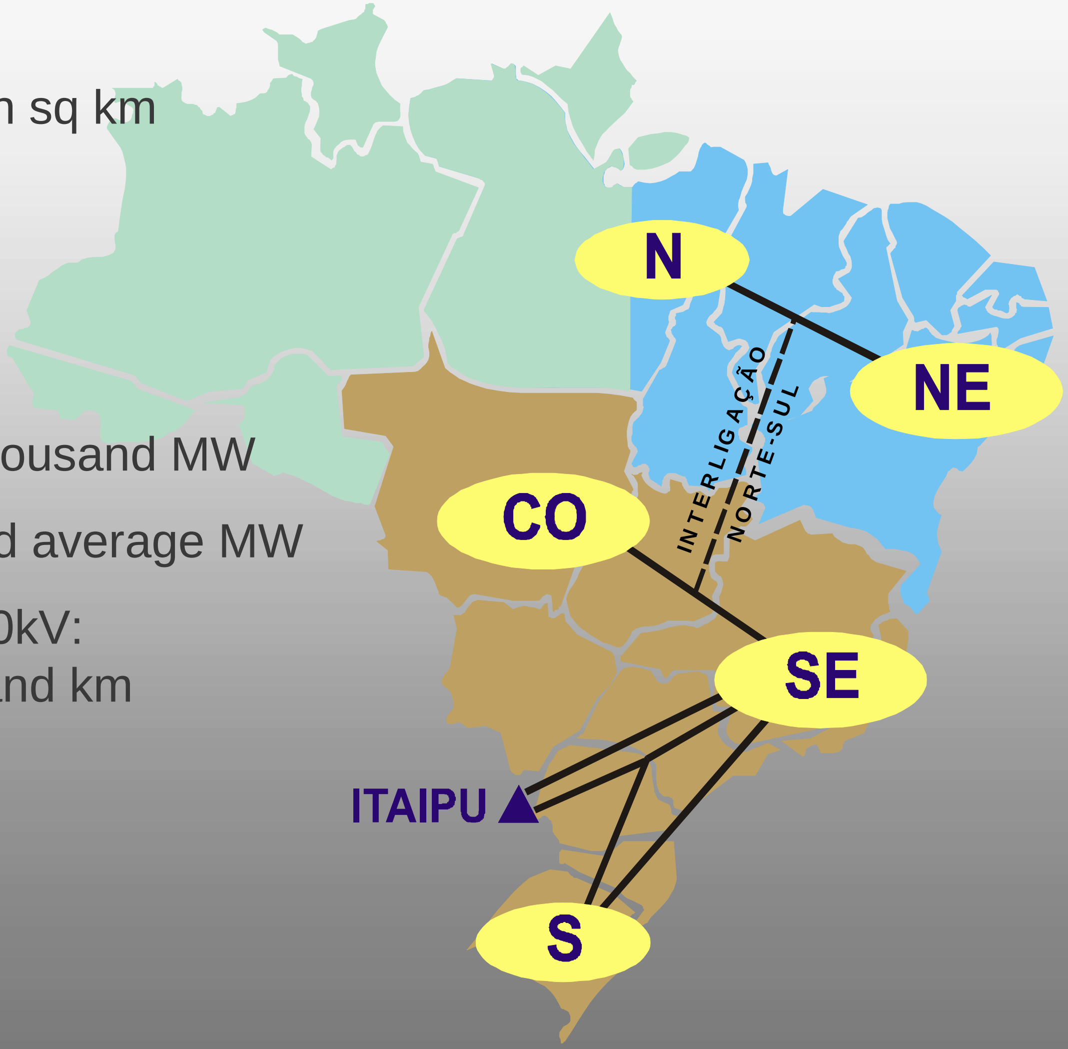
170 million inhabitants

GDP US$ 550 billion

Installed capacity: 74 thousand MW

Production: 41 thousand average MW

transmission lines > 230kV:
70 thousand km

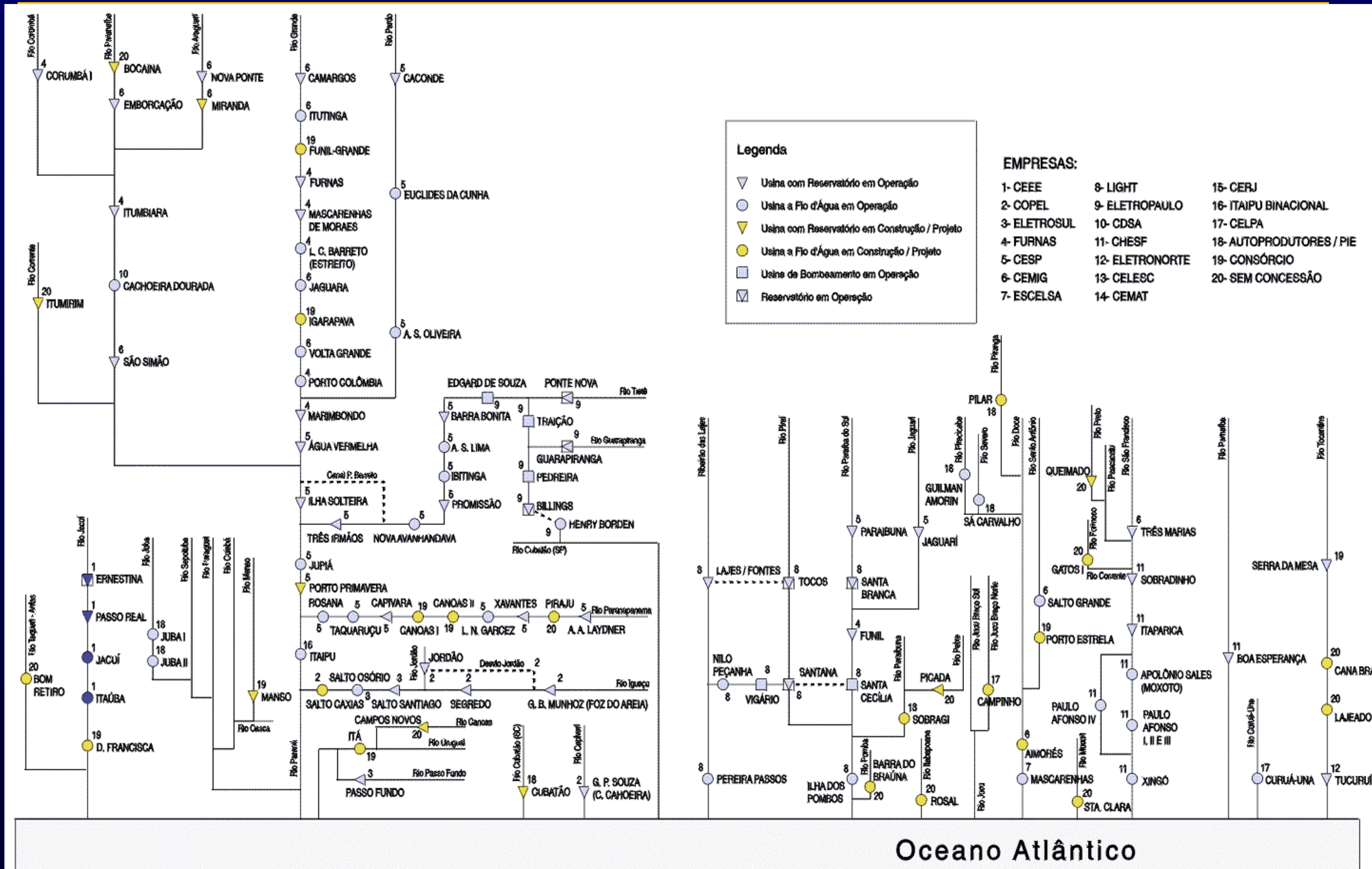


ONS - 1999 - 0131

System Characteristics

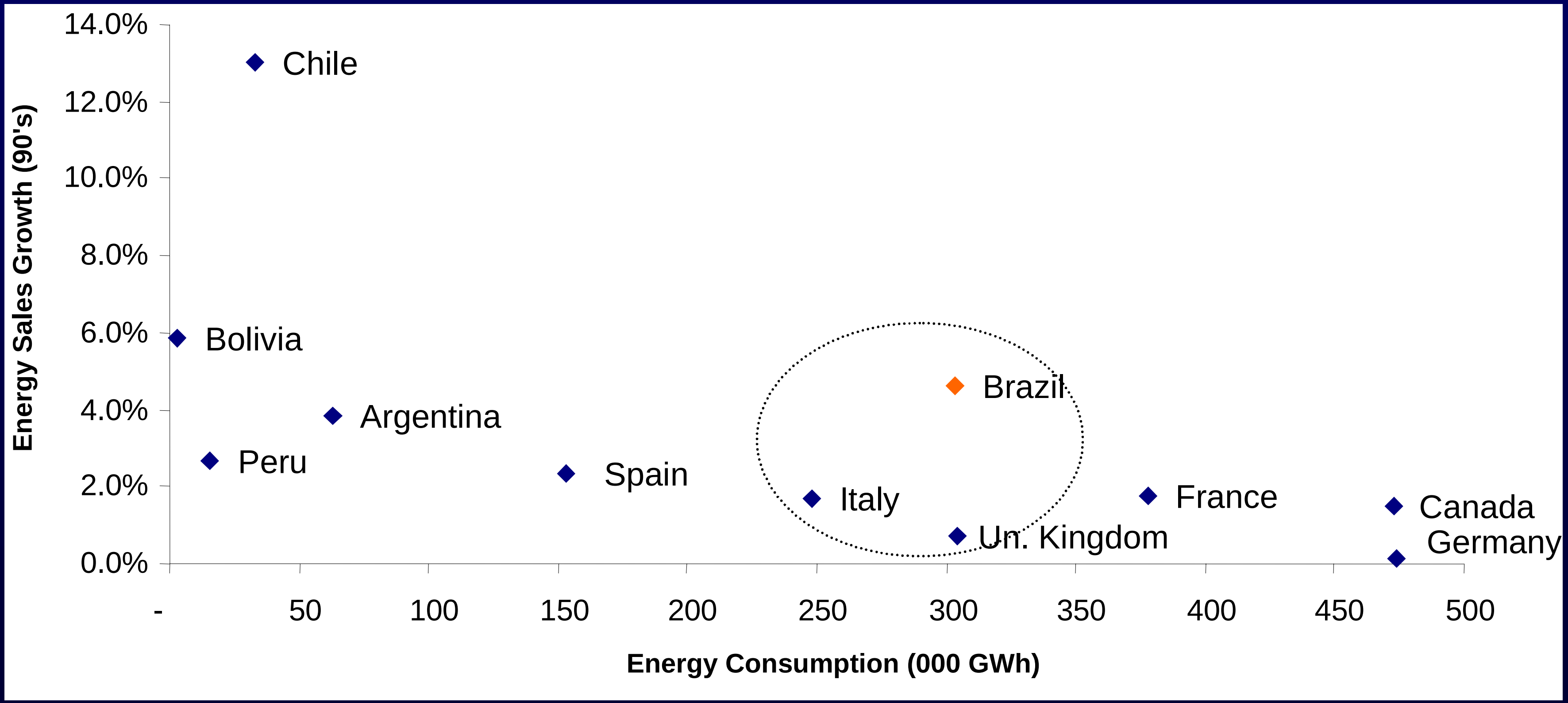
- 95% hydro
- large reservoirs and plants in cascade
- structural transmission constraints
- international interconnections
- natural gas as new source

Hydro Chains



The Brazilian Market

- Brazilian market comparable to UK and Italy, with higher load growth rate



Distribution

- 64 companies (34 private)
- Private share: 72%
- Average Tariff: 58 US$/MWh*
- Sales: 35 thousand average MW
- Annual Revenues: US$ 18 billion

Production Sector

- Installed Capacity: 74 thousand MW
- 11 companies
- Private share: 15%
- Average Tariff: 25 US$/MWh

Privatization and Regulation

Old Model

- State-Owned Companies
- Monopolies
- Vertical Integration
- Regulated Generation Tariffs
- Concessions without bids
- DNAEE, Eletrobrás

Regulation

Privatization

New Model

- Competition in Generation and Free Consumers
- Unbundling
- Competitive Generation Market
- Hydro Project Bidding
- MAE, ONS, ANEEL and MME

Main Topics of Regulatory Framework

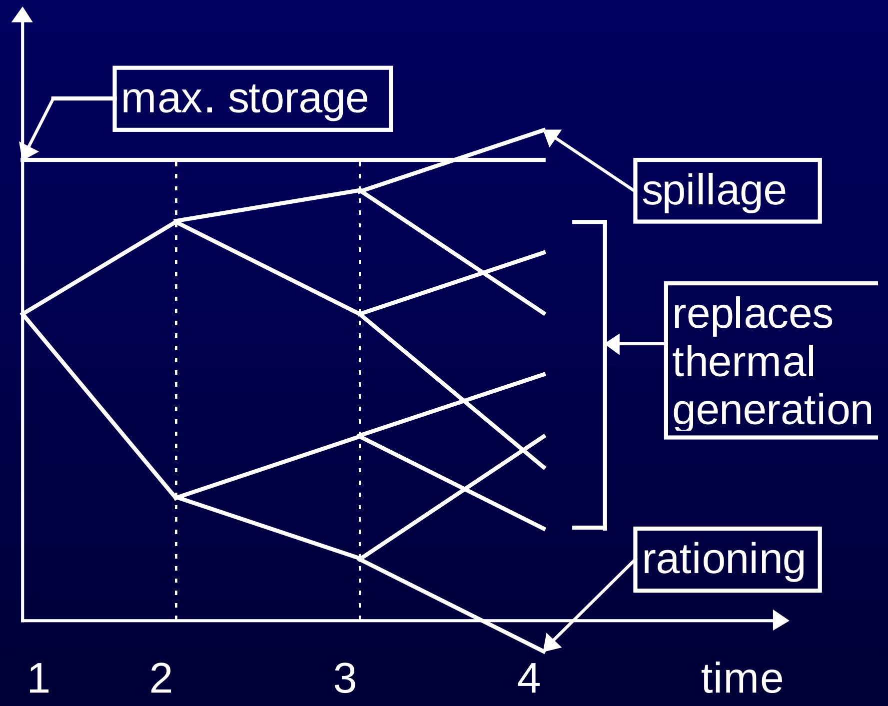
- Centralized Cost-based Dispatch
- Wholesale Energy Market
- Transmission Charges

System Dispatch

- A National System Operator controls the production of all hydro and thermal plants, with the objective of minimizing operating costs.
- A stochastic optimization model that takes into account inflow uncertainty is used for the dispatch decisions
- The short-run marginal cost reflects the expected opportunity cost of hydro production
- the SRMC is used as a proxy of the spot price

Stochastic Dispatch Model

- probabilistic simulation of system operation



- hydro plants have an indirect *opportunity* cost, associated to savings in displaced thermal generation now or in the future.

Wholesale Energy Market

- All generators and loads participate in the Wholesale Energy Market
- There are four regional sub-markets (zones)
- Each plant [load] receives [pays] an amount ($) given by the product of its generation [consumption] (MWh) by the spot price ($/MWh) in its sub-market

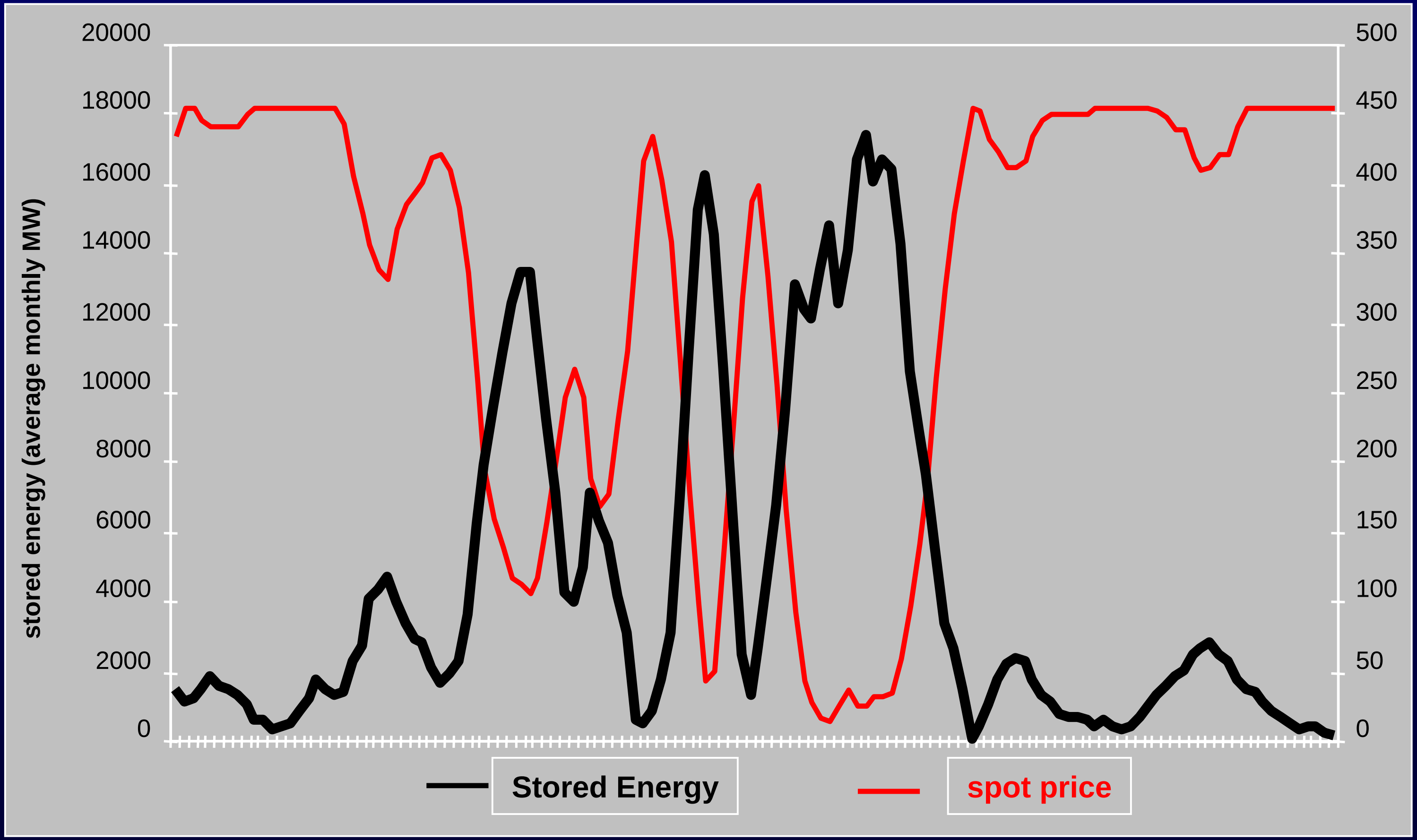
Transmission tariffs

- Generators and loads pay a fixed annual transmission tariff for the right to use the high voltage transmission network. This tariff depends on the location of each generator and load and compensates all transmission services.

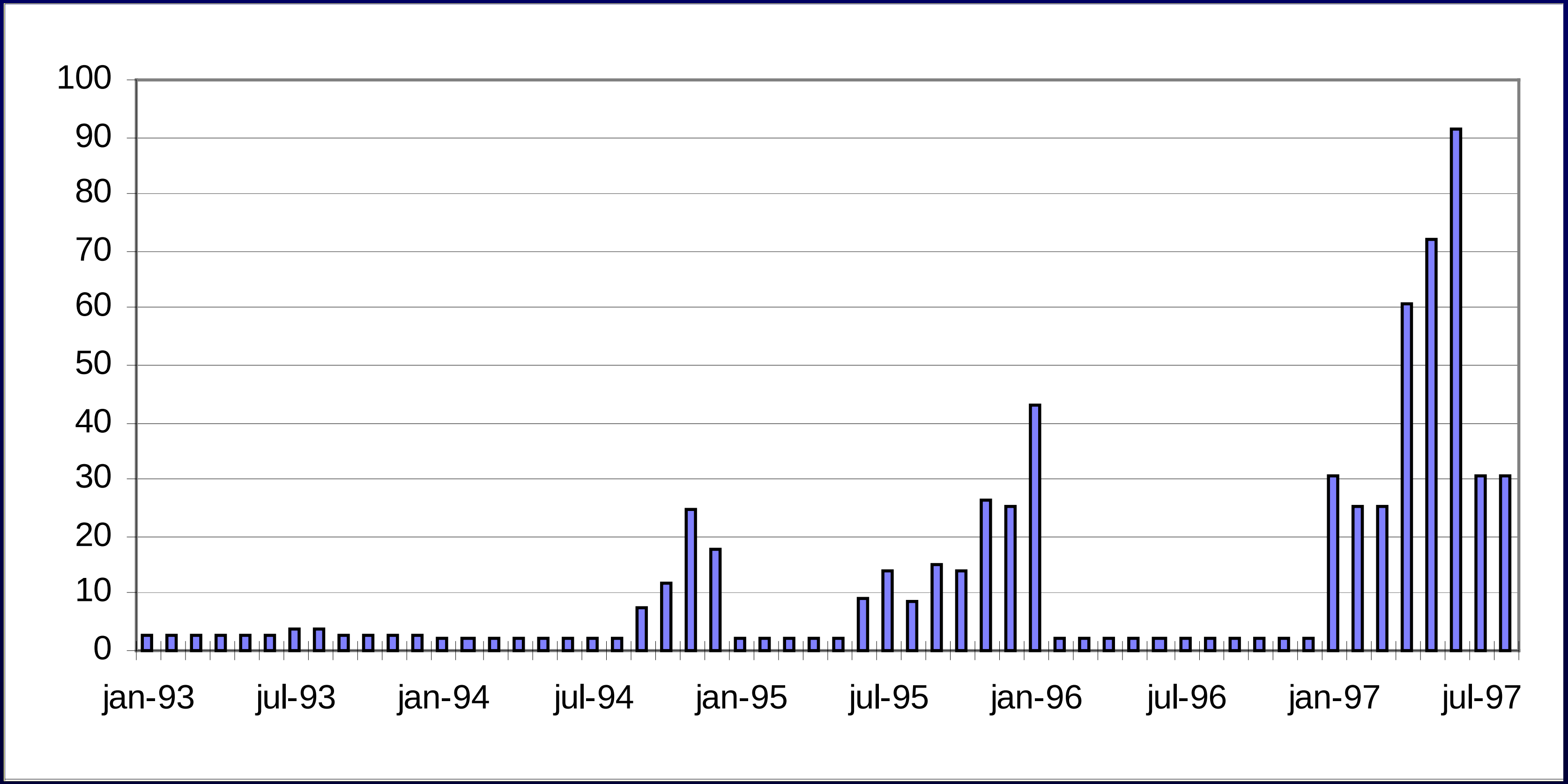
Issue 1: Spot Price Behavior

- Hydro-dominated systems are designed to ensure load supply even if very dry periods occur
- As a consequence, most of the time there are temporary energy “surpluses” $\Rightarrow$ low spot prices
- These prices can increase very sharply if the system becomes empty

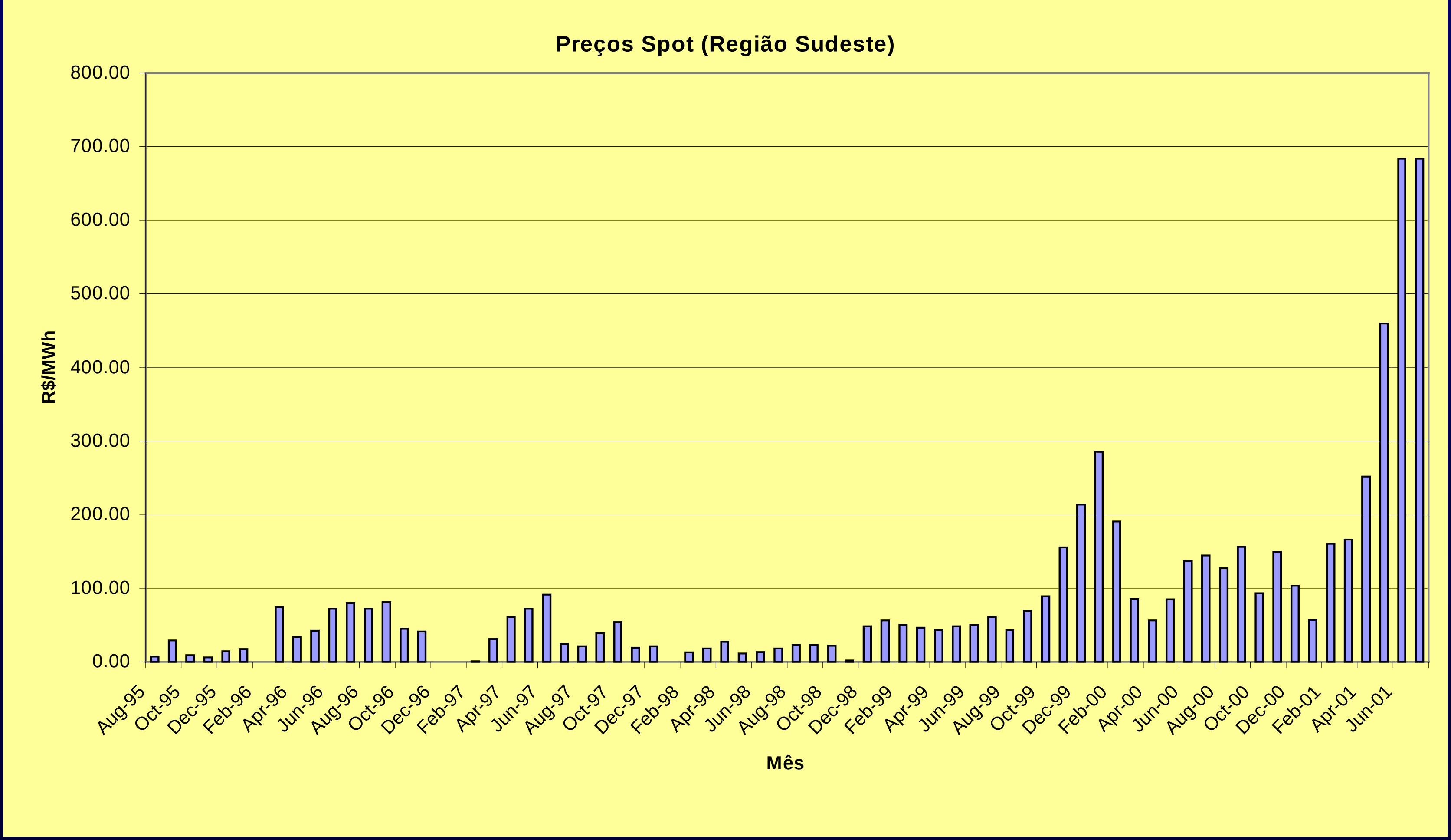
Spot Price vs Storage Level



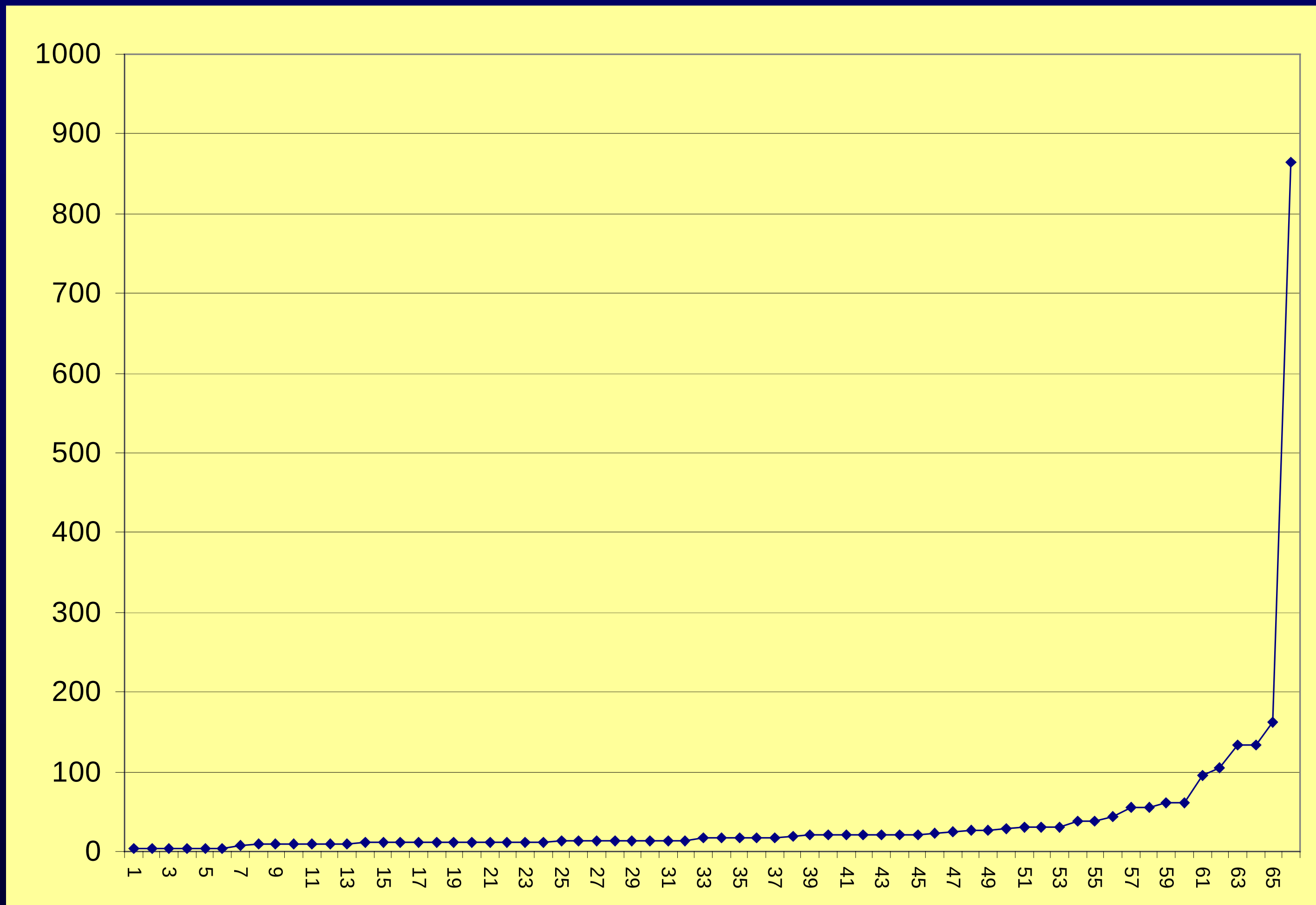
Historical Spot Prices (1 of 2)



Historical Spot Prices (2 of 2)



Spot Price Distribution

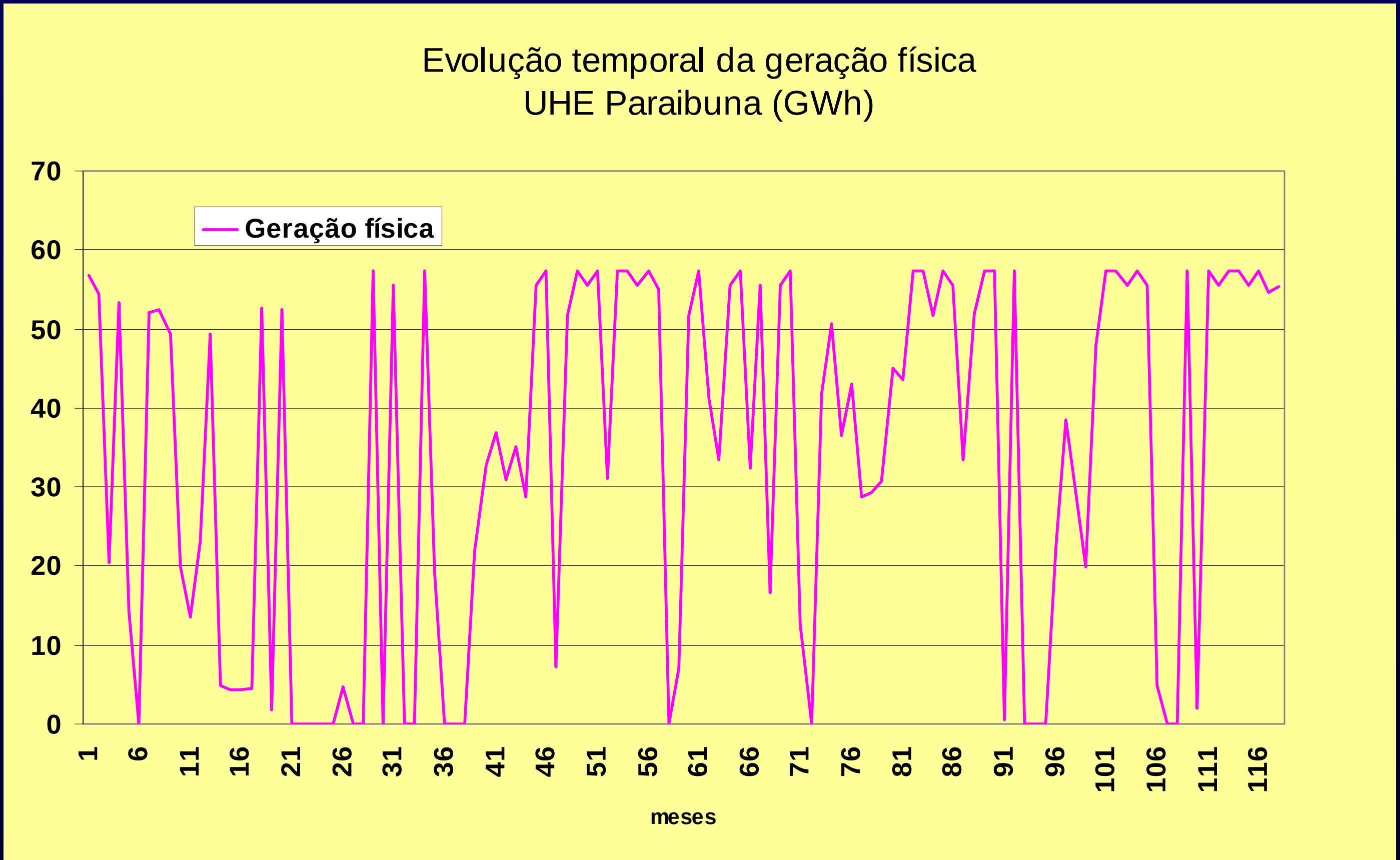


Consequences of Spot Price Volatility

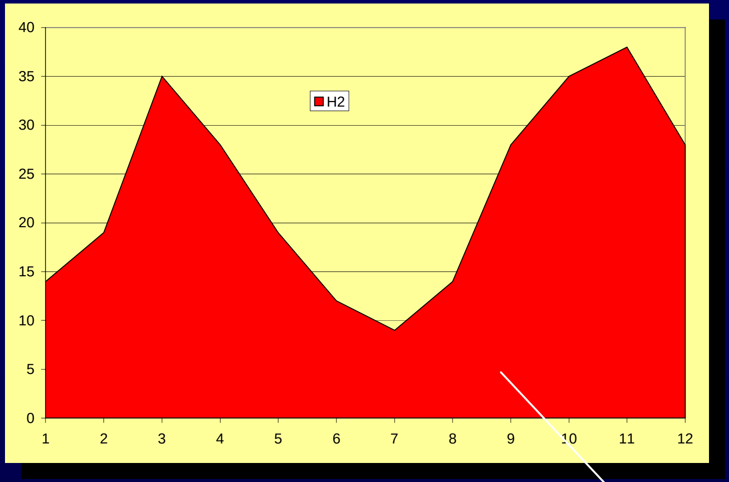
- it is difficult to identify structural signals of scarcity or excess capacity
- barrier to the entrance of merchant plants
- long-term bilateral contracts required
- load's willingness to contract drives system expansion

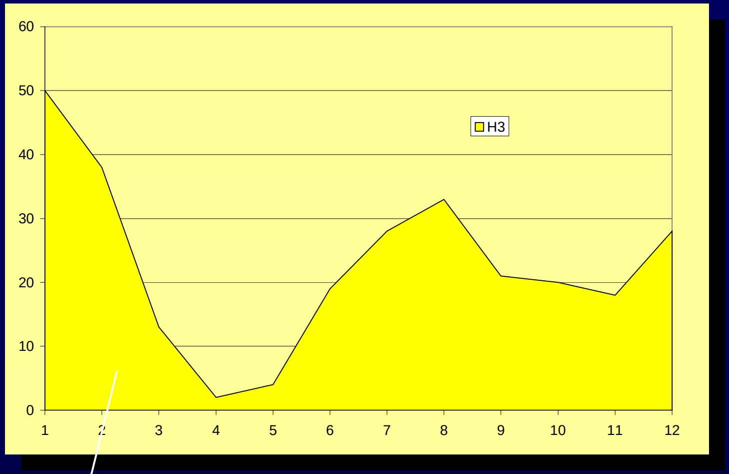
Issue 2: Variability of hydro production

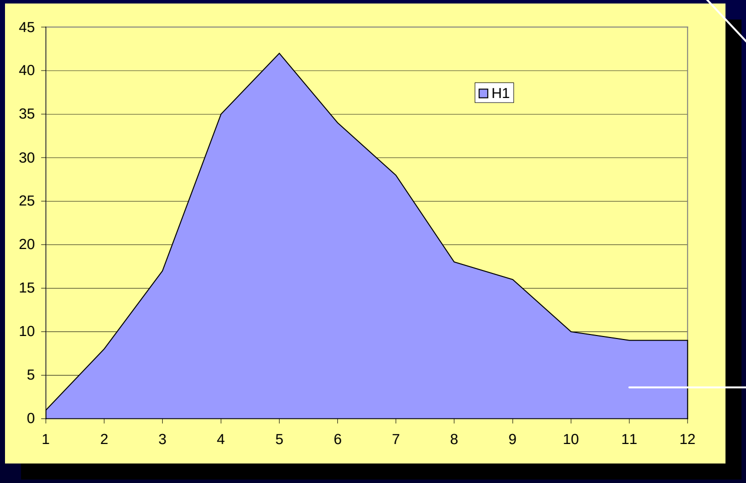
- Individual hydro production oscillates around contracted amounts, leading to frequent WEM sales/purchases. This affects cash flow and project finance.

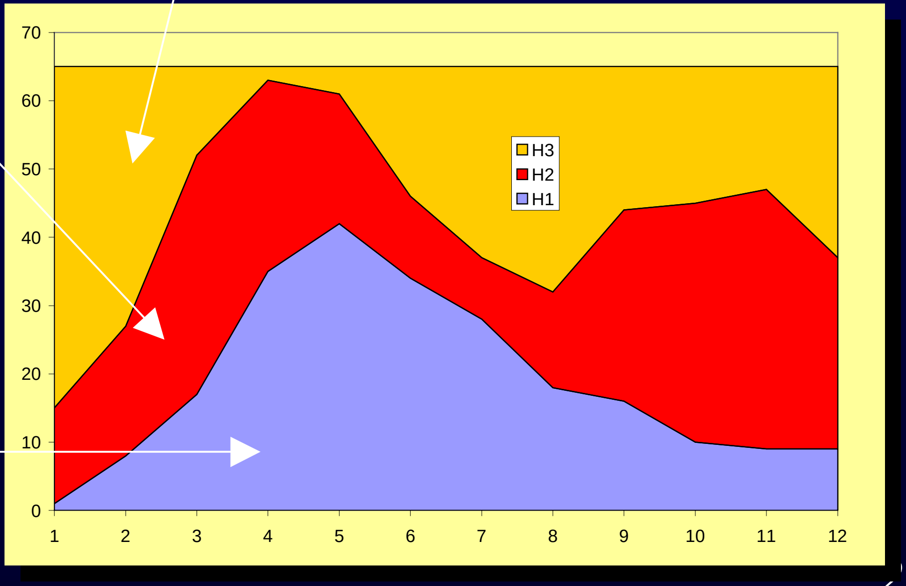


However, the *sum* of hydro productions is (nearly) constant







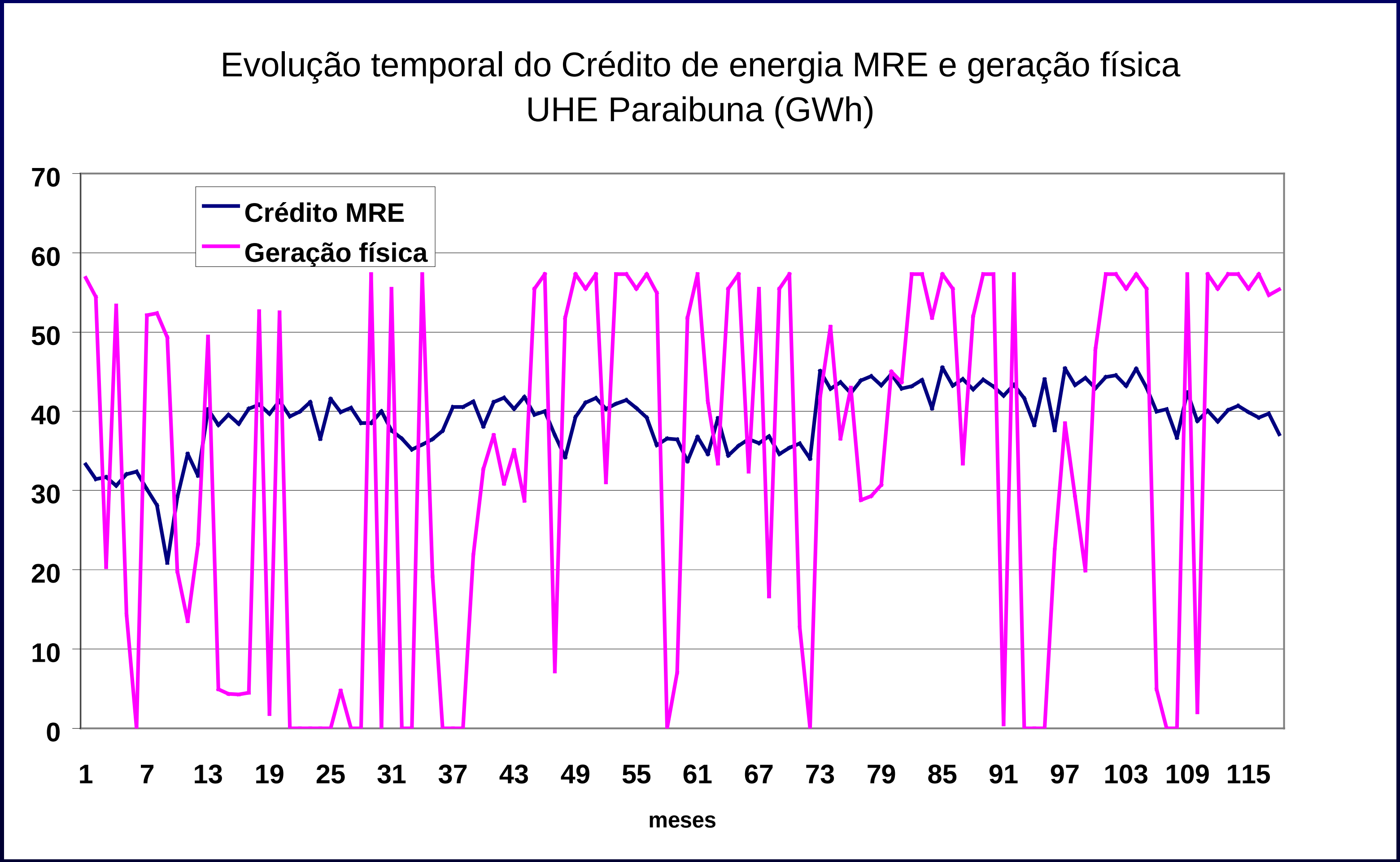


Cross Contracts

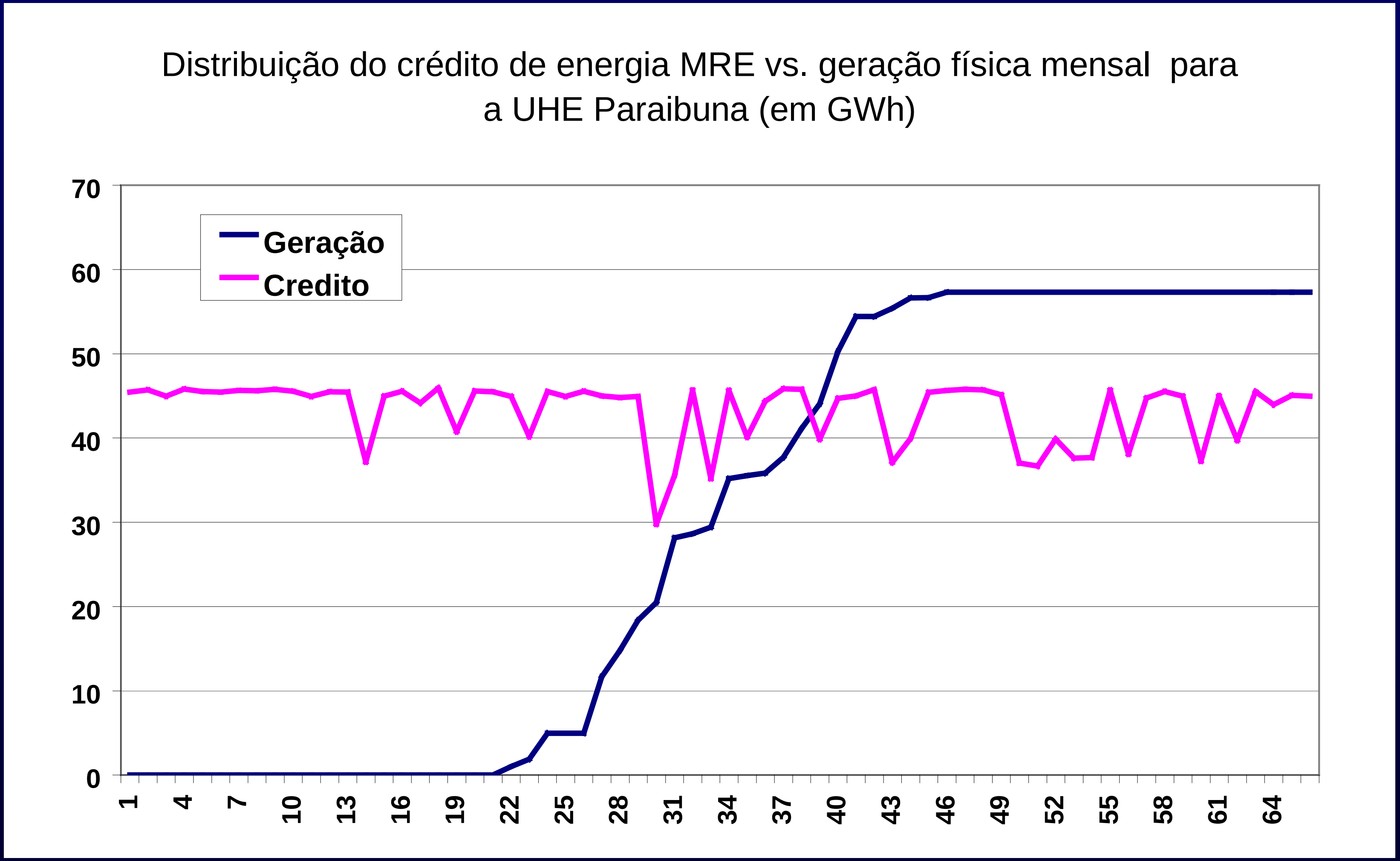
- All hydro production in each hour is assigned to a "company" called MRE
- The "shareholders" of this company are the hydro plants*
- The total hydro production is then reassigned to each hydro plant in proportion to its shares – not related to its physical production

* the number of shares is related to the expected spot revenue

Impact of MRE



Impact of MRE



MRE: upside

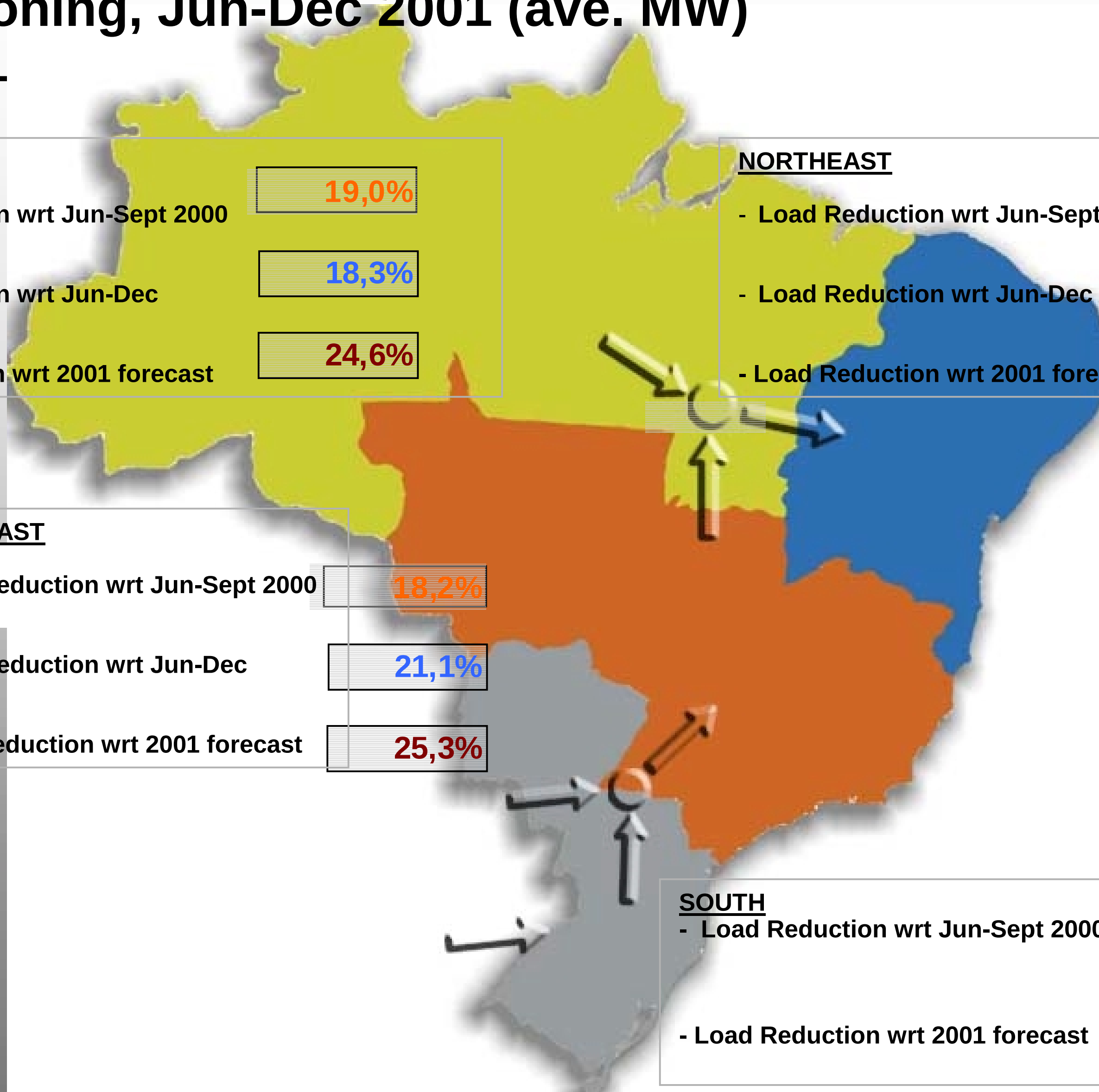
- Reduces income volatility of hydro plants
- Makes hydro plants indifferent to the System Operator dispatch decisions $\Rightarrow$ less conflict between individual and global interests
- Translates the value of any hydro asset into a common basis, which makes easier the economic evaluation of hydro companies

MRE: downside

- Definition of shares
- Submarkets
- Desincentives to efficiency
- Desincentives to the installation of peaking capacity

Issue 3: Risk Allocation

Energy Rationing, Jun-Dec 2001 (ave. MW)



NORTH

- Load Reduction wrt Jun-Sept 2000 — 19,0%
- Load Reduction wrt Jun-Dec — 18,3%
- Load Reduction wrt 2001 forecast — 24,6%

NORTHEAST

- Load Reduction wrt Jun-Sept 2000 — 16,4%
- Load Reduction wrt Jun-Dec — 20,2%
- Load Reduction wrt 2001 forecast — 24,2%

SOUTHEAST

- Load Reduction wrt Jun-Sept 2000 — 18,2%
- Load Reduction wrt Jun-Dec — 21,1%
- Load Reduction wrt 2001 forecast — 25,3%

SOUTH

- Load Reduction wrt Jun-Sept 2000 — 2,0%
- Load Reduction wrt 2001 forecast — 7,7%

Risk Allocation

- Almost 100% of generation and load were contracted before rationing
- These contracts were financial hedges, that is, the MW contracted do not change if there is rationing
- Because load is reduced by 20%, all generators were short and all loads were long on their contracts by that percentage $\Rightarrow$ huge monetary transfer from generators to loads
- However, generators refused to pay on the grounds that they could not manage their risks because of centralized dispatch and no “real” prices

Issue 4: Price Bidding

- Traditional price bids do not ensure coordination of hydro production in a cascade
- Reason: two "products" – water and energy – are being commercialized but only one is being remunerated
- Usually not a problem because all plants have the same owner
- Not true in Brazil: seven owners in the same cascade
- Need to design a special system
- Market power is a very important issue

Conclusions

- It is possible to have a market scheme including hydro
- However, it is important to make clear definitions when designing the regulatory framework:
  - risk allocation
  - price formation
  - volatility issues
  - coordination in a cascade

THE ROLE OF THE STATE IN THE PROTECTION OF COMPETITION

Salvador Apodaca Sarabia

General Director of Privatization and Tender Processes

Federal Competition Commission

Mexico, May 30, 2002

1. Competition Legislation

- **Political Constitution**
  - ✓ Art. 28. Prohibition of monopolies and monopolistic practices.
  - ✓ Art. 27. Exclusivity of the Nation in providing Public Service of Electric Power (SPEE in Spanish)
  - ✓ Art. 28. The exclusive functions of the State in electricity do not constitute a monopoly.
- **Federal Law of Economic Competition**
  - ✓ Applies to all areas of economic activity and to all economic agents, public and private.
  - ✓ Prevention and elimination of monopolies, concentrations and monopolistic practices.
  - ✓ Express opinion about policies, laws, administrative acts, etc.
- **Federal Competition Commission**
  - ✓ Decentralized administrative organ of the Ministry of Economy, with autonomy to dictate its own resolutions.
  - ✓ Enforce the law of competition and exercise powers foreseen in other laws and rules.

2. Legislation of Specifically Regulated Sectors

General characteristics

- ✓ Pro-competitive regulation
- ✓ Sector Regulator
  - State Ministry.
  - Specialized commission.
- ✓ Actions by of the Federal Competition Commission in:
  - Evaluation of economic agents interested in obtaining concessions or permits.
  - Evaluation of transfers of concessions or permits.
  - Evaluation of sale of stock by companies, permit holders or concessionaries.
  - Determination of fundamental market power or of effective competition conditions.

Law of SPEE and its Rules

- ✓ Does not foresee actions by the CFC.

3. Characteristics of the Electric Sector

- **Activities or stages**
  - ✓ Inputs.
  - ✓ Generation.
  - ✓ Dispatch.
  - ✓ Transmission. Transport.
  - ✓ Distribution.
  - ✓ Marketing.

- **Capital intensive. Sunk costs in generation, transmission and distribution**
- **Electric energy cannot be stored**
- **Functioning of the system requires continuous physical balance between the energy generated and utilized.**

3. Characteristics of the Electricity Sector

3.1 Generation / Transmission

- **Generation**
  - ✓ Basic plants.
  - ✓ Intermediate plants.
  - ✓ Plants for peak hours.
  - ✓ Smaller efficient plants.
- **Coordination of generation and transmission in real time**
  - ✓ Vertical integration.
  - ✓ Separation of generation and transmission supported by an independent operator of the system and the electricity market.
- **Competition leads to the best assignment of resources of the benefit of users**

4. Competition and Regulation of the Electricity Sector

- **The optimal combination of economic regulation and competition assumes**
  - ✓ Formation and development of markets in activities that allow concurrence of independent agents.
  - ✓ Application of competition standards in the previously mentioned activities.
  - ✓ Regulation of activities that present scale economies, where there is no option of other activities to substitute them.
  - ✓ Specific regulation of the economic agent with substantial market power.
- **Possibilities of protection of competition in the electricity sector**
  - ✓ Vertical integration.
  - ✓ Separation of generation and sustained transmission by an independent operator of the system and the electricity market, a market for end users.

5. National Electricity Sector

5.1 Present situation (a)

- **Exclusivity of the State and vertical integration in SPEE**
- **Private participation**
  - ✓ Generation for self consumption use in the forms of auto-supply, cogeneration and small production.
  - ✓ Sales of surpluses to CFE.
  - ✓ Imports for self consumption.
  - ✓ Independent production (PIE) for exclusive sale to the CFE.
  - ✓ Transmission of energy for self consumption.
- **Dispatch of load from public or private companies subject to lower cost**
- **Addition or substitution of capacity for SPEE conditioned on lower cost in the long term**
  - ✓ Diffusion of projects, for opinion of private sector.
  - ✓ Tender of capacity and associated generation.

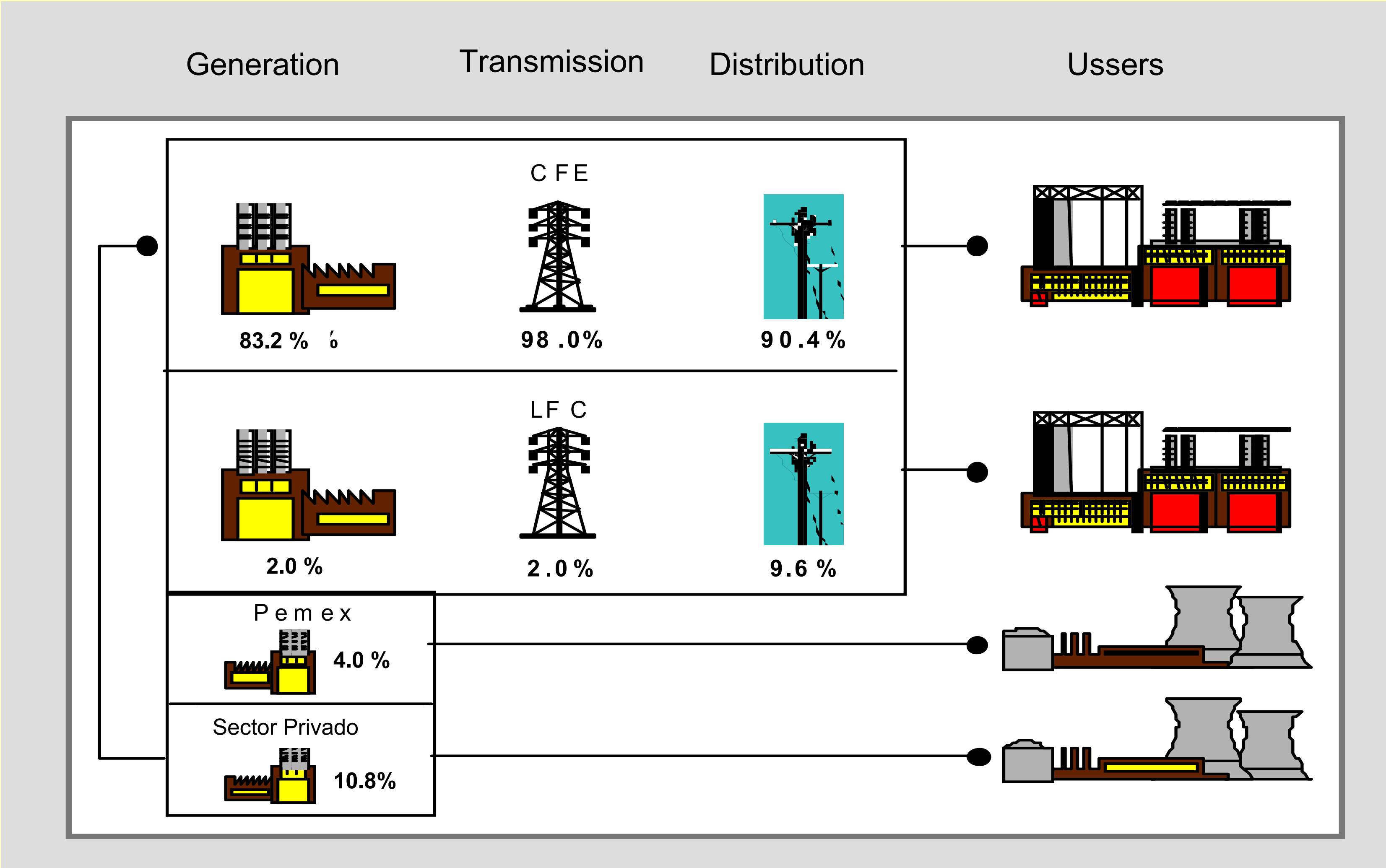
5. National Electricity Sector

5.1 Present Situation (b)

- **Elements of competition in generation through:**
  - ✓ Entrance of the PIE, when of private projects are a lower cost alternative to the CFE.
  - ✓ Competition for the market through tenders for PIE projects among private economic agents.
  - ✓ Option for auto-supply and cogeneration.
  - ✓ Dispatch of surplus with lower costs.
- **Facilities of auto-supply and cogeneration, through:**
  - ✓ Co-ownership of plants by users.
  - ✓ Access to the transmission network.
- **Increase in capacity of CFE and dispatch of its plants are conditional on the competition in PIE costs and of the auto-supply and cogeneration companies**

5. National Electricity Sector

5.1 Present Situation (c)



6. Reforms in the Electricity Sector

6.1 PRI's Parliamentary Group

- **State exclusivity and vertical integration in SPEE**
- **Private participation in generation as an exceptional and complementary activity, not substituting SPEE**
  - ✓ Permits for auto-supply, co-generation, and PIE.
  - ✓ PIE in case of CFE's technical or financial inability.
  - ✓ PIE participation, by company, less than 20% of the permitted capacity nationwide.
  - ✓ Energy sale to CFE according to cost of surplus or agreement with considerations determined in the tender process.
- **Alternatives for users through:**
  - ✓ Auto-supply, co-generation, and importing.
- **CFE and CLandFC performance is based on planning, regulation, and supervision mechanisms**
- **Technical and financial autonomy**

6. Reforms in the Electricity Sector

6.2 PAN's Parliamentary Group (a)

- **Vertical separation**
- **State participation in:**
  - ✓ Generation through CFE and CLandFC.
  - ✓ **Exclusivity in nucleoelectrical generation.**
  - ✓ Transmission (infrastructure).
  - ✓ **Exclusivity in operating, planning, and maintaining the transmission network**.
  - ✓ Distribution through CFE and CLandFC.
- **Private participation in:**
  - ✓ Generation.
  - ✓ Transmission (infrastructure).
  - ✓ Distribution.
  - ✓ Marketing.

6. Reforms in the Electricity Sector

6.2 PAN's Parliamentary Group (b)

- **Competition**
  - ✓ In generation among private economic agents and among the latter, CFC and CLandFC.
  - ✓ Operation of the National Transmission System.
  - ✓ Non-discriminatory access to the National Transmission System.
  - ✓ Future opening of the electric power market for qualified users.
- **Regulations in transmission and distribution**

7. Applying competition standards

- **Environment determined by characteristics of modes adopted**
  - ✓ Vertically integrated system, with efficiency levels and contributions to social welfare based on sheme for planning, supervising, and controling.
  - ✓ Vertical and horizontal separation, with efficiency and social welfare based on the process of competition and free participation, and on regulations based on incentives.

7. Applying competition standards

7.2 Contributions to restructuring

- **Contribution**
  - ✓ Safety for society and their representatives in implementing measures addressed to making markets operate efficiently; consisting in the prevention and elimination of monopolistic behavior and in determining substantial power in the market.
  - ✓ Safety for investors of a environment favorable to the development of efficient companies, with equal opportunities for all participants regarding competition and without risks of events that prevent them from entering the markets or ubjustifiedly oust them.
  - ✓ Safety for users in a competition process that leads to prices linked to costs, as well as to the best quality and wider variety of services.
- **CFC's autonomy**

7. Applying competition standards

7.3 Promotion and prevention

- **Promoting competition**
  - ✓ Determining opportunities to improve market operation.
- **Preventing monopolistic market concentrations**
  - ✓ Definition of relevant markets.
  - ✓ Assessing the effects of parties concerned in obtaining concessions and/or permits on competition.
  - ✓ Assessing the effects of concentrations on competition.
    - Granting concessions and/or permits.
    - Selling shares of concessionary and/or licensed companies.

7. Applying competition standards

7.4 Eliminating monopolistic behavior

- **Eliminating absolute monopolistic practices**
  - ✓ Manipulating public tenders.
  - ✓ Agreements to fix prices or reduce supply.
- **Eliminating relative monopolistic practices**
  - ✓ Unjustified ousting or barriers to entrance in input markets, on both supply and demand sides.
  - ✓ Unjustified ousting or barriers to entrance in activities in the electricity industry open to the market.

Regulation of Competition in transitional periods

Pascual García Alba Iduñate

Remarks:

The CFC takes its decisions by majority.

This presentation does not represent the official position of the institution.

- Competition is not an end in itself, but it tends to be necessary to:

Protect consumers

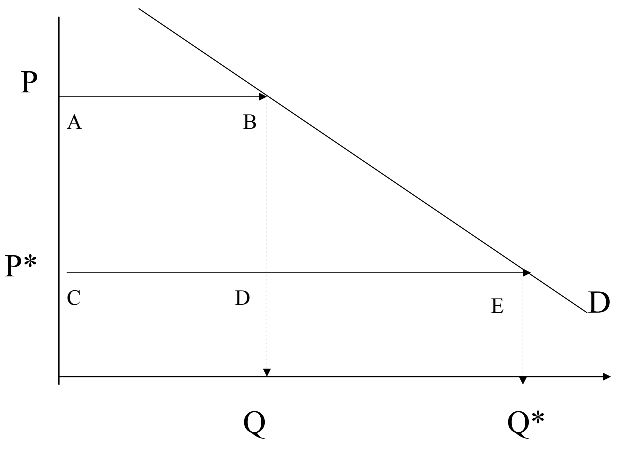
Promote efficiency

Competition and the reforms

- In “regulated sectors”, where certain particularities exist, such as: natural monopoly elements, scale economies, externalities, coverage and universal service obligations; a transparent and effective regulation coherent with competition is necessary to:

- Protect consumers
- Promote efficiency
- Avoid regulatory capture
- Reduce adverse effects of legislative lobbying
- Control the abuse of judicial instances

Costs derived from a lack of competition



Bad regulation dead-weight loss

- Regulatory capture seeks to in}rease P-P* (overprice). The direct loss in efficiency is the area of the triangle BDE.
- The area ABCD is sometimes considered a total loss (Posner), as it is dissipated through the three previous ways (capture, lobbying and abuse of instances)
- Without competition, a good administrator from a purely entrepreneurial point of view (maximization of private profits) and in a regulated sector, no longer minimizes costs but maximizes profits from political maneuvers. The successful administrator acquires in his profile the characteristics of the opportunistic politician.

Dead-weight loss... (cont)

- Because of this, additional X type inefficiencies are introduced (P* increases pushing P upwards), since lobbying deviates the attention of entrepreneurs and administrators. Another example of this type of inefficiency: the adoption of technologies, protocols or other interconnection policies that hamper network interconnection in natural monopolies (of transmission and electricity distribution, of telecommunications, of transportation, etc.) to competitors, and not due to their technical efficiency.

General considerations for a successful reform

Reforms do not take place in an institutional vacuum, but under each country's reality. Weighing this reality requires determining:

If recent reforms have been successful

Where they succeeded and where they failed

What could have been done better

If competition was promoted or if monopolies just changed from public to private hands

What can be learned from other countries' experiences

General considerations...Cont.

Before deciding what to reform, how far and how, we must consider if:

The people in charge of impelling and implementing the reform are convinced of the importance of competition.

There is capacity to impel the required legislative changes.

Regulatory capacity is effective.

Congruence between the reform and the current judicial system.

Being convinced of the importance of competition

Other authorities and diverse interest groups, could maintain positions that differ from those of the competition authorities. It is worth considering differences in the world and also maybe in Mexico, examples include:

- Openness to foreign investment

- Dominance in telecommunications

- Divestiture of airlines

Being convinced of ... Cont.

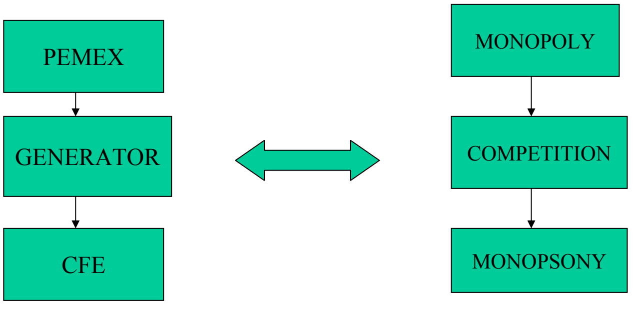
In the case of electricity, the initial proposal of the former administration indicated that it would not include measures to regulate competition, since the CFC would be in charge of preventing the emergence of a dominant operator.

After it was established that the CFE would not be privatized, contrary to the previous proposal, the issue of dominance has not been considered again in a clear and precise manner.

Monopoly of the energy resource

Competition considerations have been partial, since the role of PEMEX has not been included, although it is part of the vertical structure in the supply of electricity. For the case of liberalization of generation, its role as supplier of gas will be critical. It is well- known that in a vertical structure, it only takes the existence of a non or badly-regulated monopoly in one stage to obtain a monopoly effect in all stages (or worse if double marginalization is present).

Graph 2



Worldwide conviction of the importance of competition

In other countries, the issue of competition was overlooked while reforming the electricity sector, this led to revisions. Examples (England and Wales; Chile)

The importance given to competition in the European Union is reflected in the requirement that competitive access be introduced, in all member countries, to the transmission network, to any generator in those same countries.

Other experiences, such as California's, point not so much the risks of competition, but of its partial and asymmetrical adoption (vertical structure effect).

Impelling the legislative reforms

Related to the legislative aspect, the design and promotion of reforms must consider:

-The possibility that reforms to be approved

-The need to carry out persuasion and negotiation activities

If the previous issues are not considered, there is a risk that whatever the result, far from favoring the objectives pursued, they would hamper them.

Example: the Fiscal Reform.

Impelling the legislative reforms

Regarding the electric reform, the legislative branch has rejected projects that include constitutional reforms. Those remaining emphasize the role of the state, the re-structuring of the CFE and CLyF, and complementary private participation.

Important coincidences can be found among the different postures, despite their apparent incompatibility, more rhetorical than real; as long as extreme postures are abandoned.

The false debate surrounding privatization

Not all re-structures of the electricity sector in the world have implied privatization. (Competition opennes vs. Privatization: the British and Scandinavian experiences).

In our country the balance of privatization is at least mixed, and in many ways discouraging. Consider the experiences in

- Sugar (privatize vs. close)
- Banks (deregulate vs. Regulate well)
- Telecomm (privatization without re-structuring)
- Railways (weak interlineal regulation)

The false debate... cont

To the extent that there was not as much gas as was believed in Mexico, capacity expansion of the electricity sector will rest on other means, less prone to private participation due to their size.

Hydroelectric generation requires negotiations and authority acts to dispose of land that the private sector could hardly carry out itself.

Nevertheless, in some countries private participation is found also in generation through other means (coal in England).

Re-structuring the non-central government sector as a common factor

All legislative proposals assign, explicit or implicitly, a complementary role to the private sector (PRI and PRD, but also PAN). Zedillo’s and Fox’s proposals too, by discarding CFE and CLyFC privatization.

Re-structuring the non-central... Cont.

If the state continues being the main supplier in the near future, the most important, and for now unavoidable, will be:

- Re-leveling and a re-structuring hourly tariffs
- Re-structuring government enterprises, including revising labor agreements.
- Profesionalizing the administration and direction of these enterprises
- Their corporatization (autonomy), following the model of the Tennessee Valley Authority, the most important electricity supplier in the USA. This implies liberalizing restrictions in staff hiring, indebtedness, purchases, etc.
- Its evaluation in terms of business accounting, instead of its contribution to public financial deficit (financial requirements)

Re-structuring the non-central... Cont.

It appears possible to reach agreements regarding the re-structuring of the non-central government sector. It is a task for the government, even if the most audacious proposal would be approved tomorrow, with privatization of assets included.

Financing government enterprises in the electricity sector

If prices and tariffs were corrected, subsidies would become visible and be financed explicitly with federal funds, government enterprises would be re-structured, and would be removed from public financing deficit accounting statements; thus, there is no reason why the strengthening of the electricity sector, with the permanence of government enterprises as central actors, cannot be financially sound.

The experiences in Mexico and the world show that a private firm is more efficient than a public one, when the latter is assigned non-business objectives (particularly political), but the difference in efficiency ceases to be important when conditions are equalized. The private sector also faces "principal-agent" problems in its relationships.

Private and public accounting

An important difference between the conditions that a public and private firm face, is that the latter does not consider investment an accounting loss, while investment for public enterprises are counted as a part of the public deficit. Therefore, this is not adequate to determine the profitability and future recoupment of the resources invested by public enterprises (their self-financing).

If a project is recoverable, in principle it can be financed, regardless of who carries it out.

Exaggerations that do not help

In view of this, it is plain demagogy to defend this or that proposal, apparently more liberal than others, with the argument that the government does not have the money to finance investments in electricity, without sacrificing other objectives where social concerns give it an advantage, like education, fighting poverty, public health, security, etc.

Exaggerations... Cont.

This types of comments that have become common seem to imply

- Assuming a public expense, because of the mere fact that it is public, and independently of its recoverability, is a net loss to society.
- Ignoring that electricity is not paid by the producer- be it public or private- but consumers. With the exception of subsidies, but they can also be found in private generation, or not to be found in public generation.
- Not recognizing that the different remaning bills -from Fox, the PAN, PRI or PRD- assume that public enterprises are central agents in electric re-structuring. Which means ignoring the context of the current discussion.

Important private sector complementarity

The fact that public enterprises are projected to be dominant agents does not mean neglicence regarding the important complementary role of the private sector, especially in generation. In the far future it is very likely that it should assume a principal role. It is critical that it starts positioning itself now in a more substantive manner.

Further below, the role of the private sector will be considered. Before, it is important to consider legal and regulatory restrictions.

Legal and regulatory restrictions

With the opening of a regulated sector, regulatory capacity is important to avoid the regulator´s capture and to prevent loosing coordination of production stages in vertical relationships. It is also important that resolutions are taken and executed promptly.

The previous statement requires a regulator with authority. That its decisions are not blocked or delayed by judicial instances, because a tardy regulation can be worse than an absence of regulation.

The recent experience of the regulatory bodies is that those affected by the system go to court and they systematically give access to their appeals in proceedings that nullify the regulation for years. Without a doubt, this affects the type of regulation that can and must be implemented.

The judicial system from a non-legal perspective

Among the judicial system's characteristics that must be considered to allow Mexico to have a coherent system with the country's modernization, we can find:

The enforcement of law in regulation matters should be supported in other disciplines, besides the legal.

Judges cannot be experts in everything and should, in the absence of suspicions of abuse, trust the resolutions of the regulator under the good faith principle that it represents the social point of view over individual interest.

The current system gives more weight to individual protection before the abuses of authority, than to the public good.

The judicial system from... Cont.

In Mexico the abuse of judicial instances is not costly. The price for a judicial appeal should be raised for firms that oppose regulation and have more resources than the regulator.

The amparo review's merit is lessened as a defense mechanism against the abuse of the authority and turns into a weapon for powerful group that weaken it in its obligation to guard public good.

A judge without technical knowledge can reject technical valuation of a regulatory authority, and nullify an important decision; in this way, one individual's opinion is imposed over the experts'.

The judicial system from ... Cont.

- There is a lack of specialized courts.
- The judicial system is way too formal in procedural matters, which implies sometimes sacrificing the truth for formalism.
- The interpretation of the law is extremely based on the exegesis of legal text, and ignores the implicit interpretation that would have been done by society, the authorities, and even the legislative branch. The system is too statutory and has little respect for socially accepted customs.

May, 2002 SCJN resolution Background

- During the last few years, the public sector's participation in electricity has permitted to partially compensate the effect that public budget restrictions have had in capacity building. This participation has taken place in the following ways:
- Investment Projects of Differed Impact in the Expense Registry (Pidiregas).
- Co-generation
- Self-supply
- Independent Power Producers

These schemes have allowed private investment in electricity during the last years, which has meant that electricity capacity continues to grow, without affecting fiscal adjustments that the country has endured.

SCJ Resolution

Everybody was wrong: the constitutional exegesis as the absolute truth

In May of 2001, the Executive branch, through a decree to reform the Rulings of the Electricity Public Service Law, pretended to relax the restrictions to enable co-generators and self-suppliers to sell their surplus to the CFE.

The legislative branch appealed before the SCJ alleging insconstitutionality and arguing that the President went over the faculties conferred to him by the Constitution in article 89, paragraph I to "promulgate and execute the laws issued by Congress, providing in the administrative sphere its exact application".

SCJ Resolution

Everybody was wrong: the constitutional exegesis as the absolute truth

The court argued (implicitly and denying afterwards) that the decree was illegal because the Law, whose ruling would be subject to modification, was contrary to article 27 of the Constitution, which states "it corresponds exclusively to the Nation to generate, conduct, transform, distribute and supply electric energy that has as its object the provision of this public service. In this matter concessions to particulars will not be granted and the Nation will take advantage of the goods and natural resources required for these ends"

SCJ Resolution: Everybody loses (except the Court)

- The legislators obtained more than they sought. Now reform projects of the political parties, all which include some degree of private participation, could be considered anti-constitutional.
- The Court's decision ignores the implicit interpretation of the scope of article 27 of the Constitution, in several decisions by the authorities, by society and even the legislative branch, which in a way the Court interpreted (as a writing party of the Constitutional body), and were taken and accepted without appeal by every social and governmental agent. It is an example in today's world of the limits that an excessively statutory judicial focus has (as opposed to a common law focus), and that persists in Mexico.

SCJN Resolution: Damage Control

- The decision only applies to Fox's decree, but does not nullify the Law under which numerous and costly private electricity generation projects were undertaken. But it will limit the regulatory capacity in the future, unless the Constitution is amended. This will put pressure on the same legislators that oppose constitutional changes, because the impasse imposed by the judicial decision hampers almost any reform.

SCJN Resolution: Damage Control... Cont

- The resolution could mean that selling electricity to the CFE, to be destined for public service, is anti-constitutional; but not the sale among private parties. It all depends on the scope given to the concept of public service. The Royal Academy defines it as an: “Activity carried out by the Administration, or under certain control and regulation of it, by an organization, specialized or not, and destined to satisfy collective needs. *Public Transport Services, Public Sanitary Services*.” Maria Moliner defines it as: “Any of those provided by the State, provincial deputies or the municipality, or by a firm, for the people in general; like transport or firefighting”.

SCJN Resolution: Damage Control ...Cont.

- The dissenting justices quoted several Court criteria, to conclude that “public services constitute an institution of administrative law whose head is the State and whose exclusive and unique aim is to satisfy in a regular manner, continuously and uniformly the basic or fundamental needs of the collective”. It would suffice that the service could be limited, for example, to large qualified users and under private contracts, for electricity service to be private.

GRAPHIC 3

Please refer to page no. 37 of the Spanish version

SCJN Resolution: Implications

- That a private agent sells directly to a qualified consumer, would simultaneously free up two potentially competitive stages of the electricity sector: generation and commercialization.
- The Court's decision would also have implications for the two main ways in which opening of the electricity sector could be carried out, and that are not necessarily exclusionary:

- Spot sales by the generators to a pool.
- Direct sales through long term contracts.

GRAPHIC 4

Please refer to page no. 39 of the Spanish version

SCJN Resolution: Pool vs. Long term contracts

Following the Court’s reasoning, it would seem that the first option would be anti-constitutional, but not necessarily the second. In competition terms, both have been defended as valid options. The first option requires, in this case, a very effective regulation of the dominant operator, or its divestiture, also the creation of a dispatcher-auctioneer, with complex collection and payment formulae.

SCJN Resolution: Pool vs. contracts... Cont.

It seems convenient to begin the reform by stimulating the option of future contracts, aside from the reinforcement of existent forms of private participation (co-generation, self-supply and independent production). Even so, the re-structuring demand will be important to make those contracts feasible. It would need to:

-Separate and introduce transparency to the CFE's transmission services.
-Ensure that the CFE will not grant subsidies to large users, or if it does, it will compensate private generators' clients with an equivalent payment.

SCJN Resolution: Pool vs. contracts term...cont.

- It is convenient to avoid the arbitrariness in the definition of large qualified users. They may be defined as any interested party that pays the metering equipment and other related costs. The adoption of multiple tariffs, with an independent consumption component, would assure the elimination of non-profitable users under this mechanism.

CONCLUSIONS

- Institutional restrictions seem to point out that in the foreseeable future, electricity reform will be essentially a reform of non-central government enterprises.
- Due to regulatory weaknesses and the country's reality, as well as own merits, the most convenient step seems to be the promotion of long term contracts (in comparison to sales through a pool), together with feasibility that the CFE's re-structure implies, and the consolidation and strengthening of the existing forms of private participation.

CONCLUSIONS... Cont.

- Access to fuels controlled by PEMEX must become more transparent and competitive.
- Even though openness will be, in comparison to other countries, somewhat limited, it will require great efforts, cleverness and all the political capacity of the government and Congress to carry it out.

A laundry list

- Restructure the CFE, separating it from the public deficit's accounts, which would only register the losses and gains for the company's activities.
- Professionalize the company's management, granting it autonomy and choosing designation periods that are not aligned with those of the public administration. Removal or permanence can only be based on results.
- Tariff restructuring and balance for the non-central government sector, based on hourly tariffs for large users, mandating the sector's management to exclude subsidies from tariffs.

A laundry... Cont.

- Review of the labor relationships, particularly in CLyFC
- Strengthening current schemes of private participation in generation: co-generation, self-supply and independent production.
- Freedom to contract debt (to invest, not to finance losses), which would allow the CFE to choose the most profitable means of financing its plants (Pidiregas would automatically disappear)

A laundry...

- There would be no losses at the company level. These would be registered as subsidies and paid from federal funds. Given that the other tariffs would be aligned with costs, such subsidies would only be related to residential tariffs to low income sectors.
- Unbundling the transmission and distribution in companies independent from the CFE by regions and zones, and make that unbundling irreversible.
- Grant those companies with a similar autonomy to that of the CFE (initially, they would be publicly owned companies).

A laundry...cont.

- Give those enterprises the task of collecting enough tariffs to finance the expansion and maintenance of their networks and allow competitive access.
- Foster long term supply contracts, which means introducing futures contracts and establishing back up services, by the CFE at profitable prices. Also, one could establish terms for the negotiation of long term contracts between large users in the government and its non-central sector. The CFE would not be involved in these contracts.
- Re-structure PEMEX in its role as commodity supplier for generation, in such a manner that would assure competitive access and the possibility of privates parties to access by themselves imported gas and impelling competitive participation of different agents in the transport of gas to plants. Probably, something similar would have to be done for oil-based fuel, to foster private participation in plants that use it.

Market Surveillance in Electricity Markets

Forum on Regulation and Competition on Electricity Markets

Mexico City **May 2002**

Competition Advocacy

- Section 125 of the *Competition Act* states that the Commissioner, at the request of any federal board, commission or other tribunal, or on his own initiative may make representations before the board.
- Section 126 is similar to 125, except that the Commissioner may only make representations in respect of competition at the *request* of these provincial boards or on his own initiative *with* consent of these boards.
- The competition advocacy role of antitrust authorities is currently one of the important issues being studied by the International Competition Network (ICN).
- The Canadian Competition Bureau is looking forward to the discussion and the report on this matter at the first annual ICN Conference this September in Italy.

Electricity System

- A major challenge in market design is to find a way to give all competitors equal access to the system control / dispatch.
- Traditionally it was viewed that the efficient provision of electricity required a single, vertically integrated firm that did everything: generation, transmission, distribution and retailing.
- Not all elements of electricity provision are natural monopolies.
- Vertical integration has resulted in unnecessary and undesirable expansion of monopoly power across stages of production, and thus, has also extended the span of regulation.

Electricity System

Introducing competitive forces into network industries consists of three stages:

1. ***Liberalization and Unbundling***
   Liberalization involves the elimination of regulatory barriers to entry in the potentially competitive segments.

   Unbundling involves identifying the facilities of the incumbent that competitors require to enter *and* mandating open access to these essential facilities.

2. ***Access Regulation***
   Controls the market power of the incumbent in the supply of essential facilities and ensures that access is provided to all firms on an equal and non-discriminatory basis.

Electricity System

Introducing competitive forces into network industries consists of three stages: (cont'd)

3. ***Temporary Restraints***
   In the transition from monopoly to competition, it may be necessary to have temporary restraints on incumbents until competitors have had a chance to get established.

Electricity System

Complex Features of Electricity Markets:

- Need to match supply and demand in real time (control imbalances).
- Continuous operation of real time markets.
- Wide and to a large extent of unpredictable fluctuations in demand from hour to hour, day to day and season to season.
- Relatively long lead periods for the development of new generation and transmission.
- Demand that is unresponsive to price increases in the short and medium term.

Electricity System

Complex Features of Electricity Markets: (cont'd)

- Strict technical requirements related to the management of a reliable electricity system.
- Potential congestion depending on the capacity of lines.
- Use of supply sources having widely varying marginal, fixed and sunk costs.
- Separation between contracts for supply to users and the physical delivery of electricity.
- No direct connection between the supply source and the location of consumption - electricity follows the path of least resistance.

Electricity System

- Ruff (2002) observes:

  "The largest technical challenge in designing a competitive electricity market is to find market mechanisms that are (at least almost) as efficient as a good central dispatch process in the short run and that provide price signals that reflect physical reality and hence encourage the right availability and investment decisions in the long run."

Demand for Market Surveillance

- The advantage of competition requires that the competitive process is not diminished by inappropriate industry structure, institutional design or practice, or avoidable firm conduct.

- Requires capabilities in three core areas:

1. ***Institutional Monitoring and Assessment***
   Involves monitoring, analysis and recommendations for changing rules, behaviour, and practices of the enabling institutions and the regulatory regime associated with open access to essential facilities including distribution.

2. ***Market Monitoring and Assessment***
   Involves monitoring market participants' behaviour to see if it is consistent with competitive behaviour and to assess whether the market structure can support competition.

Demand for Market Surveillance

- Requires capabilities in three core areas: (cont'd)

3. ***Investigating and Deterring Anticompetitive Acts***
Behaviour that creates, enhances or maintains market power in the electricity system.

The unique features of electricity markets tend to make certain anticompetitive practices more of a concern in these markets as compared to others.

A unique feature of electricity generation involves taking into account how the combination of generation assets that a firm owns affects its incentives to exercise market power.

Designing Effective Market Surveillance

Governance Principles

- Governance in the context of market surveillance simply refers to the allocation of decision-making power regarding the initiation of market surveillance activities and their resolution.

1. ***Independence***
   Market surveillance should be independent from undue influence from both market participants and the government.

2. ***Secure and Adequate Funding***
   Independence will only be possible if the market surveillance authority has secure and adequate funding.

3. ***Investigation and Prosecutorial Function Separate from Adjudication***
   Market surveillance authority should not have the power to investigate and prosecute, and / or should have limited powers to impose remedies.

Designing Effective Market Surveillance

Enabling Principles

- Enabling principles are designed to ensure that the market surveillance authority has the resources to fulfill its mandate.

1. ***Expertise***
The market surveillance authority must be staffed with individuals who have the appropriate skill set (e.g. training in antitrust law and economics).

2. ***Investigative Powers and Capabilities***
Effective enforcement and monitoring requires that the market surveillance authority has appropriate access to information.

3. ***Interface***
To avoid conflict and confusion, the surveillance authority should have a well-defined operating agreement with the applicable competition authorities.

Designing Effective Market Surveillance

Enabling Principles (cont'd)

4. *Remedies*

Effective surveillance requires that the market surveillance authority has access to appropriate remedies and an efficient process for assessment and evaluation of surveillance concerns.

- *Institutional Assessment*
  Surveillance authority should have the opportunity to make public its concerns over the practices and behaviour of the framework institutions created.

- *Stakeholder Behaviour*
  Market surveillance authority should be responsible for detection and investigation of conduct by market participants of behaviour that creates, enhances, or maintains market behaviour.

Designing Effective Market Surveillance

Enabling Principles (cont'd)

4. *Remedies* (cont'd)

- *Structural Assessment*
  The root of market power problems is inappropriate market structure and the scope of the market surveillance authority's activities should include some power to control market structure.

  Monitoring should periodically assess whether the structure of the industry and the framework institutions are inhibiting competition and efficiency in the electricity system.

  Remedies that directly control the exercise of market power should be used with great care. Such remedies include price caps and automatic bidding substitution.

Designing Effective Market Surveillance

Accountability Principles

- The surveillance authority as an independent agency has considerable power and this provides the need for public accountability that this authority is in fact being appropriately exercised.

1. ***Transparency***
   The market surveillance authority's legitimacy depends on its activities being subject to public scrutiny.

2. ***Performance Standards and Internal Procedures***
   The surveillance authority should develop internal performance standards and procedures for its monitoring and enforcement activities.

3. ***Regulatory Oversight***
   Market surveillance authority should be subject to regulatory oversight, done in a manner that minimizes the impact on its independence.

Reference Documents

- *Written Comments of the Competition Bureau to the Alberta Electricity Industry Structure Review*.
- Kovacic, W.E., (1997) "Getting Started: Creating New Competition Policy Institutions in Transition Economies," *Brooklyn Journal of International Law*, 23:403-53.
- Ruff, L.E., (2002) "The Alberta Electricity Market: Structuring for Competition," Report to the Canadian Competition Bureau.

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Electricity Markets in Australia

Michael Rawstron
General Manager
Regulatory Affairs - Electricity

Australian Competition and Consumer Commission

Introduction

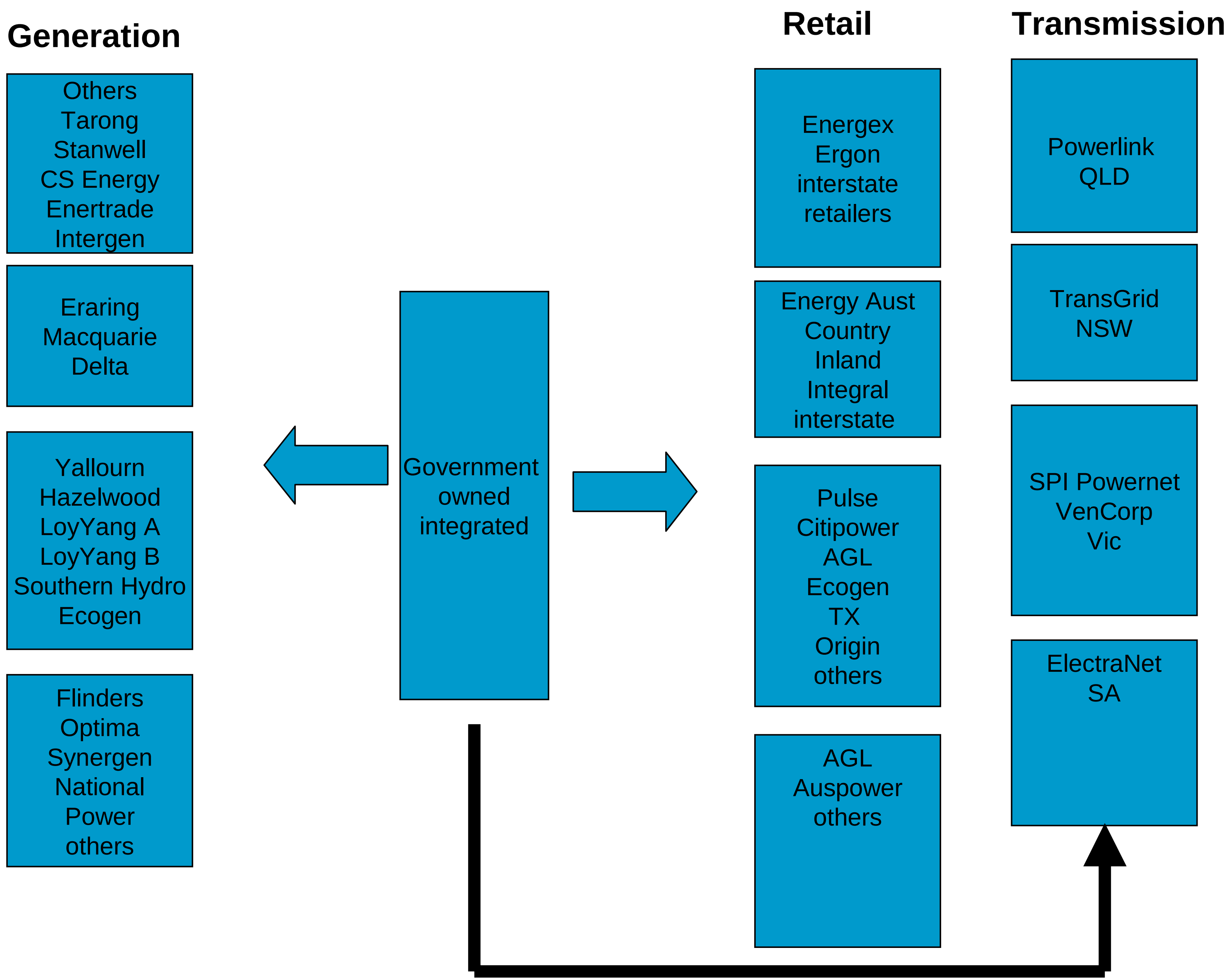
- Brief history and reform of the ESI
- performance of the market
- some observations about the reforms
  - network regulation
  - market power of generators
- conclusions

Reform path in Australia

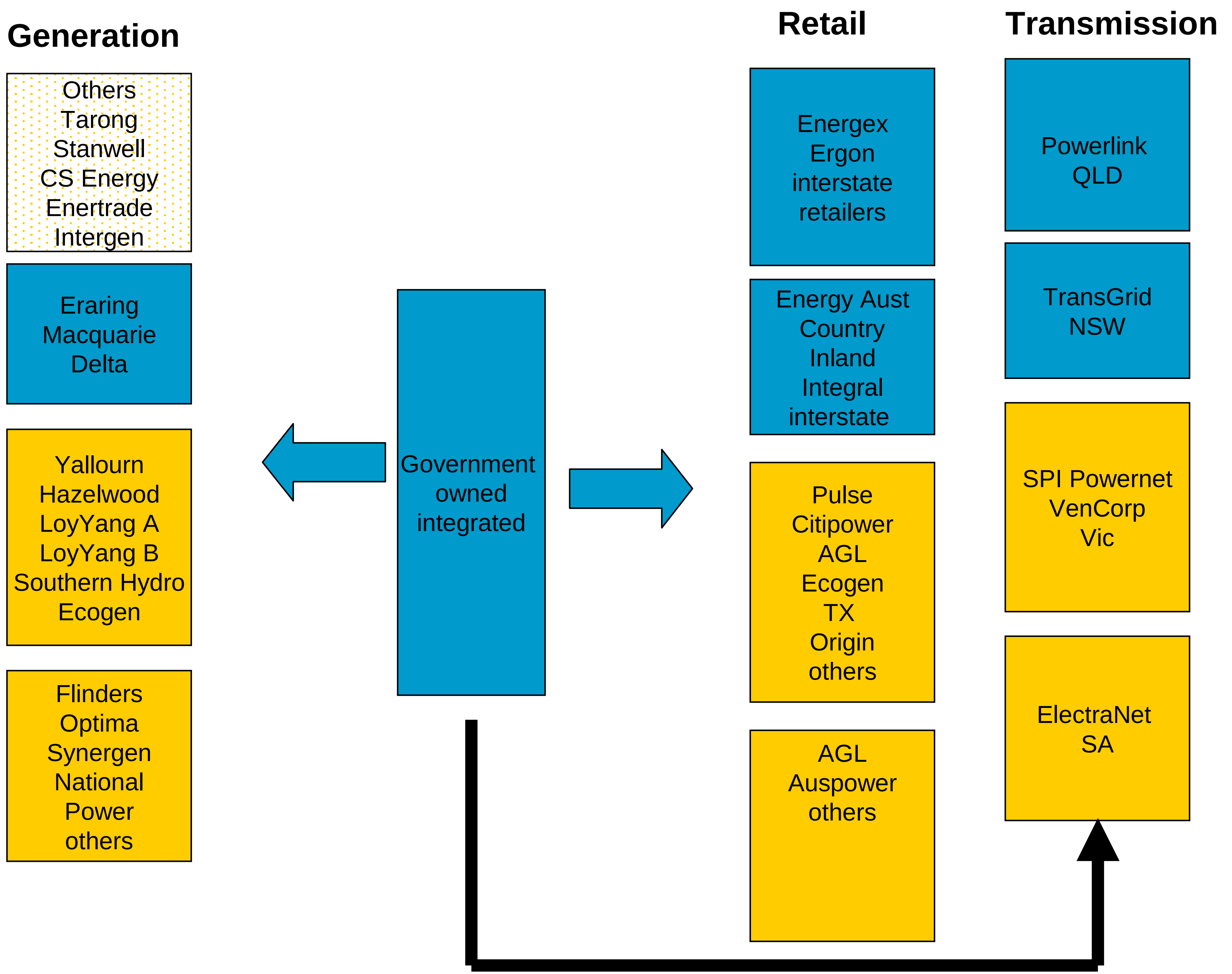
1980 → 2002

1980s		Early 1990s	Mid 1990s	Late 1990s	
Traditional integration	**review**	restructure transitional markets	privatisation	National Market start	**review**
Government ownership Regulated prices. State based markets. No competition	Poor investments high cost potential for efficiency gains sharing of reserves	Horizontal and vertical separation. Creation of competing companies. State based markets.	Sales in Victoria and SA. NSW, QLD and Tas still govt owned	13 December 1998	Review of market by state and federal governments Report due march 2003

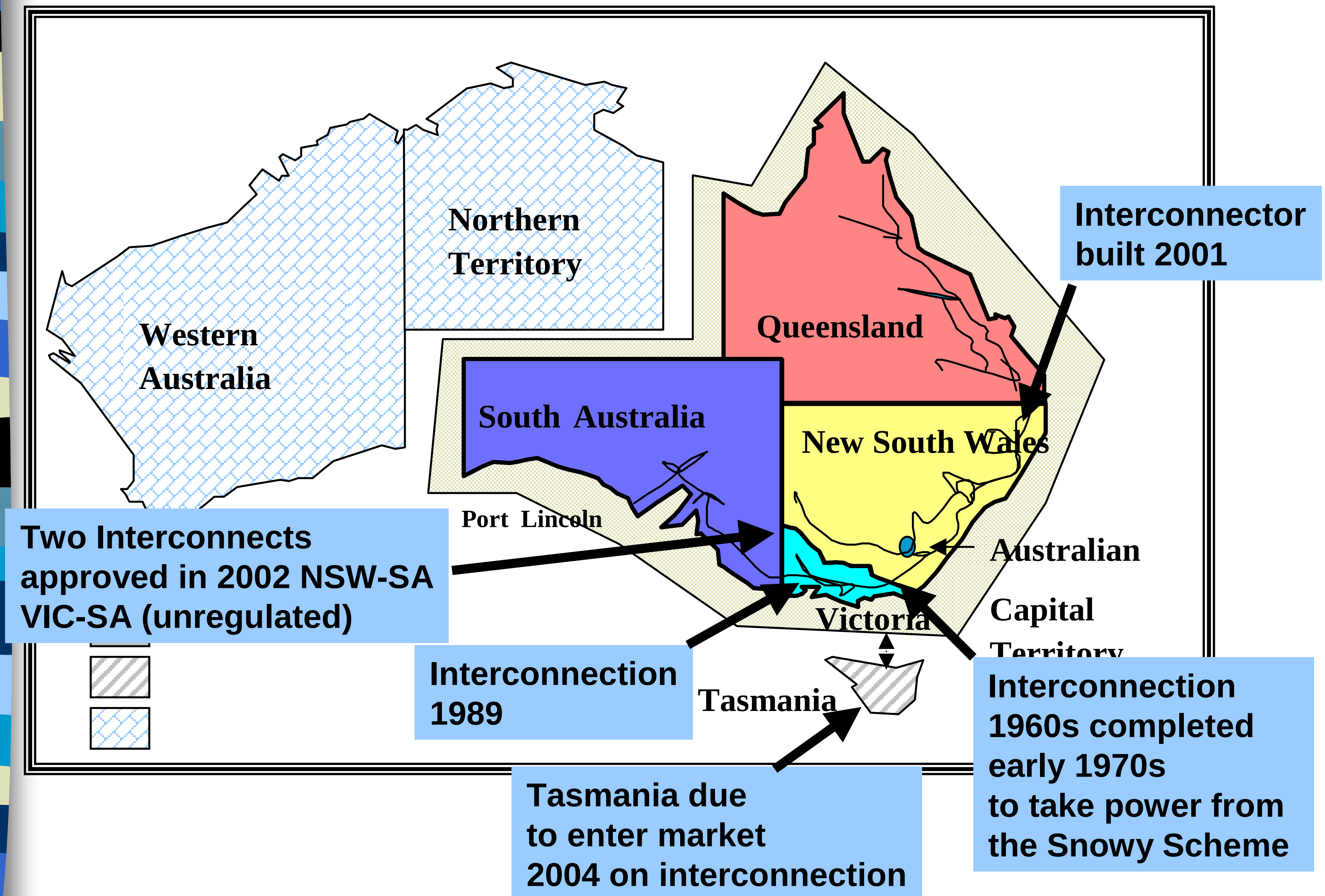
Market structure post reforms



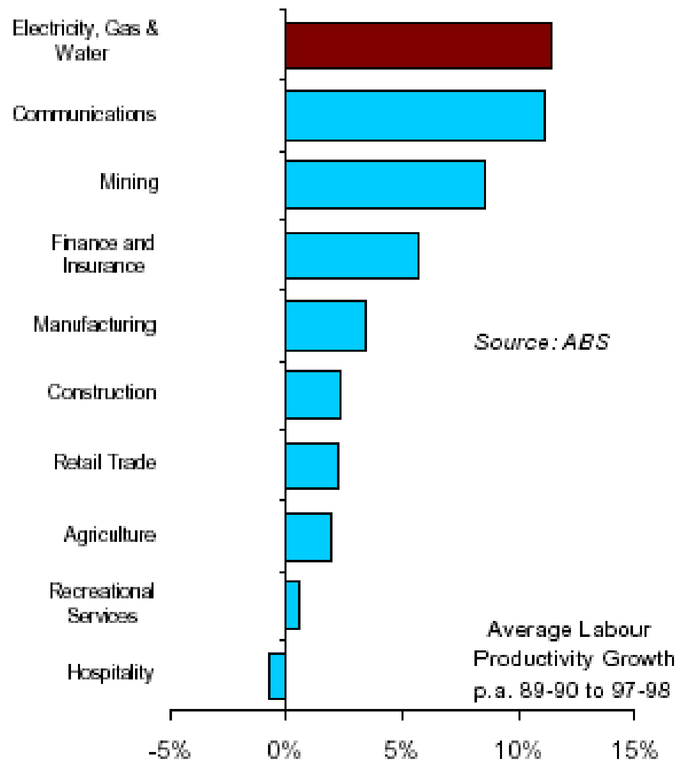
Ownership Government vs Private



Australian electricity market



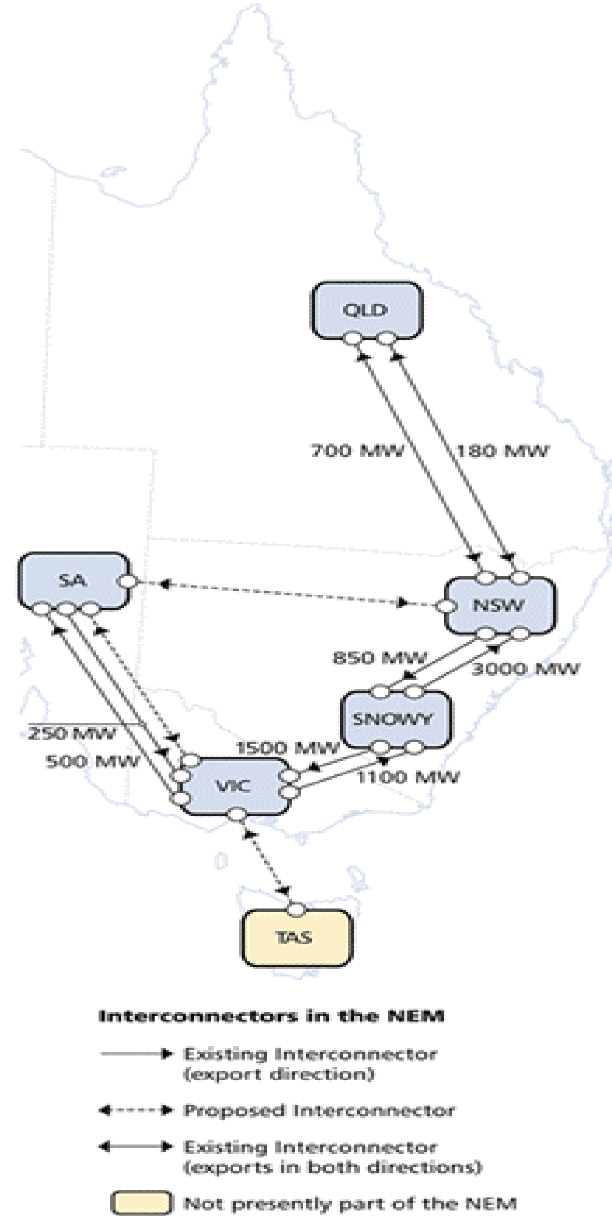
Labour productivity



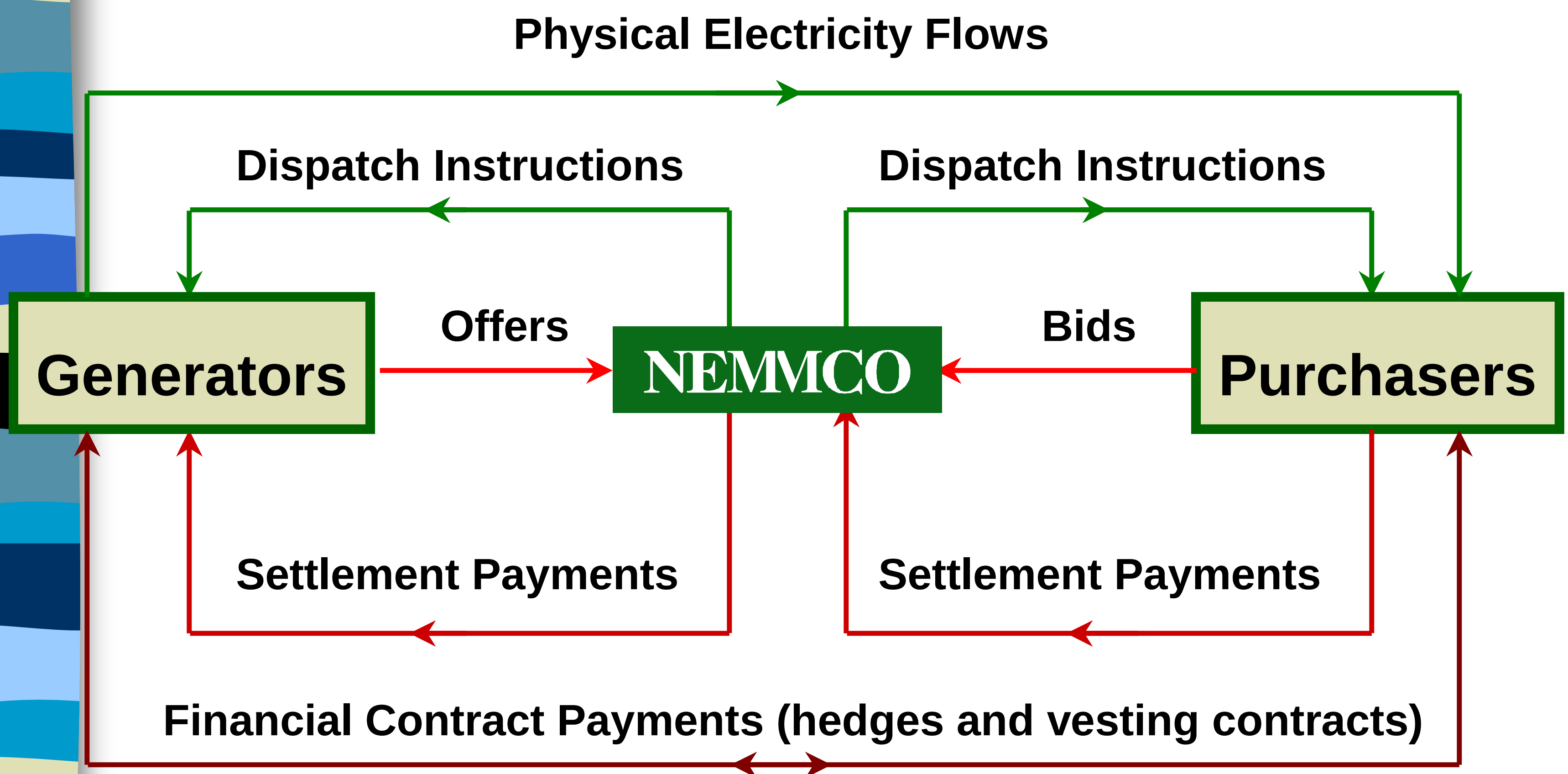
- Australia's utilities are fastest growing sector
- In the ESI
  - Employment levels fell
    - (65,000 in 1990 to 33,000 in 2000)
  - Productivity increased
    - (generator availability 80% in 1999 to 90% in 2000)

Performance of the market

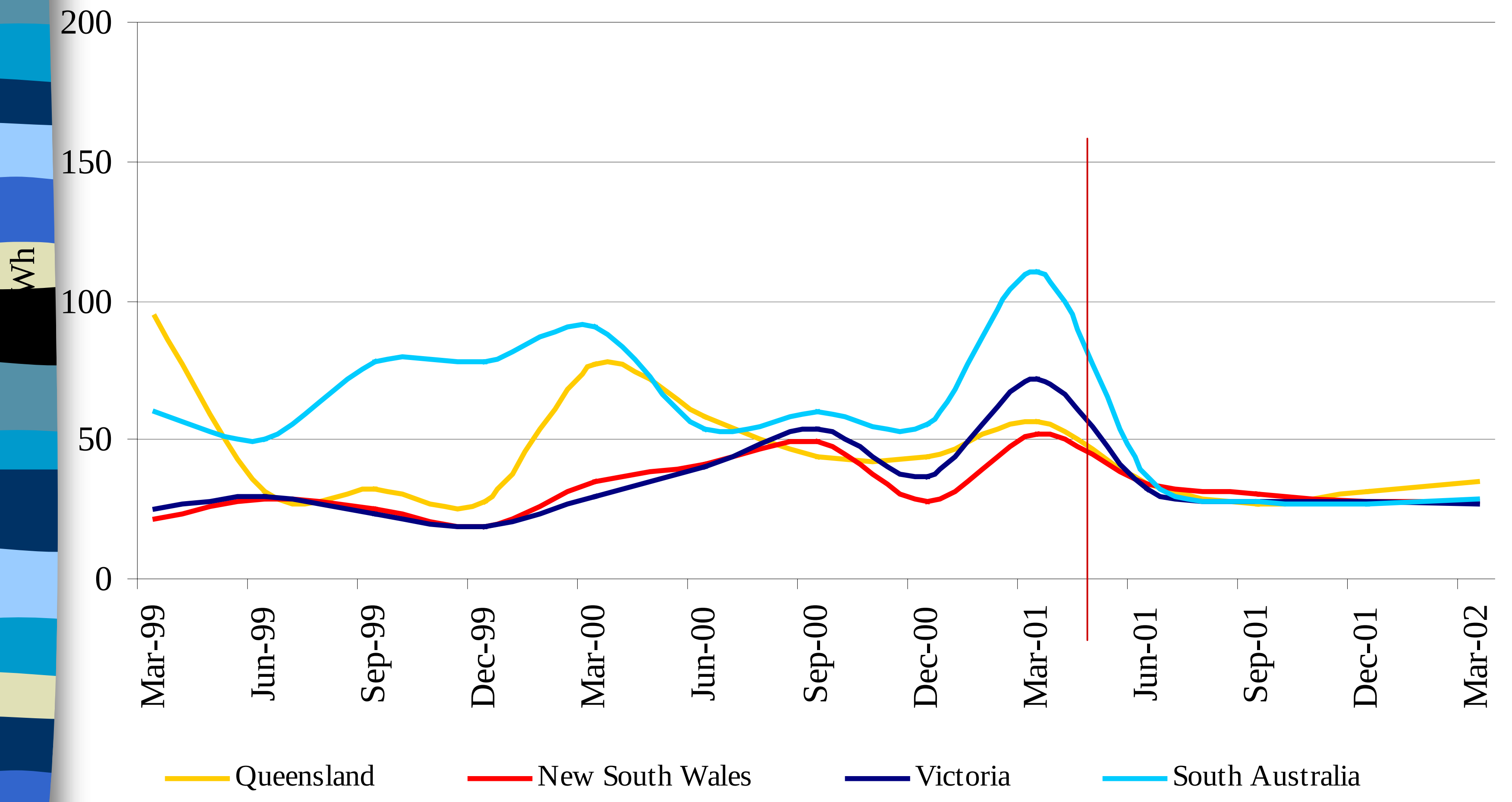
- Compulsory pool
- single price auction
- 5 minute prices averaged over 30 minutes
- price for every region
- financial hedges outside market
- separate market operator



Wholesale Market



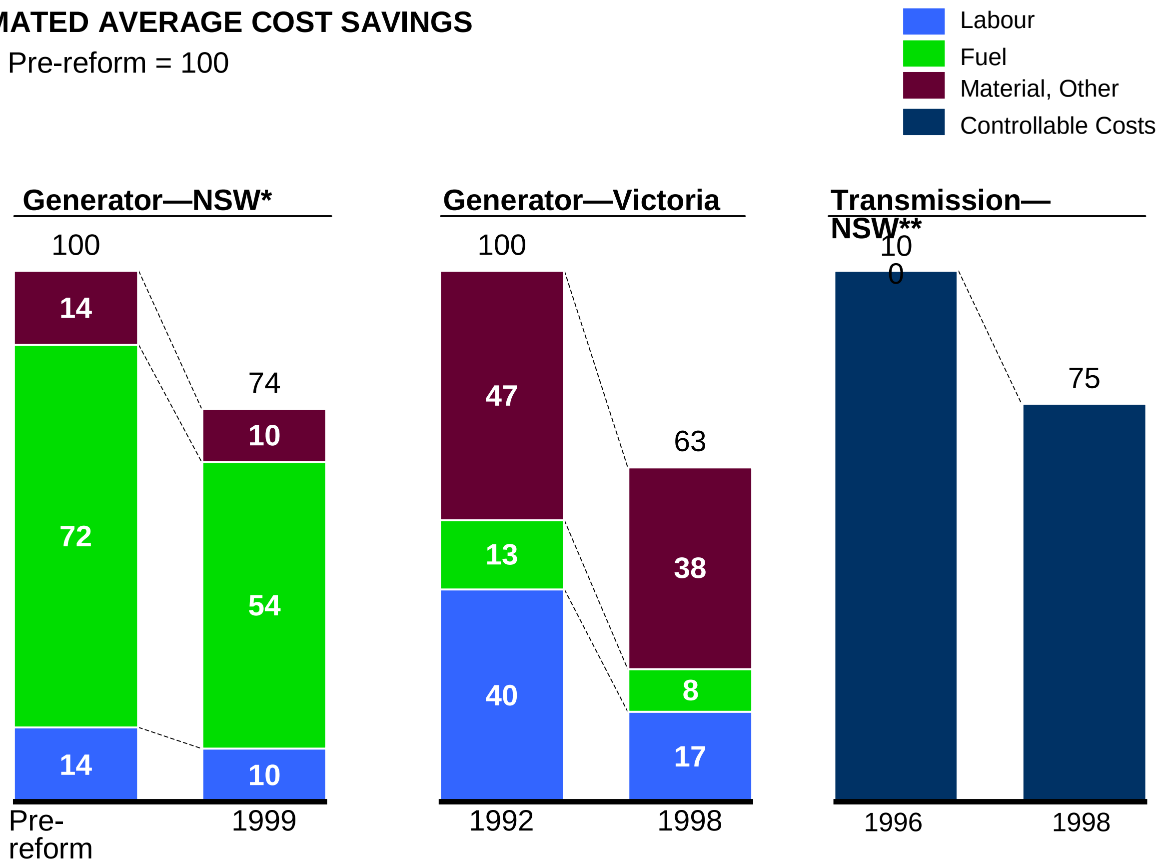
Quarterly average prices 99-02



Costs pre and post reforms

ESTIMATED AVERAGE COST SAVINGS

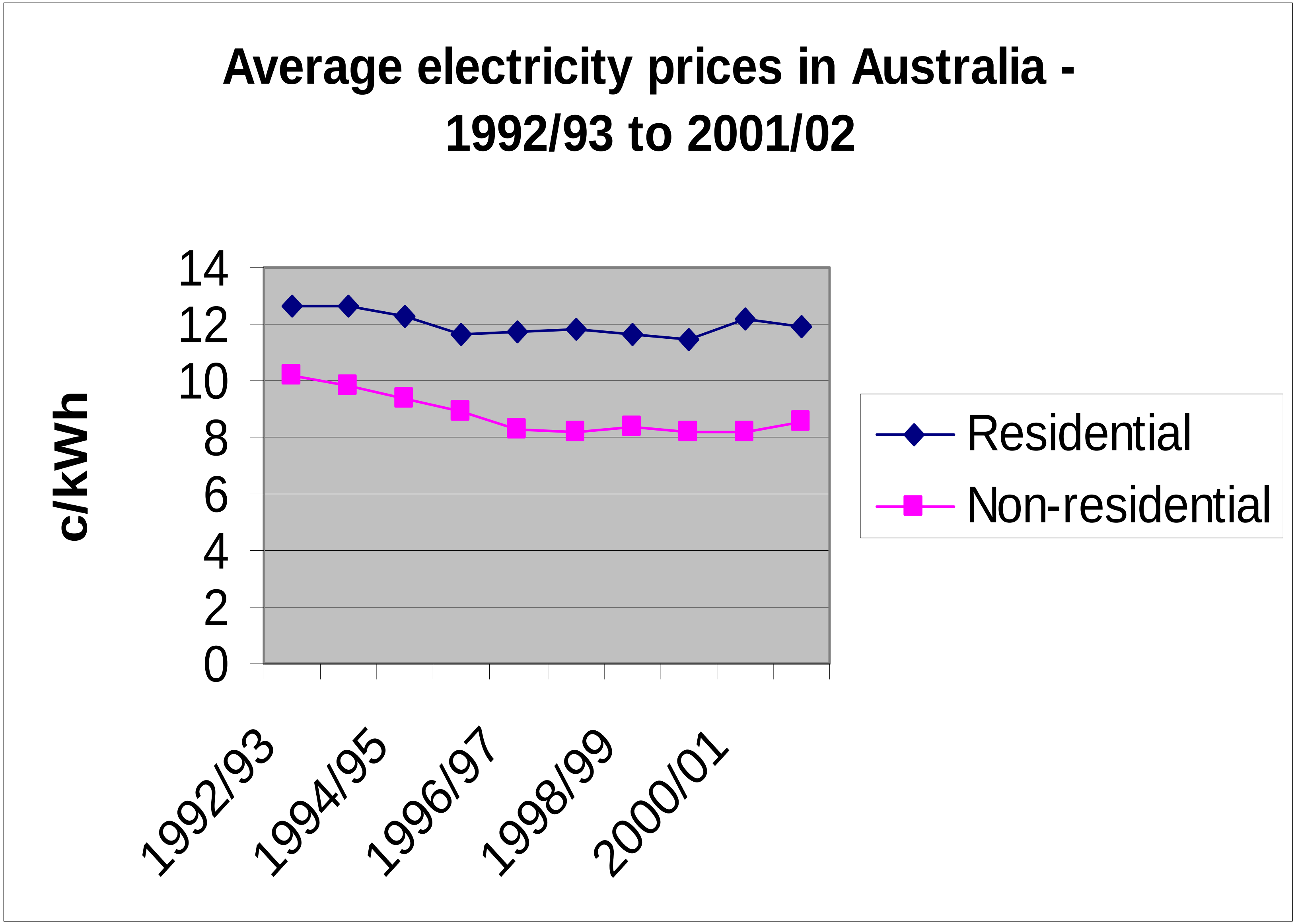
Index, Pre-reform = 100



* Based on Macquarie and Pacific Power

** Reduction in controllable costs for TransGrid, since 1996

Source: Based on Bardak estimates, TransGrid Annual Report


Average electricity prices in Australia - 1992/93 to 2001/02
c/kWh
0
2
4
6
8
10
12
14
1992/93
1994/95
1996/97
1998/99
2000/01
Residential
Non-residential

Outcomes

- Overall the market has lead to lower prices and greater productive efficiency
  - prices lower in real terms than before reforms
  - residential prices stable due to use of vesting (hedging) contracts
- most participants use financial hedges to manage risk
  - Pool price only applies where participants have pool exposure
    - ie they have not taken contract cover

Observations on networks

- question still debated is should networks be part of the market?
  - Network constraints and investment can have a significant impact on the pool price and thus generators and retail supply
  - can the market be relied upon to make investments without government intervention?
  - the form of regulation?

Observations on networks (2)

- In Australia networks are regulated
  - – CPI-X either with a revenue or price cap
- non regulated investment is permitted
  - – relies on the regional price differences
- 97% of regulated network costs are paid by consuming customers
- Losses are paid by both generators and customers

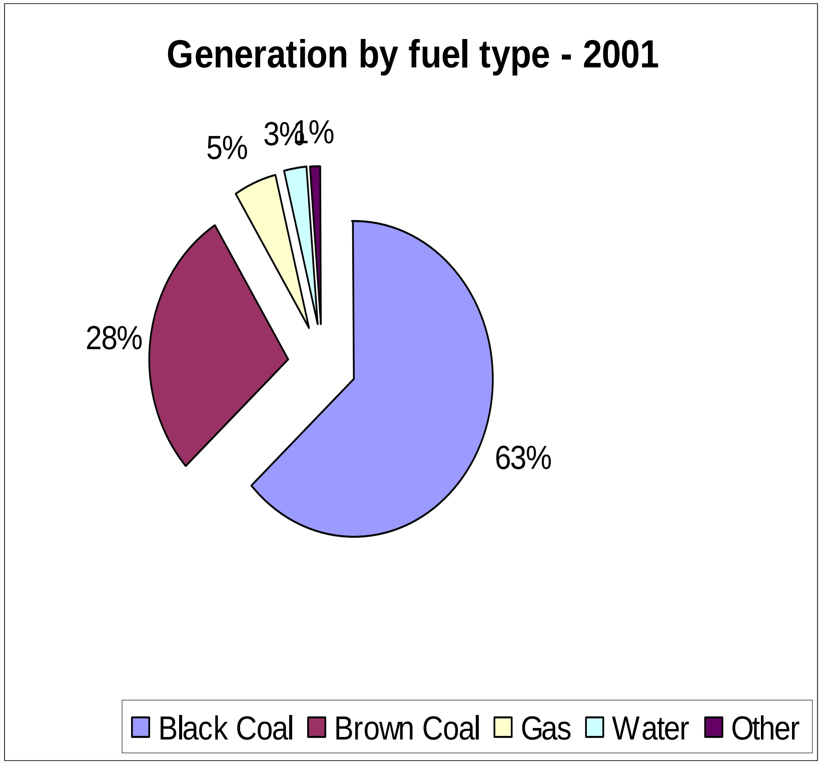
Observations on networks (3)

- Australia has a mixture of regulated and unregulated networks
  - is such a mix unsustainable?
  - regulated networks reduce energy prices, whereas unregulated networks require price differences.
- Should the market move to full nodal pricing?
  - alternatively greater use of regions or zones?

Observations on market power

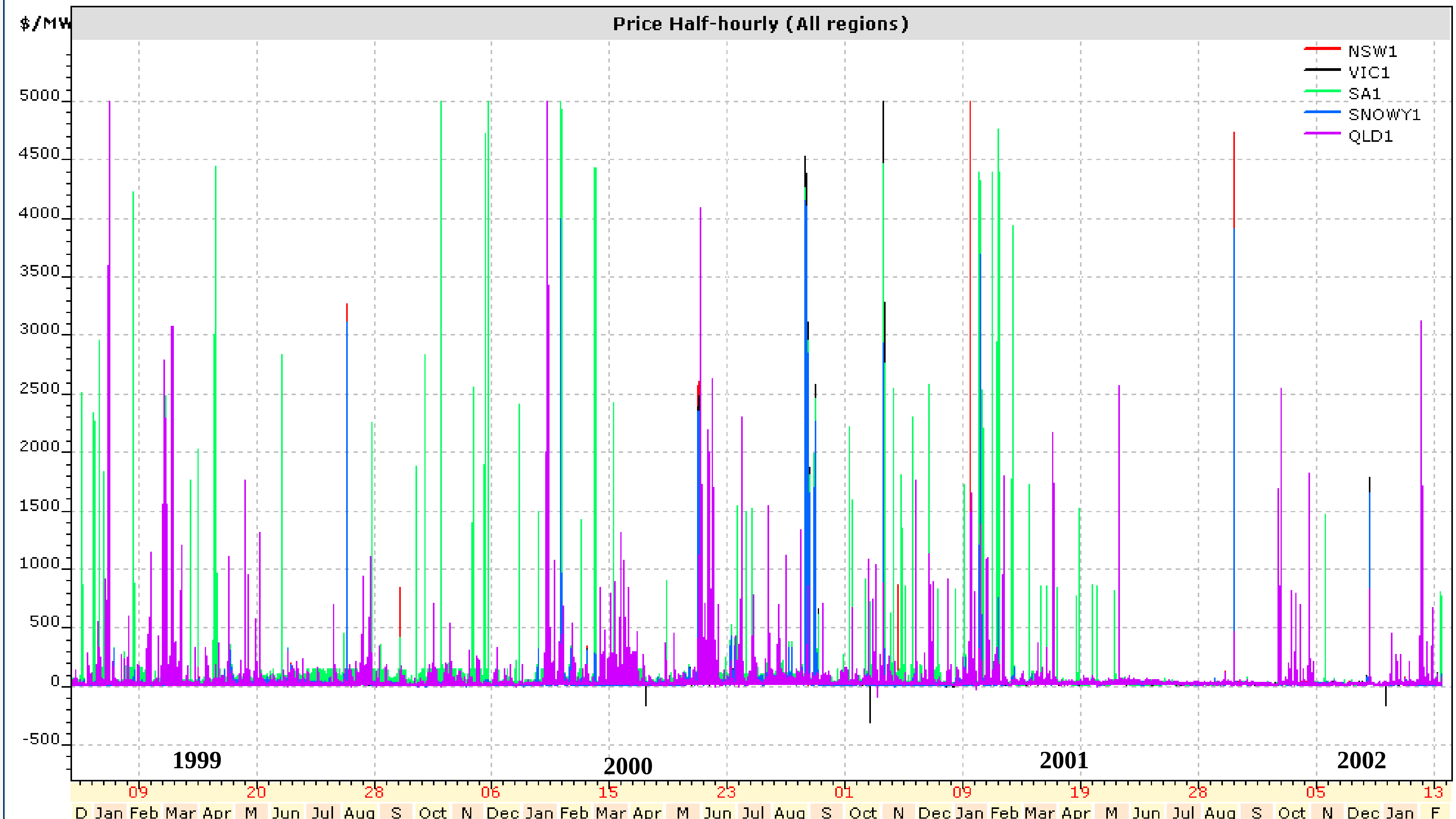
- Concern about pool price volatility in both energy and ancillary services markets
- Move to introduce conduct rules into the market code
- However, industry structure rather than pool design seems to be the cause of the problem
  - In some regions portfolio plant must run to meet demand
  - any portfolio plant can set marginal price
- Pool while technically efficient can result in price manipulation

Observations on market power (2)



- Australian base load served by coal
  - low marginal cost
  - generally inflexible
- Gas and hydro plant used to meet peaks
  - increasing "peakiness" of demand
- lack of flexible plant in Australia means balancing more critical

Spot prices for all NEM regions from Dec 98 to Feb 02



Source IES 2002

Observations on market power (3)

- Market monitoring is conducted weekly
  - cooperation between ACCC and market code administrator
  - further enhancements likely
- Relationship between bidding and market design complex
  - interaction with contract positions, weather and physical constraints
  - designing anti-gaming rules difficult
- Government review is looking at issue of market design

Conclusion - Lessons from the Australian Experience

- Clear policy direction and government commitment resulted in reforms being implemented - significant achievement
- Outcome of reforms has delivered
  - lower real prices and greater efficiency
- However some on-going issues
  - pool price volatility has raised concerns about market power
  - the role of networks needs to be resolved
  - completing retail reform also a priority

Lessons from the Australian Experience (2)

- Australia attempted to recognise the different starting points within Australia
  - hence approved transitionary arrangements
  - but now some temptation to make these permanent
- recognise that structural reform is essential for an effective market
  - market design cannot fix structural defects
- creating independent market institutions provides reassurance and credibility

TRANSMISSION PRICING IN MARKETS:

Price Regulation in Electricity Transmission

Juan Rosellón
Centro de Investigación y Docencia Económicas (CIDE)

Seminar "Regulation and Competition in Electricity Markets". Mexico City, May 30th and 31st

CONTENTS

- Introduction
- Regulation of Price Level
- Regulation of Price Structure
- Regulation of Natural Gas Distribution
- Regulation of Electricity Transmission

INTRODUCTION

History of Optimum Prices

- First best: marginal cost (70´s)
- Second best: Ramsey prices (80´s)
- Third best: Revelation Principle/Laffont-Tirole (93)
- Fourth best: Theoretical models with practical restrictions (at present)

INTRODUCTION

Mechanism Design

- A mechanism implements the social choice function for some equilibrium concept, if:

$$\begin{tikzcd}
\Theta^1 x \ldots x \Theta^I \arrow[rr, "f(\bullet)"] \arrow[dr, "E_{gc}(\bullet)"'] & & A \\
& M^1 x \ldots x M^I \arrow[ur, "g(\bullet)"'] &
\end{tikzcd}$$

INTRODUCTION

Mechanism Design

- A mechanism is

  * Direct if $M_i=\Theta_i, \forall i=1,\ldots,I$

  * Revealing if $\theta\in E_{gc}(\theta), \forall\theta\in\Theta$

  * Implementing by revelation if direct, revealing and $g(\theta)=f(\theta), \forall\theta\in\Theta$

INTRODUCTION

Mechanism Design

- Revelation principle

  "Let (g,M) be a mechanism that implements the social choice function $f(\bullet)$ for a dominant equilibrium criteria, then there is a direct mechanism (φ,Θ) that implements $f(\bullet)$ by revelation"

INTRODUCTION

The Canonic Model of Regulation. Assumptions (J.J. Laffont, Econometrica, 1994)

1.- Regulation is subject to adverse selection and to moral hazard.

2.- Costs, products and prices can be verified. However, the regulator cannot distinguish different cost components.

3.- The firm may refuse to produce if the regulator contract does not guarantee a minimum level of expected utility.

INTRODUCTION

The Canonic Model of Regulation. Assumptions

4.- The regulator may give monetary transfers to the firm.

5.- The firm and regulator are risk neutral with respect to income.

6.- The firm only cares about its income and effort ($U=t-\varphi(e)$, $t=t + R(q)-c(\bullet)$).

7.- The regulator faces a shadow cost of public funds ($\lambda>0$).

INTRODUCTION

The Canonic Model of Regulation. Assumptions

8.- The regulator's objective is to maximize social welfare (benevolent regulator).
9.- The regulator designs the regulating contract.

INTRODUCTION

- Revelation Principle (direct revealing mechanism: $\{t(\beta), c(\beta)\}$)

- Under asymmetric information

$$Max \int_{\underline{\beta}}^{\overline{\beta}} \{S - (1+\lambda)(\beta - e + \varphi(e)) - \lambda U(\beta)\} \mathrm{dF}(\beta)$$

Subject to:

$$U(\beta) = -\varphi'(e(\beta)),\ \forall\beta$$

$$U(\beta) \geq 0,\ \forall\beta$$

INTRODUCTION

- Linear Contract Menu. Transfers function:

$$t(\beta) = U^*(\beta) + \varphi(e^*(\beta)) = t(\beta(c)) = T(c)$$

$$t(c,c^a) = a(c^a) - b(c^a)(c - c^a)$$

- Dichotomy between Price and Cost Repayment Rules

$C = c(\beta,e,q)$ can be rewritten as

$$C = c(\zeta(\beta,e),q)$$

INTRODUCTION

- Dichotomy between Prices and Cost Repayment Rules
  - Prices Rule: Ramsey-Boiteux
  - Cost Rules:
    - * maximum price regulation for the most efficient firm
    - * regulation using cost of service for least efficient

INTRODUCTION

- "Desirable" properties of applied mechanisms:

  - Pareto Superiority
  - Efficiency improvements

- Few niches for legal and natural monopolies (e.g. gas and electricity transmission and distribution)

INTRODUCTION

- Monopoly's regulation is important because they are vertically related to competitive sectors.

- Two basic concepts:

  - Price level
  - Price structure

REGULATION OF PRICE LEVEL

Options

- Regulation using “Service Cost”
- Maximum prices. Adjustment factors (RPI, X, etc.)
- “Yardstick” Regulation
- Profit distribution
- Hybrid regulation

REGULATION OF PRICE STRUCTURE

- Total distribution of costs
- Price bands
- Restricted flexibility

  - Tariffs’ basket
  - Average income

REGULATION OF PRICE STRUCTURE

Types of weights

- Laspeyres' chained
- Paasche.
- Laspeyres' fixed
- Ideal
- Flexible (average income)

REGULATION OF PRICE STRUCTURE

- Fights regarding consumers groups and competitors of the regulated firm.
- An unrestricted monopoly fixes an efficient price structure but at an inefficient level.
- Contractual prices must coexist with regulated prices and must come with quality regulation in order to avoid cross subsidies.

REGULATION OF NATURAL GAS DISTRIBUTION

Maximum Price Regulation

- Average Income Regulation:
- Establishes a maximum for income per unit.
- Does not establishes weights that restrict tariffs' rebalance

- Tariffs' Basket Regulation:
- Establishes a maximum for an index.

$$\mathrm{I(p)} = \sum_{i=1}^{h} w_i p_i$$

REGULATION OF NATURAL GAS DISTRIBUTION

CRE's Plan

- New projects (greenfield) are characterized by a higher level of uncertainty at their initial phase.

- Average Income Regulation is used during the first five years period. After that, tariffs' basket regulation is implemented.

- CRE's Plan:
- Average income is calculated each period t using product for the same period Q_t .

REGULATION OF NATURAL GAS DISTRIBUTION

- CRE's Plan:
- Prices are established at the begining of the period based on an estimation of $Q_{t.}$
- A correction factor (K) is necessary in order to adjust estimation errors.

- CRE: average income regulation provides the necessary flexibility when rebalancing tariffs during the initial stage of new projects.

REGULATION OF NATURAL GAS DISTRIBUTION

Literature review. Three outcomes

1. Under steady cost and demand functions, and myopia in welfare maximization, the Laspeyres' chained index converges to Ramsey prices.

2. Assuming steady cost and demand functions, and myopia in welfare maximization, average income regulation implies divergence relative to Ramsey prices.

3. Within a dynamic environment with unstable cost and demand functions, or no myopia in welfare maximization, the Laspeyres's chained index generates prices that can diverge from Ramsey's structure.

REGULATION OF NATURAL GAS DISTRIBUTION

Literature Review. Policy recommendations.

- The Laspeyres' chained index must be used under conditions of costs and demand stability.
- Under risk and uncertainty there is no reason that justifies the use of the Laspeyres' index.
- Average income regulation is a less binding restriction than the Laspeyres' chained index.
- Under fluctuating demand conditions, what are the effects of average income regulation on consumer surplus?

REGULATION OF NATURAL GAS DISTRIBUTION

Average Income Restriction (Ramírez&Rosellón, Energy Economics, forthcoming)

- Static restriction: $\left\{ p \,/ \sum_i Q_i(p_i)p_i \le p_0 \sum_i Q_i(p_i) \right\}$

$$AR_t = p_t + \frac{F_t}{Q_t}$$

- Dynamic restriction: $E(AR_t) = p_t + \dfrac{F_t}{E(Q_t)} \le M_t$

$$F_t \le E(Q_t)\left[M_t - p_t\right]$$

REGULATION OF NATURAL GAS DISTRIBUTION

Average Income Restriction

- Dynamic Restriction:

$$M_{t+1} = K_t + M_t$$

$$M_t = M_0 + k_1 + ...k_{t-1}$$

REGULATION OF NATURAL GAS DISTRIBUTION

Average Income Restriction

- Dynamic restriction:

- K_t will be positive, zero or negative when $AR_t < M_t$, $AR_t = M_t$ o $AR_t > M_t$, respectively.

- Strategic effect: $F_t \leq Q_t \left[M_t - p_t \right]$

REGULATION OF NATURAL GAS DISTRIBUTION

Average Income Restriction

- Dynamic restriction:
- Stochastic effect: Q_t stochastic $\Rightarrow$ $E(Q_t) \neq Q_t \Rightarrow AR_t \neq M_t \Rightarrow$ $K_t \neq 0$ and then, higher (or lower) flexibility for F_{t+1}.

REGULATION OF NATURAL GAS DISTRIBUTION

Stochastic model

$$\max_{p_t, F_t} E\left\{ \sum_{t=1}^{T} \beta^t (p_t Q_t - c(Q_t) + F_t) \right\}$$

Subject to

$$Q_{t+1} = Q_t(p_t) - K_t$$

$$F_t \leq E\{Q_t(M_t - p_t)\}$$

$$Q_T \geq N$$

$$\beta^t \in [0,1]$$

REGULATION OF NATURAL GAS DISTRIBUTION

Stochastic model. Solution

- Static scenario: Establishes a usage charge *P* close to zero and a fixed charged *F* that fulfills average income and cumulative restrictions.
- Dynamic scenario with strategic settlement of prices: usage charge in time *t* (P_t) is kept close to zero while the fixed charge in time *t+1* (F_{t+1}) is strategically established in order to cover prediction errors.

REGULATION OF NATURAL GAS DISTRIBUTION

Stochastic model. Solution

- Dynamic scenario without strategic settlement of prices: static case solution is applied every period.
- However, we isolate stochastic effects on consumer surplus. We assume that fix charge remains constant each period and study how the firm handles its expected profits subject to restrictions on average income and cumulative restrictions, and under the stochastic behaviour of correction factor *K*.

REGULATION OF NATURAL GAS DISTRIBUTION

Stochastic model. Simulation

$$\max_{p_t} E\left\{\sum_{t=1}^{T} \beta^t (M_t[a - bp_t] - [F + cp_t]\right\}$$

subject to

$$Q_{t+1} = a - bp_t - K_t$$

$$Q_T \geq N$$

REGULATION OF NATURAL GAS DISTRIBUTION

Simulation Outcomes

- Results were obtained assuming that there is no strategic behaviour.
- Consumer surplus lowers (increases) when the firm is risk loving (risk adverse) and when there is less (more) demand uncertainty.

REGULATION OF ELECTRICITY TRANSMISSION

Objectives

- Incentives to minimize distance between generating stations and demand centers.
- Reliability of frequency and voltage in the system.
- Coordination among generating plants and providing answers to emergencies.

REGULATION OF ELECTRICITY TRANSMISSION

Main problems

- Capacity usage (short term).
- Optimum investment (long term).

Suggestion for regulating price level

- Maximum prices.
- RPI-X; 0% ≤ X ≤ 5%.
- 5 years regulator lag.
- Service cost each quinquennial revision.

REGULATION OF ELECTRICITY TRANSMISSION

Suggestions for regulating price structure

- It consider congestion (short term) and capacity (long term) problems.
- Two-part tariffs:
  - ∗ Usage charge: solves congestion problems.
  - ∗ Fixed charge: recovers capital costs.
  - ∗ Rebalancing charges: incentives to investment.
  - ∗ Transmission quantities are used as weights.

REGULATION OF ELECTRICITY TRANSMISSION

Model (I. Vogelsang, Journal of Regulatory Economics, 2001)

$$max \prod^t = p^t q^t + F^t N - c(q^t, k^t)$$

subject to $\sum_i p_i^t q_i^w + \sum_j F_j^t \delta_j^w \le (\sum_i p_i^{t-1} q_i^w + \sum_j F_j^{t-1} \delta_j^w)(1 - X)$

$$F^t \le F^{t-1} + \left(p^{t-1} - p^t\right) q^w / N$$

$$q^t \le k^t$$

REGULATION OF ELECTRICITY TRANSMISSION

- F.O.C.

$$\left(\frac{\partial q^t}{\partial p^t}\right)\left(p^t + \mu^t - \frac{\partial c}{\partial q^t}\right) = q^w - q^t$$

$$\mu^t = 0 \Rightarrow \left(p^t - \frac{\partial c}{\partial q^t}\right) = -\left(\frac{q^w}{q^t - 1}\right) \Big/ \varepsilon$$

- Under Laspeyres' chained index it converges to Ramsey

REGULATION OF ELECTRICITY TRANSMISSION

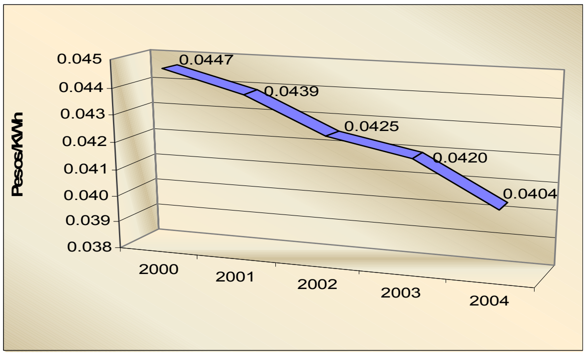
Simulation (Rosellón J., y A. Nevarez, UNAM- Miguel Angel Porrúa, forthcoming)

1. A transmission firm that provides transmission service across all national territory and applies the same charges to all consumers.
2. Different regional transmission firms that operate independently in each of nine areas of NES and that apply different charges to each area.
3. A transmission firm that operates across all national territory but applies different prices in each region.

- Higher investment sums and profits for the transmission firm are obtained in scenario 3.

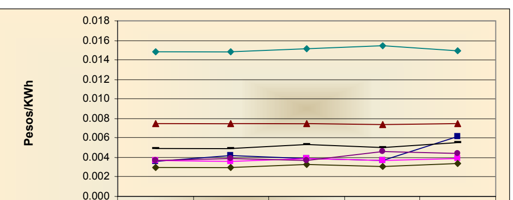
REGULATION OF ELECTRICITY TRANSMISSION

Variable charge. Monopoly with Price Discrimination (2000-2004)



REGULATION OF ELECTRICITY TRANSMISSION

Fixed charge per area with Price Discrimination (2000, 2004)



	2000	2001	2002	2003	2004
PENINSULAR	0.003618	0.004209	0.003937	0.003686	0.006093
NORTHEAST	0.003632	0.003629	0.003851	0.003634	0.003864
NORTH	0.004871	0.004866	0.005330	0.005058	0.005537
OCCIDENTAL	0.002928	0.002925	0.003222	0.003063	0.003370
NORTHWEST	0.003695	0.003886	0.003728	0.004606	0.004423
ORIENTAL	0.007426	0.007421	0.007424	0.007411	0.007426
CENTRAL	0.014852	0.014842	0.015164	0.015477	0.014939

REGULATION OF ELECTRICITY TRANSMISSION

Final Price per Area, Monopoly with Price Discrimination

YEAR	2000	2001	2002	2003	2004
Peninsular	0.048275	0.048086	0.046485	0.045658	0.046476
Noreast	0.048289	0.047506	0.046398	0.045605	0.044248
North	0.049527	0.048743	0.047878	0.047029	0.045921
Occidental	0.047584	0.046803	0.045769	0.045035	0.043754
Norwest	0.048352	0.047764	0.046275	0.046577	0.044807
Oriental	0.052083	0.051298	0.049972	0.049383	0.047810
Central	0.059509	0.058719	0.057712	0.057448	0.055323

REGULATION OF POWER TRANSMISSION

Principals

- Efficient operation of the energy market.
- Efficient investment in the system.
- Signposting advantages of locating generation and distribution.
- Recovering asset costs.
- Simplicity and transparency.
- Political feasibility.

ENERGY QUALITY AND ITS REGULATION

Dr. Manuel Madrigal Martínez
Graduated and Electric Engeneering Research Program
Morelia TECHNOLOGICAL INSTITUTE

Regulation and Competition in the Electricity Markets

Mexico City, May 30-31, 2002

CONTENTS

- Introduction to Energy Quality
- Energy Quality Improvement
- Regulation of the Electric Energy Distribution
- Conclusions

INTRODCTION TO ELECTRIC ENERGY QUALITY

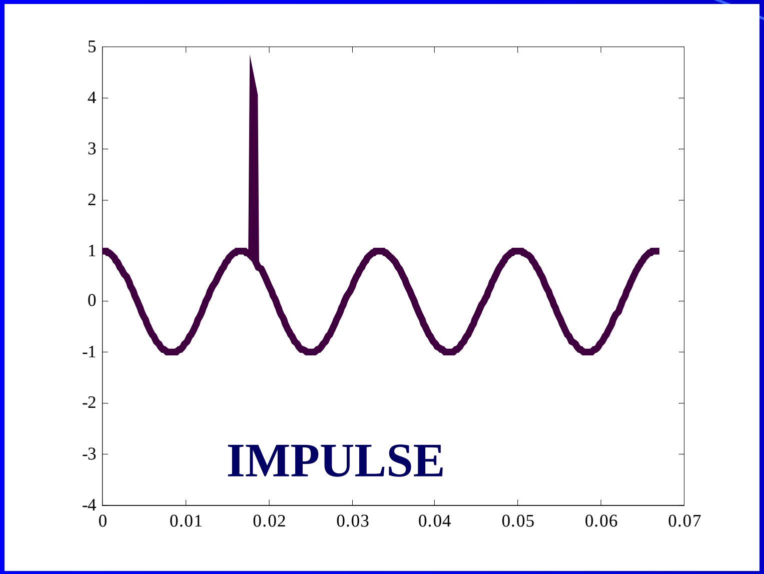
Definition

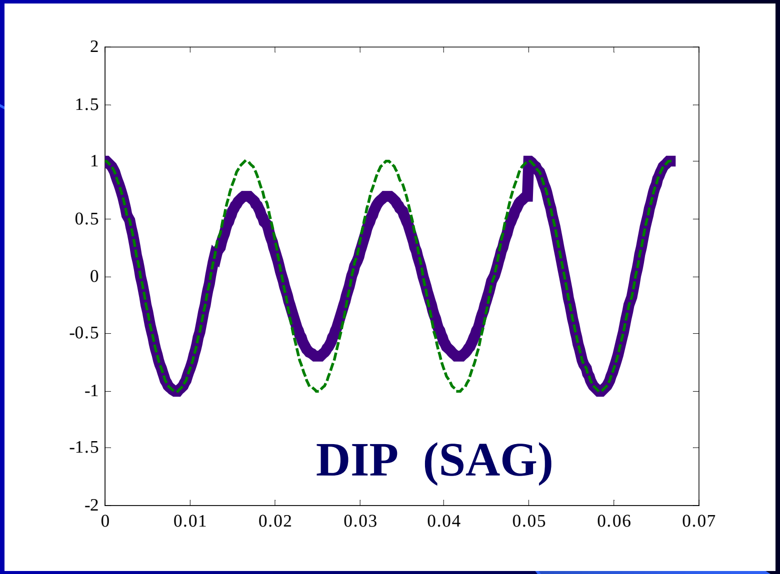
- Parameters and/or properties of the voltage delivered to the user, which should be free of stability, continuity and wave form deterioration problems

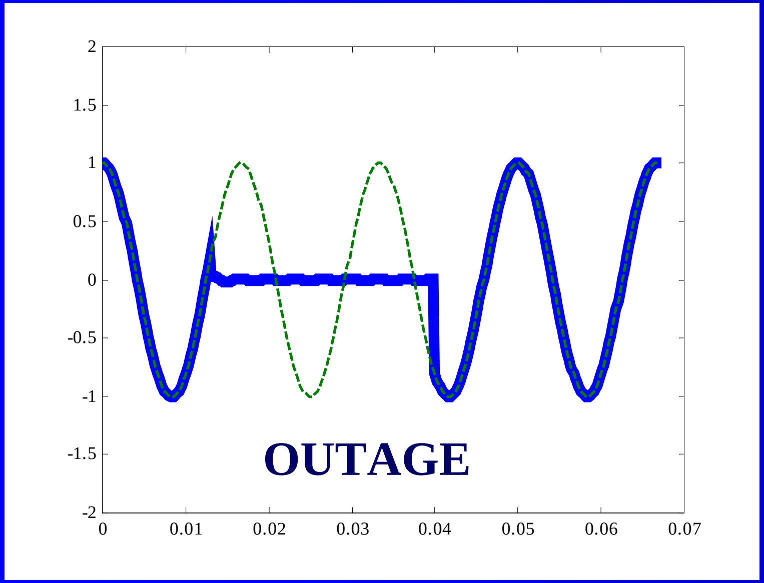
Definition (Cont'd)

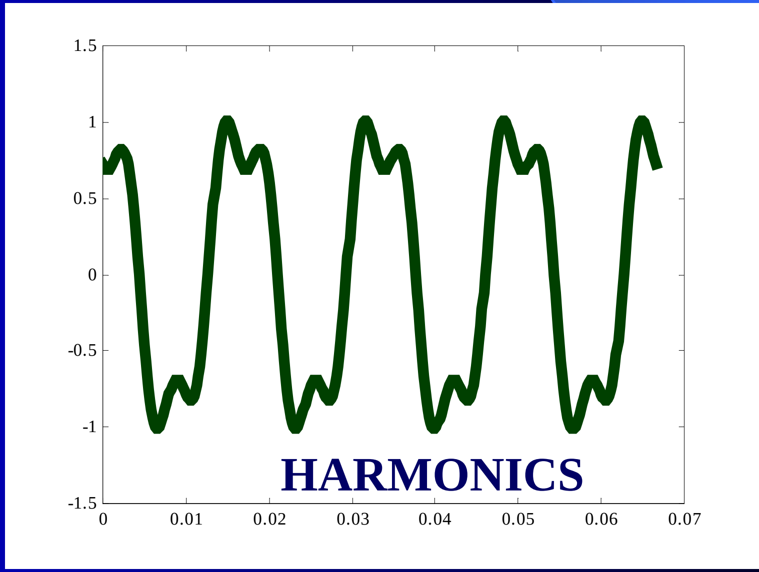
- Voltage stability
  - Over-voltage, under-voltage, voltage brownouts (sags), swells, flickers, frequency
- Supply continuity
  - Momentary, temporary and sustained interruptions
- Voltage wave forms
  - Transitories, unbalance, harmonic

Energy quality disturbances









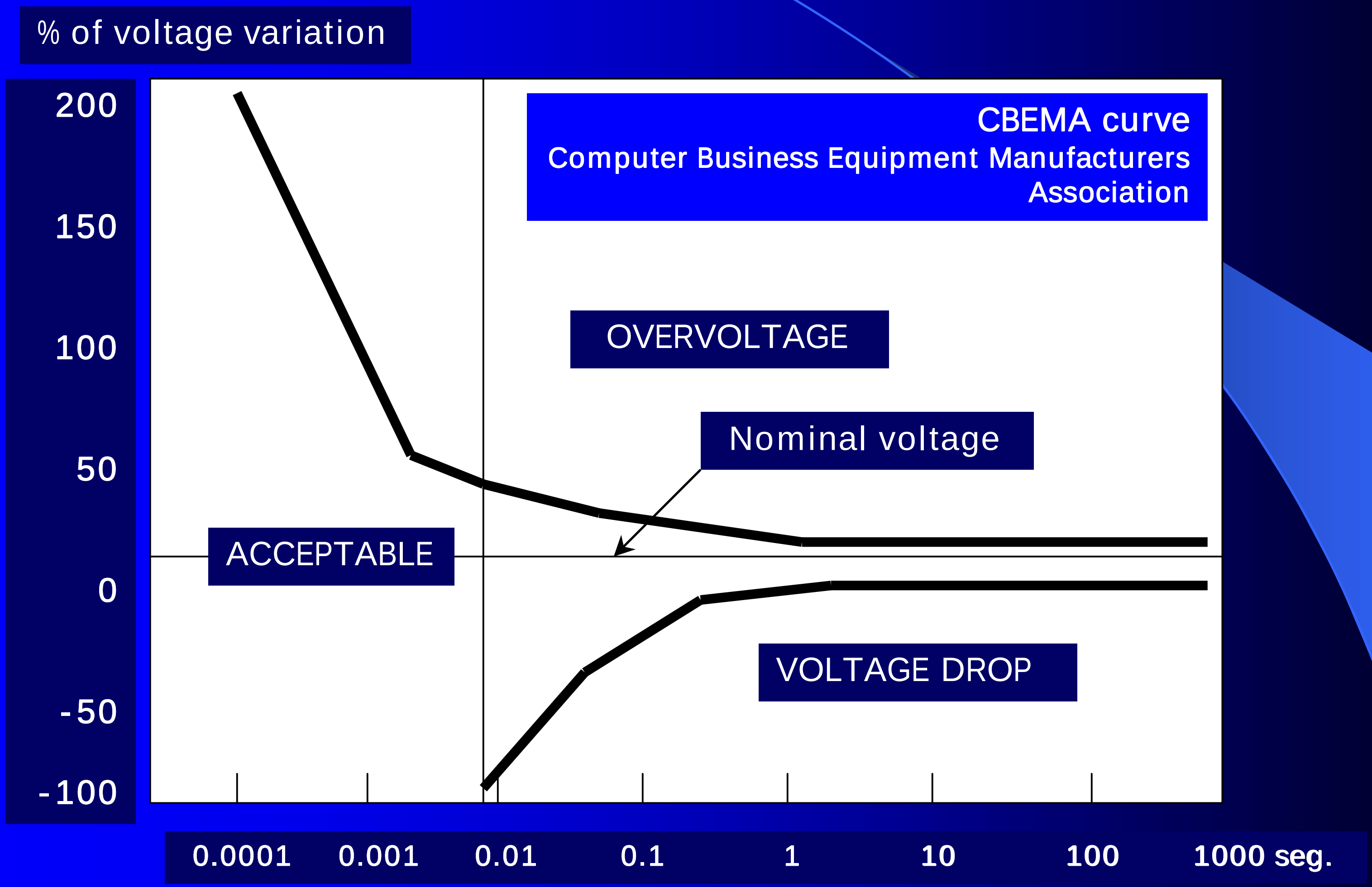
Disturbances categories

CATEGORY	PERIOD	MAGNITUDE
TRANSITORY		
Impulses	< 1 ms	<8 pu
Oscillations	1 ms – 50 ms	<8 pu
SHORT LASTING		
DIPS (sags)	0.5 30 cycles	0.1 – 0.9 p.u
Swell	0.5 – 30 cycles	1.1 1.8 pu
LONG LASTING		
Outgage	> 1 min	0.0 pu
Voltage drop	> 1 min	0.8 – 0.9 pu
Over voltage	> 1 min	1.1 – 1.2 pu
STEADY STATE		
Unbalances		0.5 – 2 %
Harmonious	0 – 100 harmonic	
Inter-harmonious	0 – 6 kHz	
Fluctuations	< 25 Hz	

Energy quality indexes

INDEX	DEFINITION	APPLICATION
Active power (*P*)	$\sum_{h=1}^{N} \frac{V_h I_h}{2} \cos\theta_h$	Measurement
RMS Value	$\sqrt{\sum_{h=1}^{N} V_h^2 / 2}$	Measurement
Apparent power (s)	$V_{rms} I_{rms}$	Measurement
Power factor *(PF)*	P / S	Penalization
Harmonic distortion (*THD*)	$\sqrt{\sum_{h=2}^{N} V_h^2} / V_1 \times 100\%$	Standards, general purpose
Unbalance factor	$\lvert V_- \rvert / \lvert V_+ \rvert$	Triphasic circuits
K Factor	$\sum_{h=1}^{N} h^2 I_h^2 / I_{rms}^2$	Transformer capacity
Flicker Factor	$\Delta V / \lvert V \rvert$	Lamp operation, voltage regulation
Telephone influence factor	$\sqrt{\sum_{h=1}^{N} w^2 I_h^2} / I_{rms}$	Interference in audio
Crest factor	V_{pico} / V_{rms}	Dielectric effort

Energy quality quantification



Importance of the electricity quality

- Main causes for poor quality energy

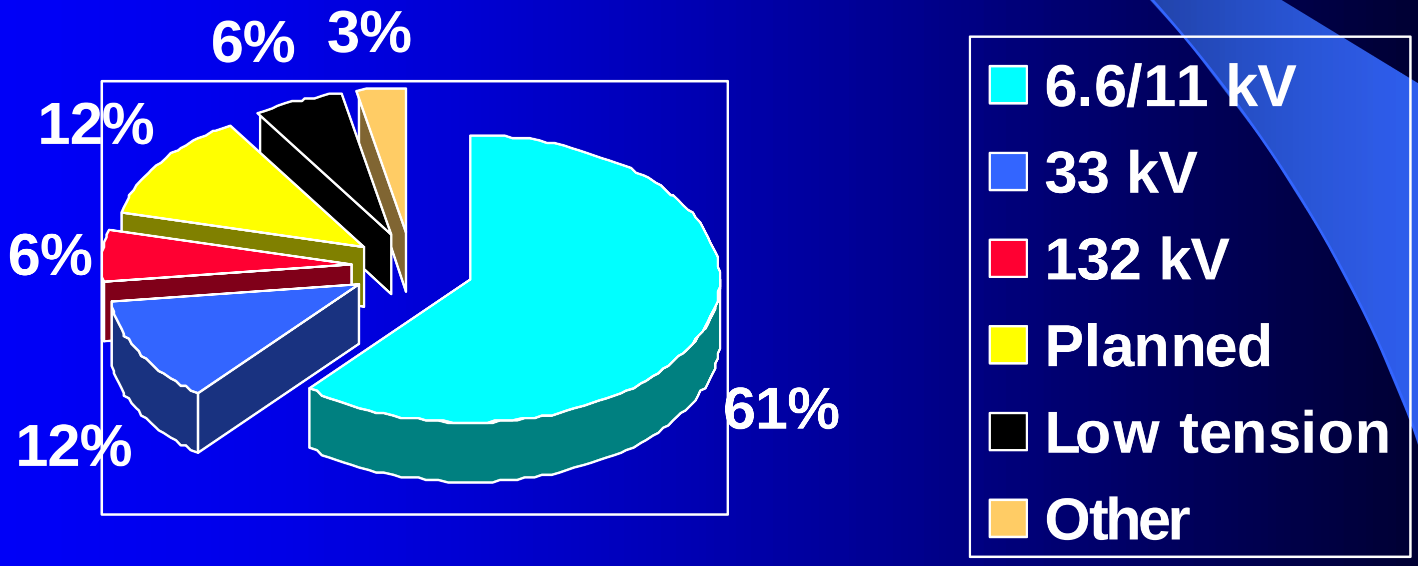
  Normal network operation conditions, atmospheric electrical discharges, failures, switch and fuses operation, capacitors management, motor starting, lack of feeders maintenance, among others.

- Effects of a poor electric energy quality
  - Mis-operation of sensitive equipment, production lines to stop, mis-operation of electric motors speed contollers, high penalizations for low power factors, among others.

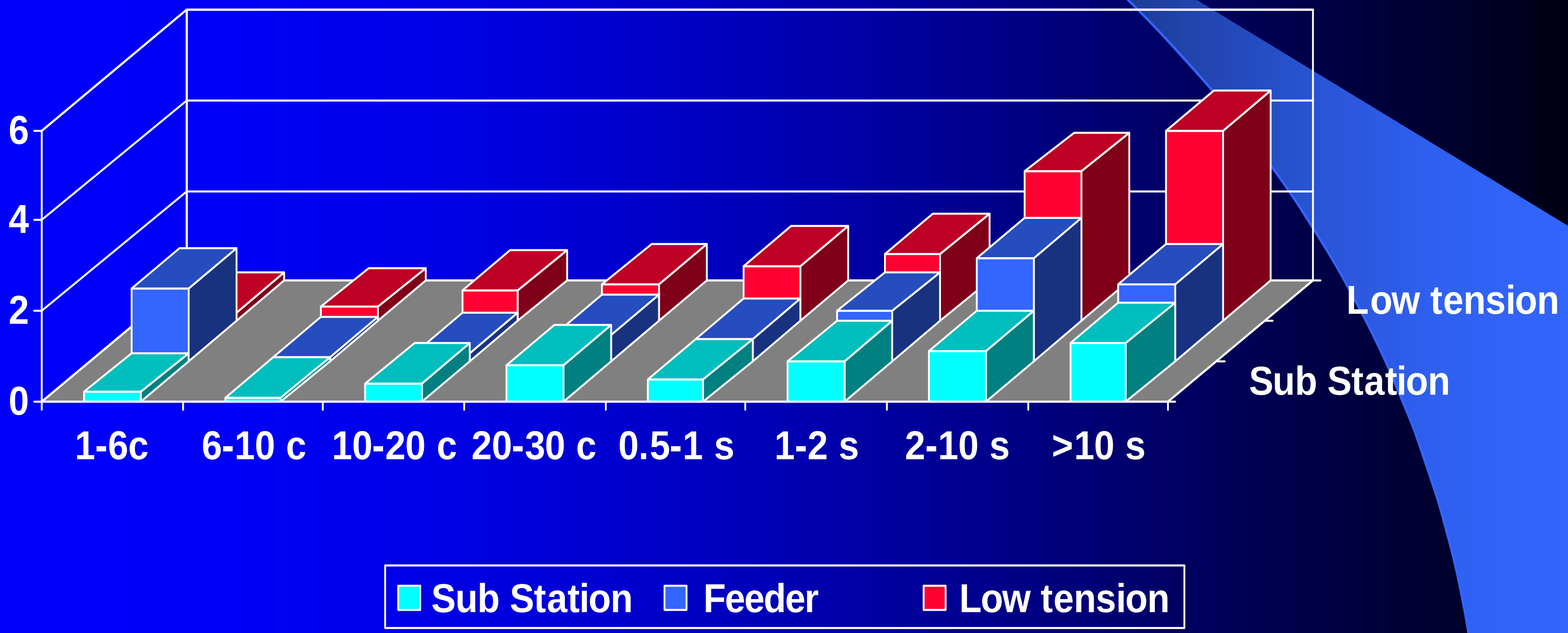
Norms and standards

- IEEE std 1159: Recommended practice for monitoring electric power quality
- IEEE std 1100: Recommended practice for powering and grounding sensitive electronic equipment
- EN 50160: European standard, voltage characteristics of electricity supplied by public distribution systems
- IEC 61000-1-1: Electromagnetic compatibility, application and interpretation of fundamental definitions and terms
- IEEE std 519: Recommended practices and requirements for harmonic control in electric power systems

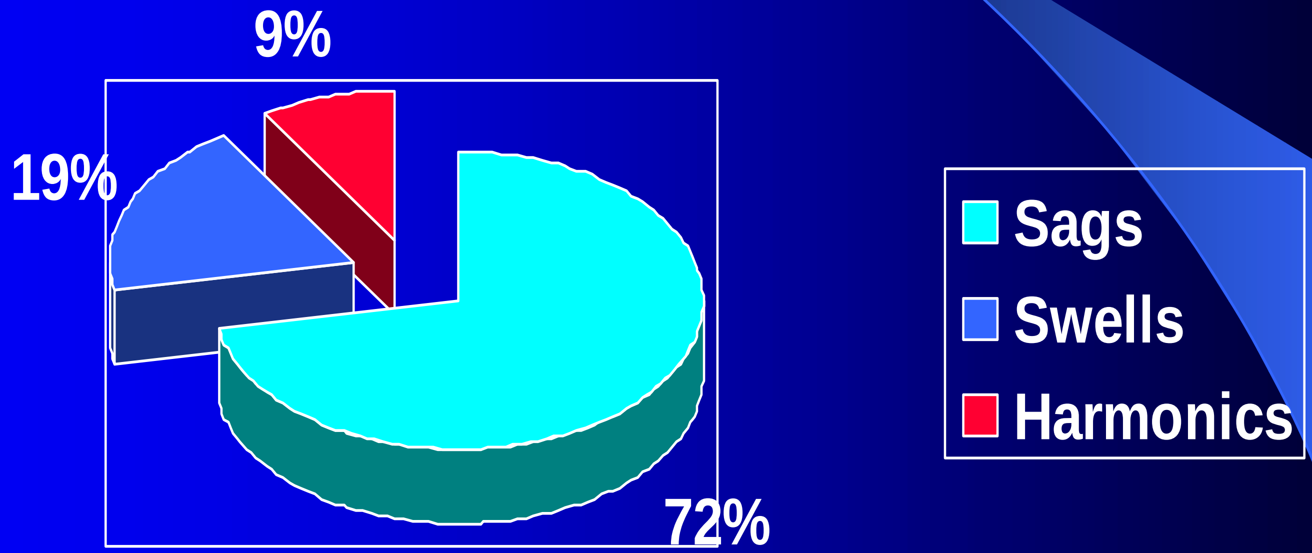
Contributions to long lasting outages (UK)

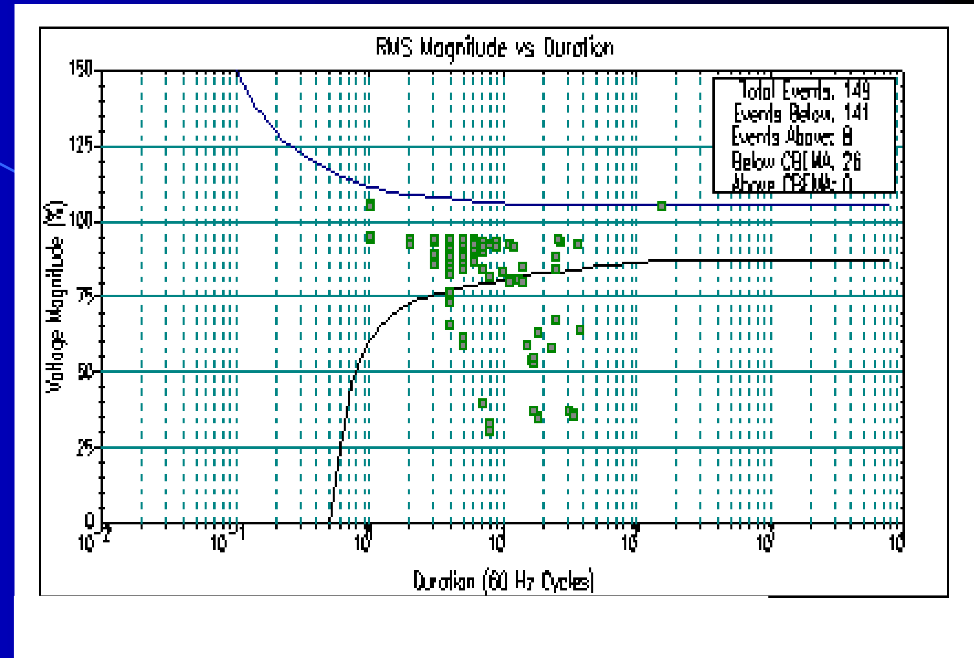


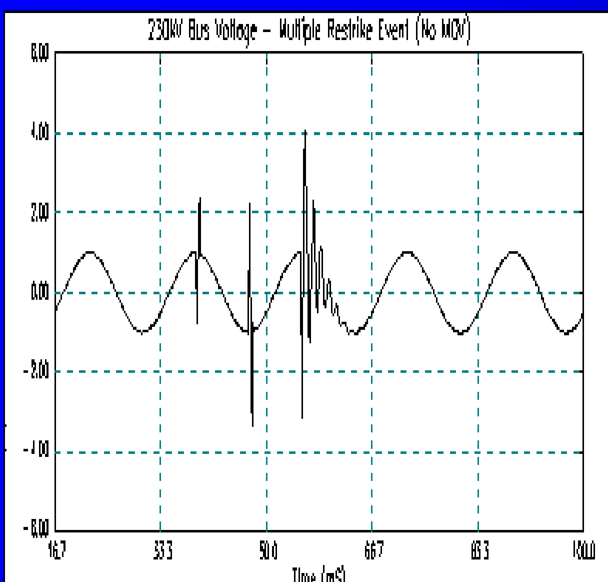
Outage frequency in a distribution system (USA)

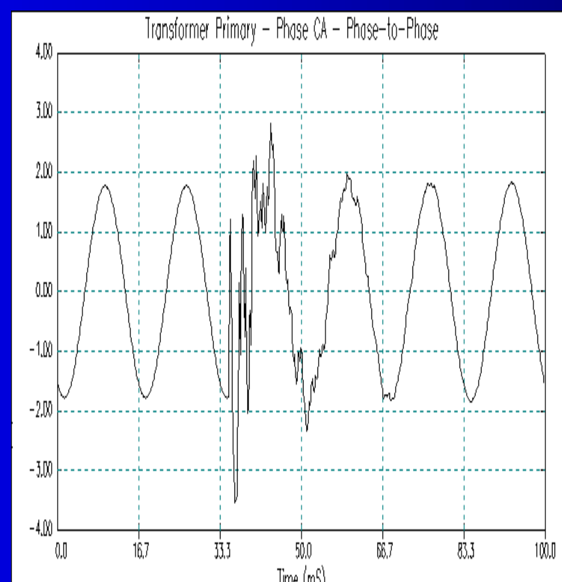


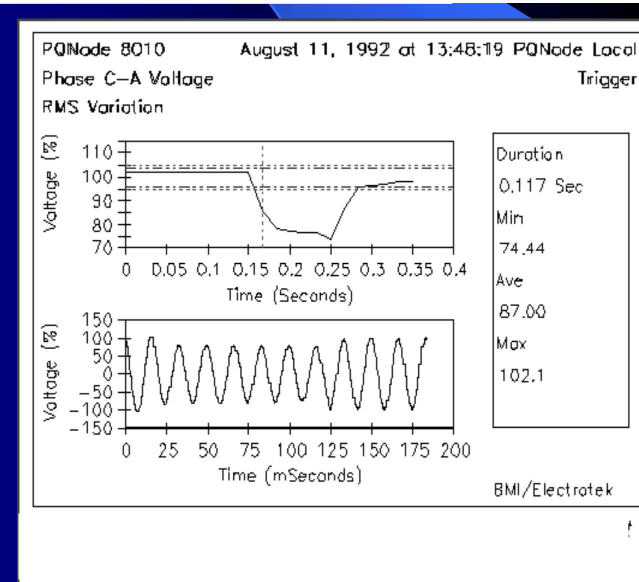
Disturbances that affect production in semiconductors manufacturing companies (Taiwan)




RMS Magnitude vs Duration
Total Events: 149
Events Below: 141
Events Above: 8
Below CBEMA: 26
Above CBEMA: 0
Voltage Magnitude (%)
150
125
100
75
50
25
0
Duration (60 Hz Cycles)


230kV Bus Voltage – Multiple Restrike Event (No MOV)
4.00
2.00
0.00
-2.00
-4.00
16.7
33.3
50.0
66.7
83.3
100.0
Time (mS)


Transformer Primary – Phase CA – Phase-to-Phase
4.00
3.00
2.00
1.00
0.00
-1.00
-2.00
-3.00
-4.00
0.0
16.7
33.3
50.0
66.7
83.3
100.0
Time (mS)


PQNode 8010
August 11, 1992 at 13:48:19 PQNode Local
Phase C–A Voltage
Trigger
RMS Variation
Voltage (%)
110
100
90
80
70
0 0.05 0.1 0.15 0.2 0.25 0.3 0.35 0.4
Time (Seconds)
Duration
0.117 Sec
Min
74.44
Ave
87.00
Max
102.1
Voltage (%)
150
100
50
0
–50
–100
–150
0 25 50 75 100 125 150 175 200
Time (mSeconds)
BMI/Electrotek

IMPROVEMENT OF ELECTRICITY QUALITY

- Quality to satisfy customer's specific needs
  - Increasing Reliability
  - *Custom Power Equipments*
    - Dynamical Voltage Restorer (*DVR*)
    - Static Syncronous Compensator (*STATCOM*)
    - Solid-State Transfer Switch (SSTS)
  - Flexible, Reliable and Intelligent Electrical eNergy Delivery System (*FRIENDS*)
  - Premium Power Park (*PPP*)

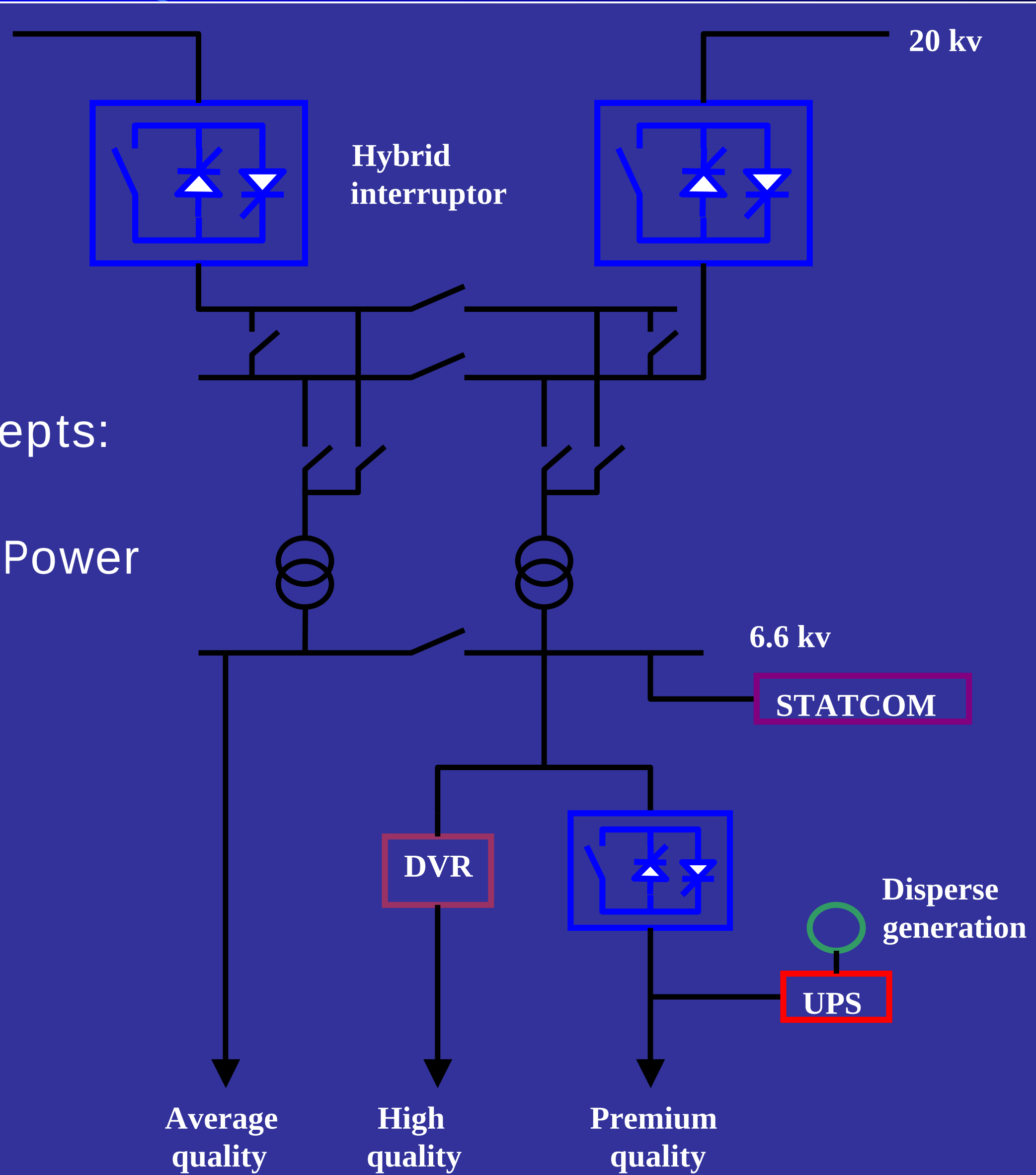
Increasing reliability

- Feeding ciruits redundancy
- Automatic interruptors use
- Additional protection devices
- Altenative energy sources
- High maintenance level
- Minimizing interruption periods

Quality to satisfy customer's specific needs

- Concepts:

Custom Power
FRIENDS
PPP



ELECTRICITY DISTRIBUTION REGULATION

- Supply Quality
  - Supply continuity
- Voltage Quality
  - Quality of the product
- Commercial Quality
  - Customer services

Supply Quality

- Continuity in the energy supply
- Long period interruptions
- Supply restoration time
- Limitations to interruption frequency
- Limitations to interruption periods

Supply Quality (Cont.)

Country	Planned vs unplanned interruptions	Short vs long interruptions	Voltage levels	Number and period indicators
Italy	Both measure, only no planned are regulated	Both measured, only long are regulated	Measure at all levels, regulated only in MT and BT	Both calculated, only period is regulated
Norway	Both measure and regulated	Only long are measured and regulated	Only those up to 1 kV are measured and regulated	Only period is measured and regulated
Portugal	Both measure and regulated	Measured only > 1 min, regulated only > 3 min	Measured only above 1 kV, regulated at all levels	Only period measured, proposal to regulate only period
Spain	Both measured, only no planned regulated	Only long measured and regulated	Measured only above 1 kV, regulated at all levels	Only period measured, proposal to regulate both
United Kingdom	Both measured and regulated	Measured and regulated only > 1 min, > 1 sec to be measured in the future	Measured and regulated at all levels	Both measured

Voltage Quality

- Product quality
- Magnitude
- Frecuency
- Waveform distortion
- Short period interruptions
- Oscillations
- Transitories

Voltage Quality (Cont'd)

	Italy	Netherlands	Norway	Portugal	Spain	United Kingdom
Is voltage quality part of the regulation?	Yes	Yes	Yes	Yes	Yes	Yes
Is voltage quality regualted at system level?	Yes	Yes	No	Yes	No	Yes
Is the voltage quality regualted at individual level?	Yes	Yes	No	Yes	Yes	Yes
Do fines apply for failure to comply with standards ?	No	No	No	No	No	Yes
Is voltage uniformly regulated along the country?	Yes	Yes	Yes	Yes	Yes	Yes
Is voltage zone-regulated?	No	No	No	No	No	Yes
Is the E N 50160 standard imposed by regulation?	No	Yes	Yes	Yes	Yes	No
If so, at which levels?		All	22 kV	<45 kV	<36 kV	
Is voltage regulated at >35 kV levels?	Yes	Yes	No	Yes	Yes	Yes

Voltage Quality (Cont'd)

Voltage quality	Italy	Norway	Portugal	Spain	United Kingdom
Magnitude	EN 50160		EN 50160	EN 50160	(+-) 1%
Magnitude fluctuations	EN 50160	22 kV, other levels no regulated	< 45 kV EN 50160 > 45 kV (+-) 5%	BT y MT (+-) 7%	BT (230 V) +10%, - 6%
Sags	EN 50160		< 45 kV EN 50160		
Transitories					
Unbalances	EN 50160		< 45 kV EN 50160; > 45 kV (<2% for 10 min)		
Harmonics	EN 50160		< 45 kV EN 50160; > 45 kV indicative values		THD < 5% de 275-400 kV

Commercial Quality

- GS: individual service level
    - Costs estimation
    - Service requirements (Restoring time)
    - Penalizing payment
- OS: Global standards
  - For this service it is not possible to grant individual guarantees
    - Connection guarantees
    - Minimun performance level (connection time)
    - No penalization
- IS: Indicative standards
  - Establishes minimum quality standards
    - Individual guarantee
    - No penalization

Service	Italy	Holland	Potugal	Spain	United Kingdom
1. Responses to supplier fuse caused failures	-	IS	GS	-	GS
2. Supply restoration / reconnection	-	IS	OS	-	GS
3. Connection (supply and measurement)	GS	-	OS	GS	GS
4. Charges valuation	GS	-	OS	GS	OS
5. Notification of supply interruption	-	IS	-	OS	GS
6. Voltage claims	OS	-	GS	-	GS
7. Measurement problems	OS	IS	GS	GS	GS
8. Questions on charges and payments	OS	IS	GS	GS	GS
9. Appointment planning	GS	IS	GS	-	GS
10. Notification of standards-related payments	-	-	-	-	GS
11. Anticipated payment for measurement failures	-	-	-	-	GS
12. Voltage failure corrections	-	-	-	-	GS
13. Visits to consumers requiring measuring device change	GS	-	-	-	OS
	OS	-	-	-	OS
15. Measurer readings per year	OS	-	OS	GS	OS
16. Replies to customers letters	OS	IS	OS	-	OS
17. Replies to customers complaints	GS	IS	OS	GS	OS
18. Simple repairs execution	GS	IS	OS	GS	-
19. Cancellation when required by customer	GS	-	-	GS	-
20. Service re-connection after cancellation payment	OS	-	GS	GS	-
21. Estimation of charges for complex services	OS	-	-	-	OS
22. Complex services excecution	OS	IS	-	GS	-
23 Accuracy in billing	OS	-	-	-	-
24. Centers for consumers attention	-	-	OS	-	-
25. Telephonic attention services	-	-	OS	-	-

Commercial quality (Cont.)

Service	Italy	Holland	Portugal	Spain	United Kingdom
Fuse failures restoration	-	2 hrs	4-5 hrs	-	3-4 hrs
Supply restoration/re-connection	-	4 hrs	4 hrs	-	3 hrs
Connection (supply and measurement)	5-7 days	-	2 days	5 days	2 days
Service interruption notification	-	3-10 dias	-	24 hrs	5 days
Voltage complaints	10 days	-	20 days	-	5-7 days
Reply to customers letters	20 days	10 days	20 days	-	10 days
Re-connection after cancellation payment	1 day	-	1 day	1 day	1 day
Measurement problems	10 days	10 days	20 days	5-15 days	5-7 days
Queries regarding charges and payments	15 days	10 days	20 days	5-15 days	5 days

Strategies to ensure quality

- Regulation mechanisms (indivual contracts, tariffs, etc.)
- Quality indexes definition (norms and standards)
- Minimum acceptable quality definition (guaranteed indexes)
- Quality indexes measurement (monitoring and forecast)
- Periodic publication of quality indexes
- Penalizations and incentives

Quality regulation aspects

Country	Quality regulated aspects	Distributor responsibility	Incentives penalizations and beneficiaries	Quality objectives by zone	Quality indexes classes	Quality control mode
Argentina	Continuity, voltage, commercial	Trustability	Tariff reductions to affected customers	BT, MT and AT	System indexes and individual indexes	Selective measurement, contingency data
Chile	Continuity, voltage, commercial	Distribution quality	Penalizations	Urban and rural	System indexes and individual indexes	Specific customers, statistically selected nodes
England and Walles	Commercial	Distribution quality	Compensation to affected customers	-	Guarateed indexes	Client surveys reports to OFFER
France	Continuity, voltage	Aggregated	As negotiated	Voltage level or inhabitants number	individual indexes	EDF commitment with clients
E.U. (NYSEG)	Continuity, voltage, commercial	-	Incentives/penalization	12 divisions	System indexes	Control over 12 divisions
Norway	Voltage level and frecuency	Continuity contracts	Arbitration by committee	No zonification	Individual indexes as contracted	Compulsory report s to clients

CONCLUSIONS

- Requirement of norms and standards
- Quality according to specific needs
  - Cost of not having an appropriate quality level
  - Cost of having an appropriate quality level
- Distribution quality
  - Supply quality
  - Voltage quality
  - Commercial quality
- Guaranteed indexes
- Penalizations and incentives

Regulation of energy distribution depends on each country's conditions

Experiences with renewable energies in electricity markets

Eng. Odon de Buen R.

May 2002

Index

- Generalities
- International context
- International experience
- Cocoyoc meeting
- Conclusions

Renewable Energies : Definition

- Are forms of energy with a practically inexhaustible resources.
  - Technically usable
- They are also defined as non-conventional
  - Solar, wind, mini-hydraulic, biomass

Renewable Energies: Advantages

- **Allow the conservation of non-renewable resources**
- **Result in lower environmental impacts**
- **Have positive impacts in the economy**
  - Do not imply fuel costs
  - Employment opportunities
- **Can foster regional development**
- **Increase the energy portfolio**

Renewable Energies: Disadvantages

- Tied to site
- Intermittent availability
- Diffuse: require large land extensions
- Higher investment expenses needed at the beginning of the project

Barriers

- Energy prices do not reflect all costs
  - Negative externalities are not included
- High initial costs
  - The price of the generated energy is practically the leveled cost of investment
- Price volatility
  - Generates uncertainty when taking long-term decisions

Regulation

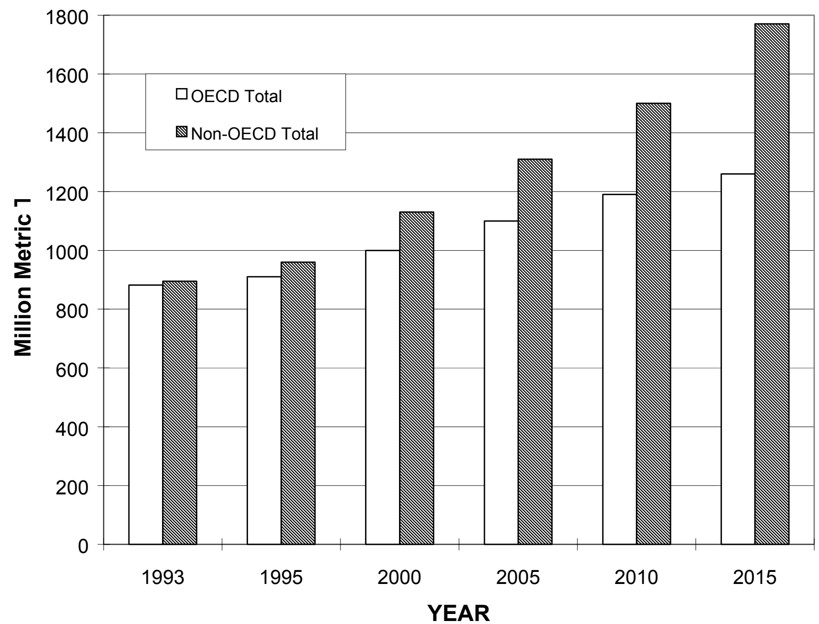
- **Market failures exist when:**
  - Few buyers and sellers exist
  - Entry or exit barriers exist
  - There are externalities or public goods
  - When information is scarce and imperfect
- **Some kind of governmental intervention is necessary to ensure market efficiency**
- **The question is not whether there should be regulation or not but what its nature and scope should be**

International Context (1)

- **Concerns about the environment**
  - **Climate changes**
    - Kyoto Protocol
  - **Air quality in urban areas**
    - Ozone
    - Particles

International Context (2)

- **High reliance on fossil fuels in electricity generation**
  - **Over 50% in many countries**



Carbon emissions related to electricity generation

International Context (3)

- **Technological maturity and price reduction**

  - **Water heating: competitive costs**
  - **Wind: Cost reduction of 50% between 1992-97**
  - **Photovoltaic: Cost reduction of 25% between 1992-97**

International Context (4)

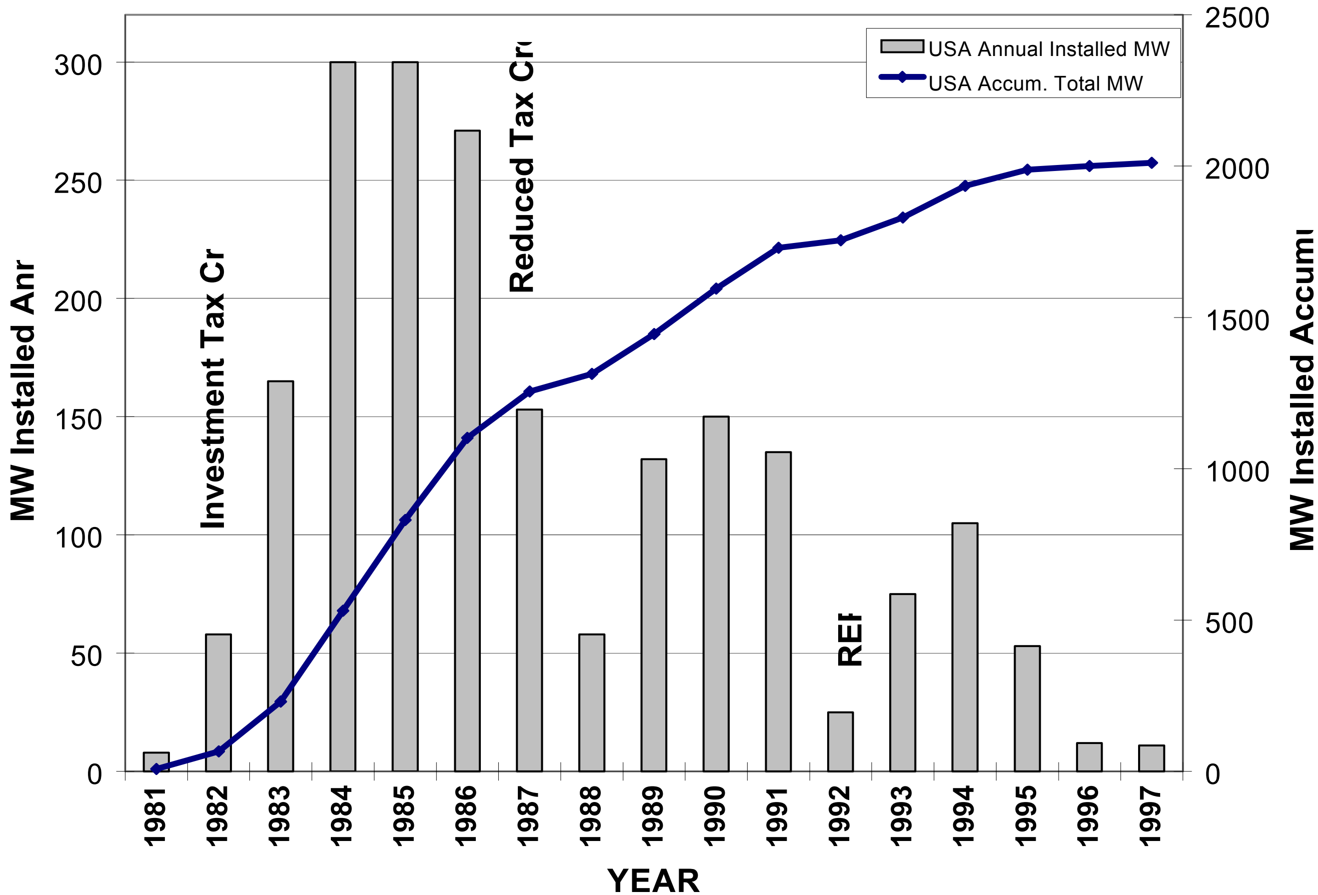
- **Restructuring electricity markets**
  - **Opening to competition**
  - **Dismantling vertically integrated monopolies**
  - **Defining policies to promote renewable energies**

International Context : USA

- **PURPA* (1978)**
  - Regional monopolies obliged to buy
  - Long term contracts at long term marginal costs
  - Tax reductions for investments
- **1992 Energy Policy Act**
  - Tax reduction of 1.7 cents per kWh generated
- **Deregulation**
  - Standard portfolio (RPS)
  - Green energy
  - Green funds
  - Renewable energy certificates

*** Public Utility Regulatory Policies Act**

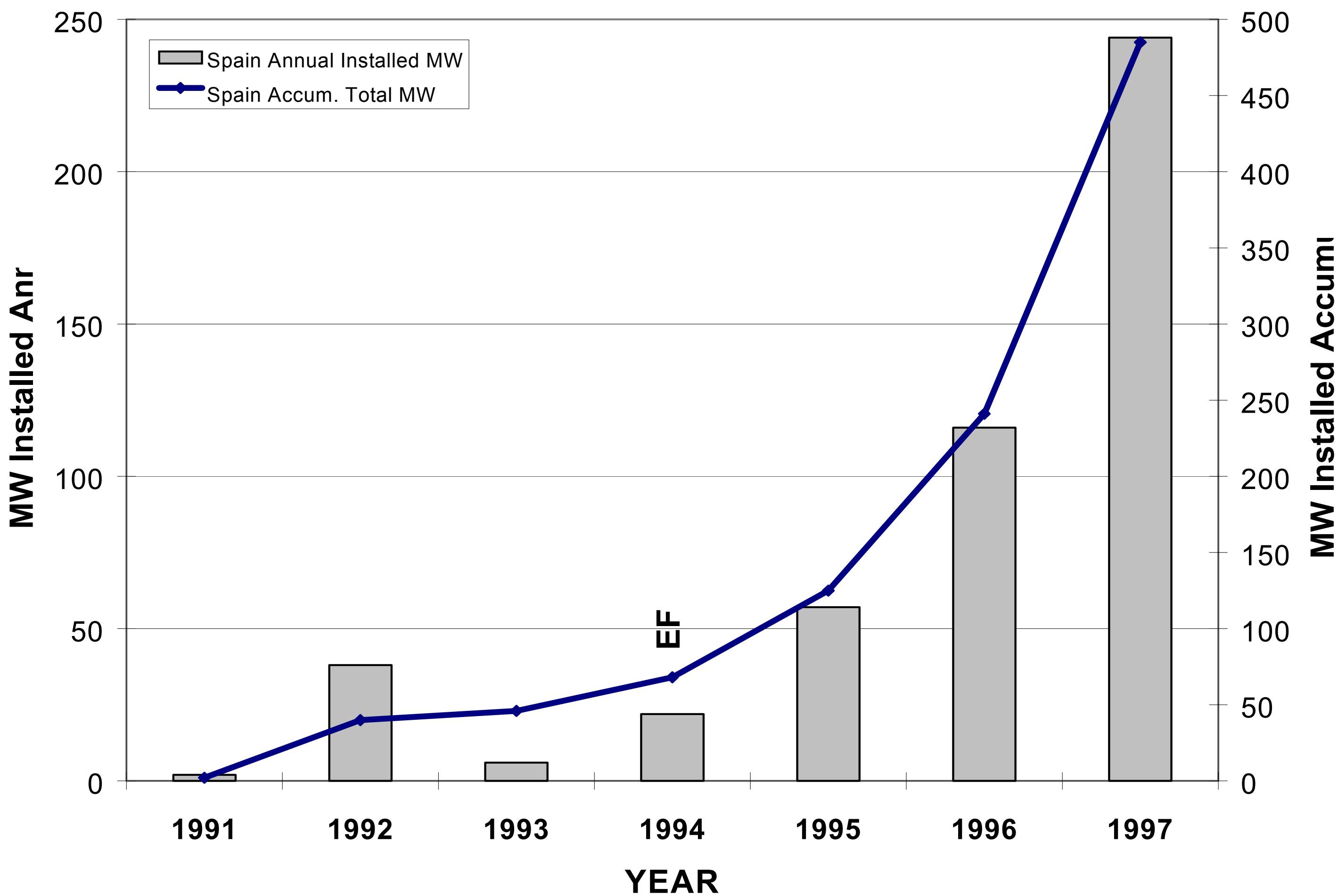
International Context : USA



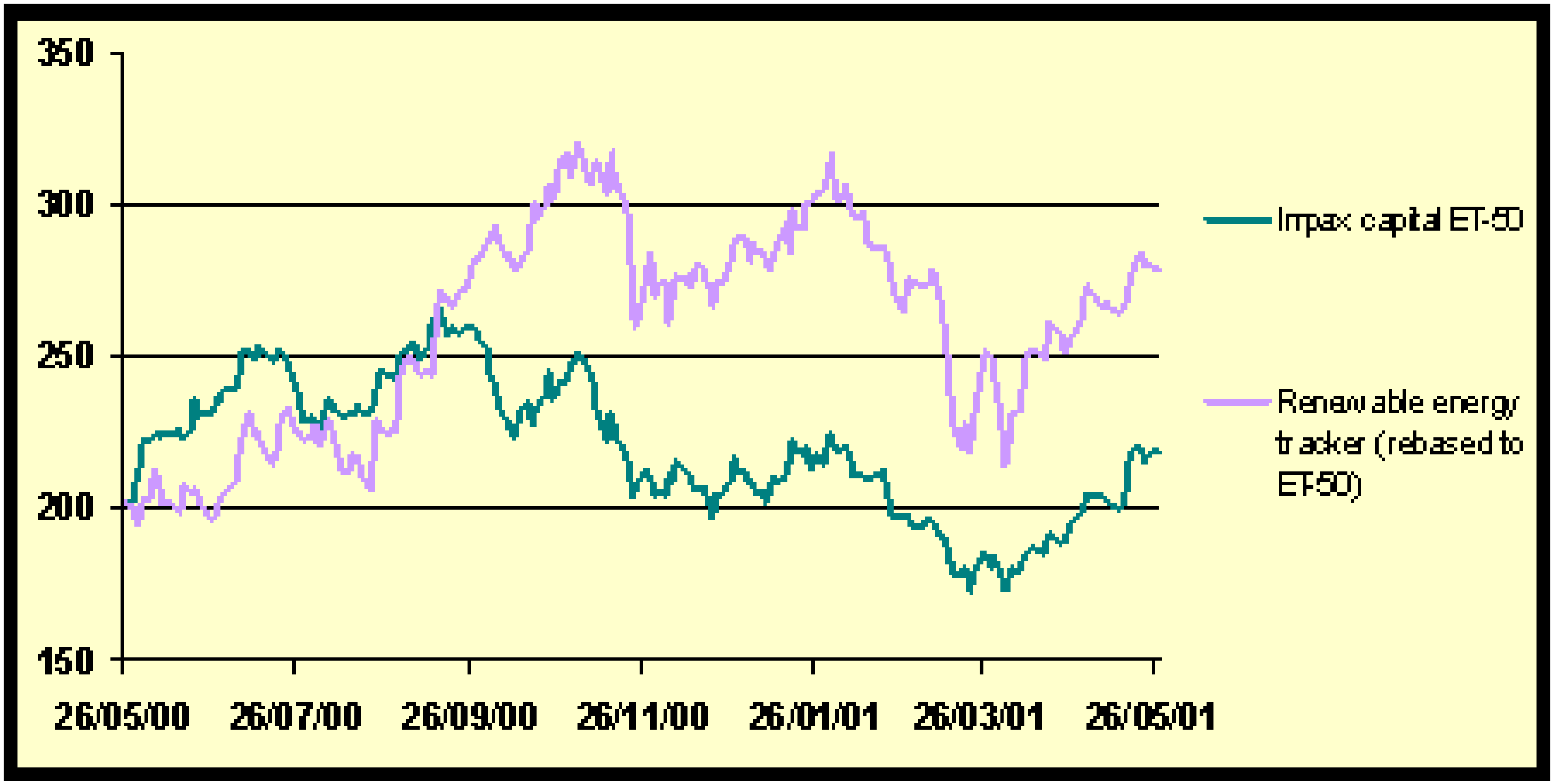
International Context : Spain

- **1994 Law**
  - Price cap regulation for RE
- **Electric Act 1997**
  - Electric market liberalization
  - Updates price cap for RT’s
- **Special Regime of 1998**
  - Establishes the goal for RE’s to contribute at least 12% by year 2010
  - Differentiated incentives
  - Two alternatives
    - **Fixed price**
    - **Fixed incentive**

International Context : Spain



International Context: Values of RE shares (2000-2001)

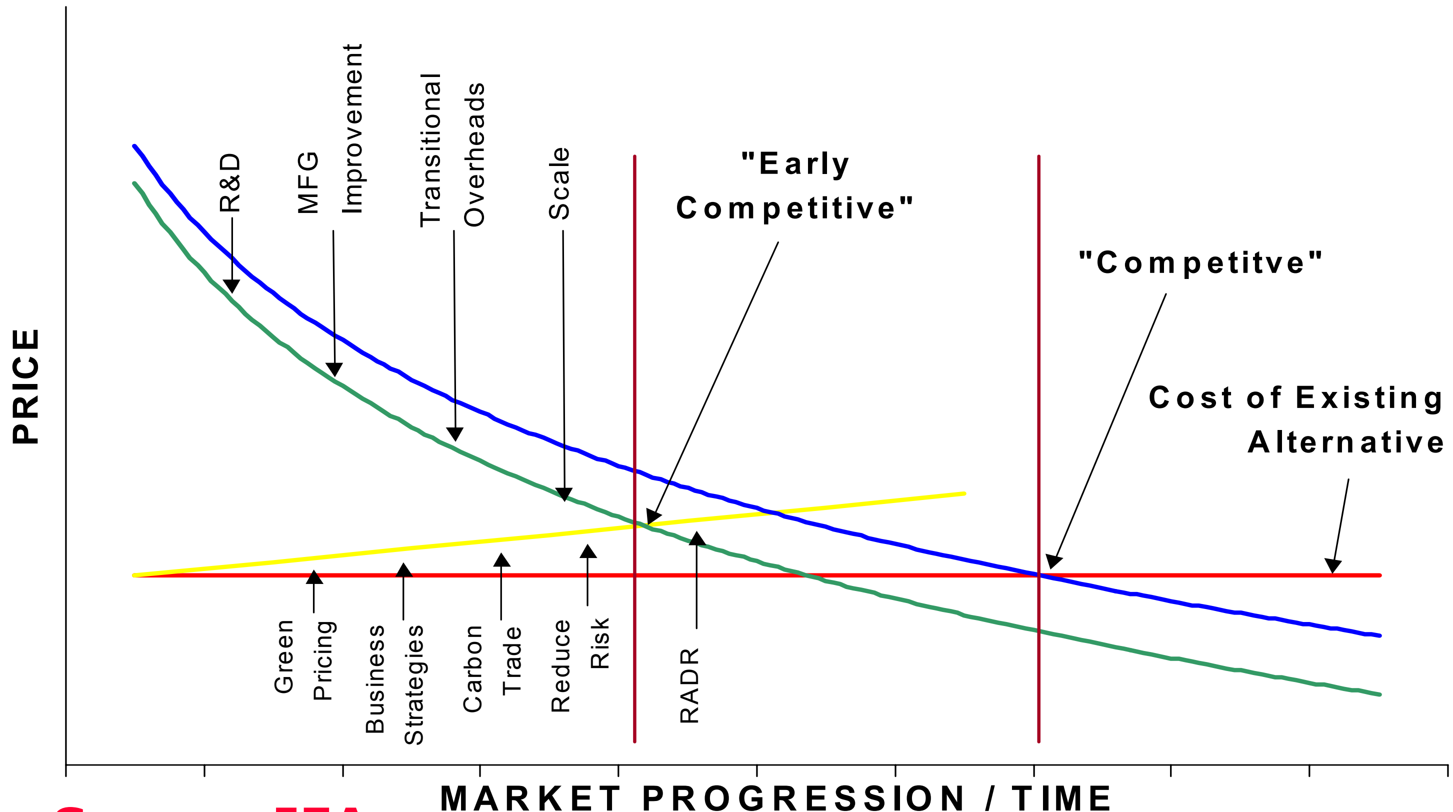


International Context (5)

- Tendency towards a more friendly configuration for RE technology :
  - Small plants in modular and hybrid systems
  - Closer to loads

- There are market niches for electrifying areas outside of the cities
  - Photovoltaic, mini-hydraulic and biomass

Accelerating strategies



Source: IEA*

* International Energy Agency

SECRETARÍA DE ENERGÍA | SENER

CONAE
COMISION NACIONAL PARA EL AHORRO DE ENERGIA

High level conference *"Best practices in renewable energies: sharing experiences to develop markets"*

Cocoyoc, Morelos
June 21-22, 2001

It was established that the emphasis at this moment . . .

- ...should be in searching for mechanisms to create and promote markets, given that at least for mini-hydraulic, biomass and wind usages, **there is no technical problem, but a lack of market mechanisms**

A key element is a specific legal framework

- A key element is a **specific legal framework** that provides certainty to investments and allows projects to obtain conventional financing

A special incentives regime is necessary

- It was considered, as demonstrated by international experience that a special incentives regime is necessary, under an **"investments for learning"** logic, in order to extend market participation in renewable energies

Recommendations

- First, to evaluate the **price at which the private sector would be willing to invest**, instead of justifying it by valuing externalities

- Nevertheless, in a given moment it would be necessary to **assess the value of economic social benefits** in order to provide a basis for treasury and legislative authorities.

It was established that international experience has demonstrated:

- Having **certainty in the terms of financing** (between ten and fifteen years), established through contracts, is a key element
- That this certainty (and contracts) should be **based on a specific legal framework** for these kinds of projects
- That a **special kind of incentive is necessary** to promote first investments

Likewise...

- To be really effective, **incentives should be based on performance** (energy generated) instead of investment amounts (installed capacity)
- Established **incentives should not be homogenous**, they should vary according to technology
- **Solid institutions** should be present
- **Technical norms** to ensure the equipment's and systems' quality are necessary

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General Conclusions

- **In an electricity market deregulating context countries and states have established some type of special regime for REs**
- **The special regime has a cost which is divided, in one way or another among all electricity users**
- **The special regime recognises the value that the development of RE brings to society**
  - Energy dependence
  - Environment
  - Economic development (industrial, regional)

Comments for Mexico

- Mexico can greatly benefit from promoting electricity generation based on RE
- What is needed is that the value be socially recognized in order to have "collective investment"
- There is however, little and insufficient information at all levels
- Therefore what is needed at this moment is a great effort to build a "social base" that supports "investments for learning"

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Electricity regulation trends

Francisco de Rosenzweig
Electrical Restructuring Unit
May 2002

The CRE takes its decisions in a collegiate fashion
This presentation does not represent an official position

Index

I. Electricity restructuring processes

Restructuring trends

- In the world, electricity sectors have been changing with the purpose of reaching higher efficiency standards when providing services and ensuring electrical energy supply.
- Among the common factors that lead to reforming the electricity sector are the following:

✓ Technological advances

✓ Budgetary restrictions

✓ More strict environmental standards

Restructuring trends

The concept behind restructuring is the possibility of "distinguishing sales of energy as a product, from its transmission as a service"

Traditional structure	New structure
✓ Electricity provider vertically integrated in generation, transmission, distribution and/or supply ✓ Monopoly can be public or private	✓ Separation of monopolies ✓ Introducing competition in generation and marketing ✓ Economic regulation in transmission and distribution

Change in industry structure

Activities segmentation

- Reforms to electricity industry have considered restricting vertical and horizontal integration to ensure transparency and encourage competition

Vertical separation

- ✓ Through ownership change or by legal or accounting separation
- ✓ Separation may include:
  - Each of the 4 activities
  - Competitive vs. monopolistic activities

Horizontal separation

- ✓ Seeks to reduce market share of dominant firms (specially in generation)

... Change in industry structure

Generation and supply

Are potentially competitive activities. In these activities, regulations seeks to promote competition through:

- ✓ Allowing some flexibility when choosing a provider.
  - In some cases, consumption limits are established for an eligible consumer, as in Spain or Argentina.
  - In other cases, all consumers can choose a provider, as in the United Kingdom or some regions in the United States.
- ✓ Preventing market power in generation
  - No individual or group of generators must influence the price level (market operation rules)
- ✓ Separation in the generation-transmission integration
  - Generators that control assets or transmission networks have a strong incentive for using that control to their benefit.

... Change in industry structure

Transmission and distribution

- Are activities with natural monopoly features. Regulation seeks to simulate competition conditions through:
  - ✓ Ensuring open and non discriminatory access to transmission and distribution networks at competitive prices
  - ✓ Eliminating anticompetitive practices
  - ✓ Incentive-based regulation

... Change in industry structure

Transmission and distribution

Transmission in particular requires:

- ✓ Defining the type of network separation
- ✓ Implementing clear and equitable mechanisms in order to promote and guarantee network extension

Distribution requires:

- ✓ Establishing a proper tariff structure and if necessary providing focalized subsidies
- ✓ Ensuring a service with international quality standards
- ✓ Promoting efficiency in the supply of the service

… Change in industry structure

Systems operator

Autonomy of the Systems' Operator

- ✓ The systems' operator must be independent from the ownership and control of remaining participants
- ✓ There are several models that define the functions and responsibilities of the operator:
  - Transco. Is an independent body that combines network ownership with responsibility for operating and managing the network and market (it may or may not be for profit)
  - Gridco (Wireco). Is an independent body, owner of the network but not responsible for the operation of the transmission network. Generally it works in coordination with the electricity market operator.
  - ISO. Is an independent operator of the system and is responsible for managing the use of the network and coordinating the spot market (PJM).

... Change of industry structure

Regulatory body

Establishment of independent regulatory bodies

- ✓ Traditionally, are concentrated in only one independent body. The more independence (financial, technical and budgetary) granted, the more efficient are its regulatory functions.
- ✓ Must have express powers in order to regulate certain activities of the industry, they are not merely consultative or of an advisory nature.
- ✓ Among the powers generally given is tariff regulation in transmission and distribution and for final users.

II. Electricity regulation trends

Regulatory bodies

- International experience shows that there must be coherence between organizational structure and its legal framework given that regulation will hardly substitute possible deficiencies in structure and design
- Regardless of the adopted industrial organization model, bodies in charge of regulating must be given enough functions and powers in order to efficiently regulate the activities that include the new industrial organization
- Structure of the regulatory bodies must be sufficiently lax to allow its adaptation to changing challenges of the electricity industries.

Regulation trends

- **Regulatory bodies have common elements such as:**
  - ✓ Certain degree of independence
  - ✓ Procedures based on openness, transparency and public consultations
  - ✓ Economic regulation
- **Regulatory bodies tend to be stronger in countries whose regulatory framework considers the separation of activities**
- **However, the structure of each regulator will be a function of legal issues and the political environment of each country**

Regulatory agencies' design

Objectives

- ✓ Protecting final users
- ✓ Protecting investors
- ✓ Promoting economic efficiency
- ✓ Encouraging competition conditions, mainly

Functions

- ✓ Economic regulation
- ✓ Regulation of monopolistic activities (T&D)
- ✓ Tariffs to final users
- ✓ Terms and conditions for T&D
- ✓ Encouraging mediation or arbitration
- ✓ Participating with the government in planning issues

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Regulatory agencies' design

Procedures

- ✓ Developing rules, term and conditions
- ✓ Monitoring activities and implementation of corrective actions
- ✓ Rules to promote transparency
- ✓ Appropriate publication of information

Coverage

- ✓ Exclusively to electricity industry
- ✓ Multi-industries

Coordination with other authorities

- ✓ Formal or informal consultation mechanism

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III. Conclusions

Conclusions

- **A great many countries have opted for restructuring their electricity industry by implementing a design and structure according to each country's needs.**

- **There is no a single model to restructure the sector. Design and organization of institutions as well as the scope of regulation depends on economic, political, cultural and social conditions prevailing in each country.**

Conclusions

- **In the international experience there are common functions in the operation of regulatory bodies**
  - ✓ Establishing terms and conditions for transmission, distribution and supply of electricity
  - ✓ Establishing their tariff regulation
  - ✓ Ensuring open and non discriminatory access to transmission and distribution lines
  - ✓ Participating in planning the extension of the transmission system
  - ✓ Granting permits, licenses and concessions
- **Different schemes have been implemented in order to obtain resources for the regulator**
  - ✓ Taxes for using transmission and distribution lines
  - ✓ Permits, licenses and other procedures

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Framework design of the public policy: Electricity Sector Case

May, 2002

What we expect of the electricity sector?

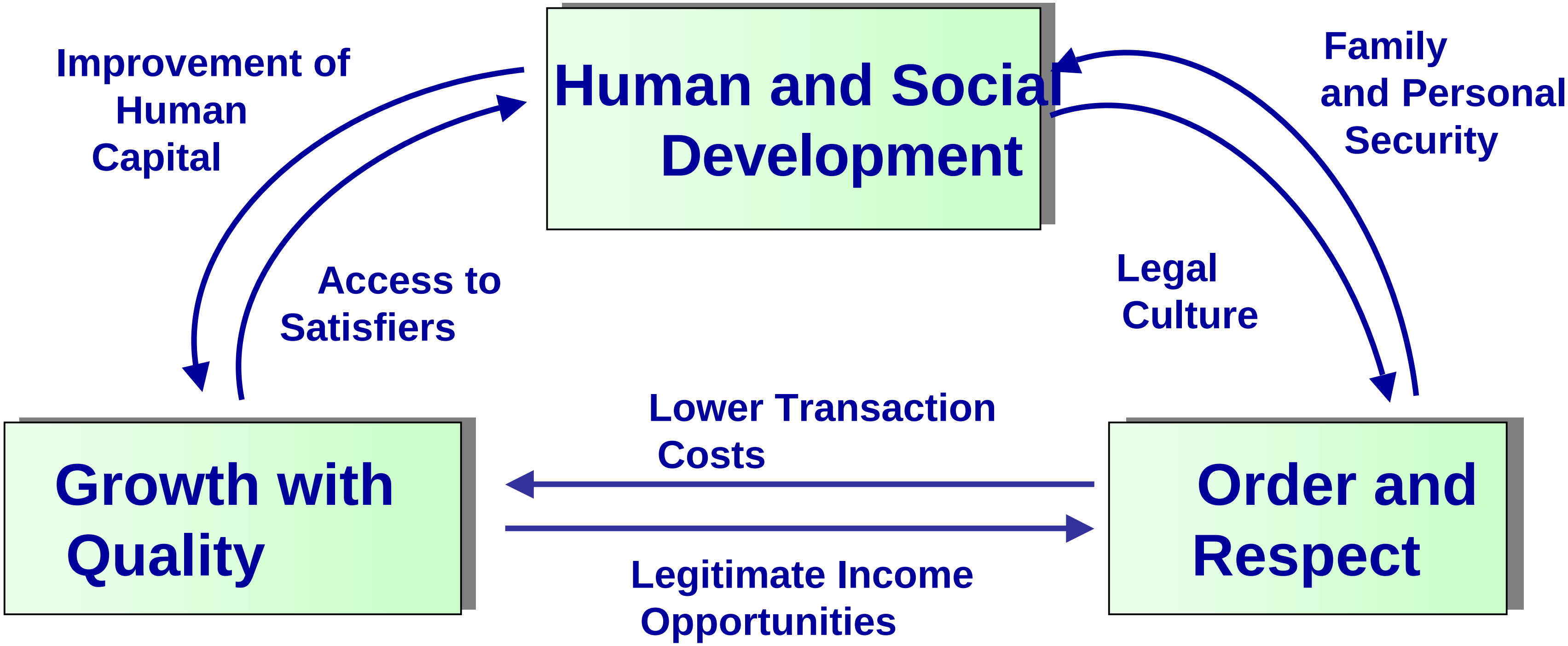
I. Integral treatment of the public policy design

II. Population profile

III. Impact on Firms

IV. New Alternatives in the Electricity Sector

Virtuous circle/
Integral treatment of the public policy design



- The aim of the economic and social policy is to ***raise the welfare***...
- ...***The Redesign of the legal framework of the electricity*** sector must begin on the same principle...
- ...need to know our client

I. Integral treatment of public policy design

II. Population profile

III. Impact on Firms

IV. New Alternatives in the Electricity Sector

Population profile: Synthesis

1. High degree of Inequality

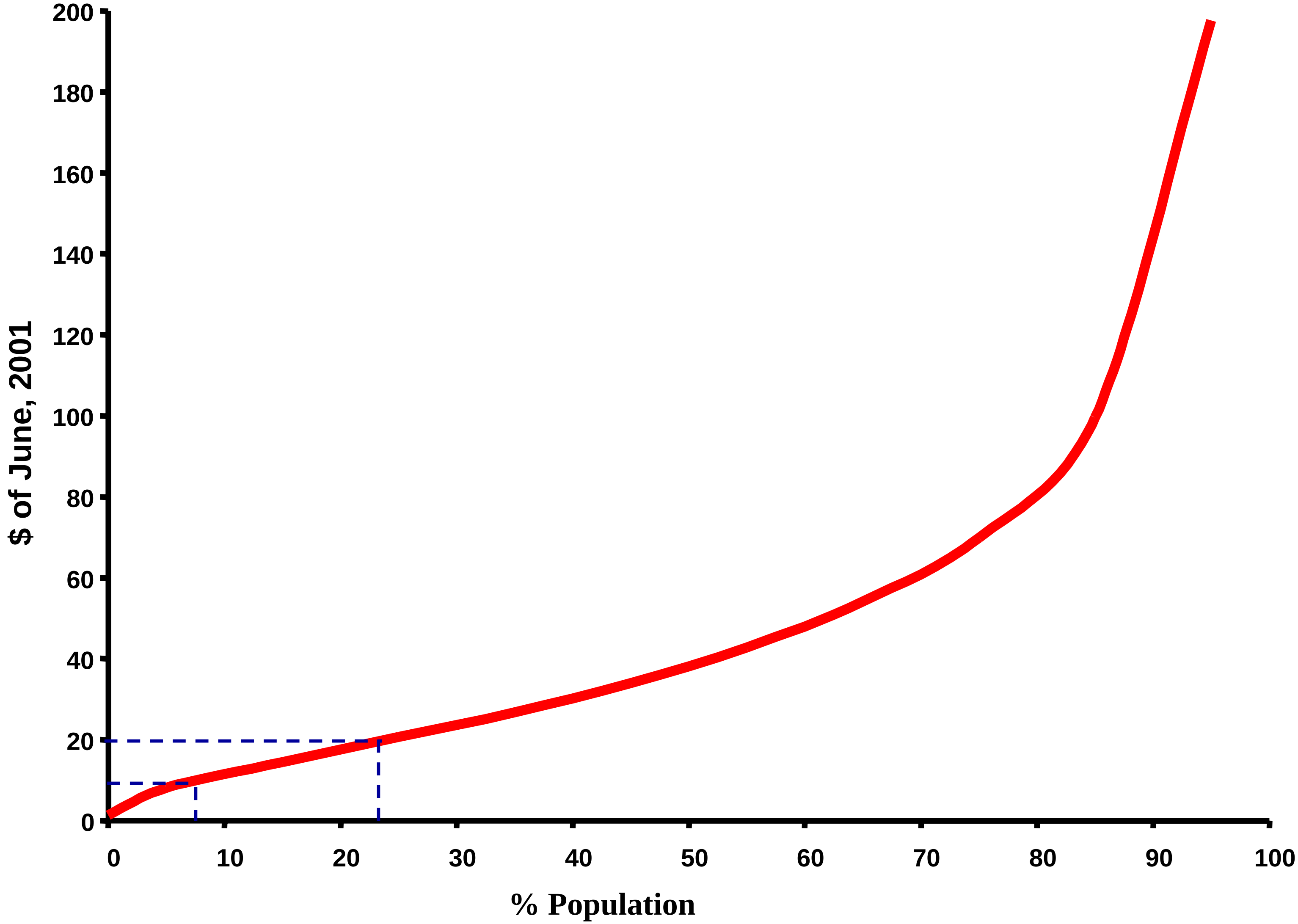
- *Concentrated in the jump of decil X*
- *Widespread poverty*
- *Consumption pattern with some atypical characteristics*

2. Lag in Schooling and Health Services

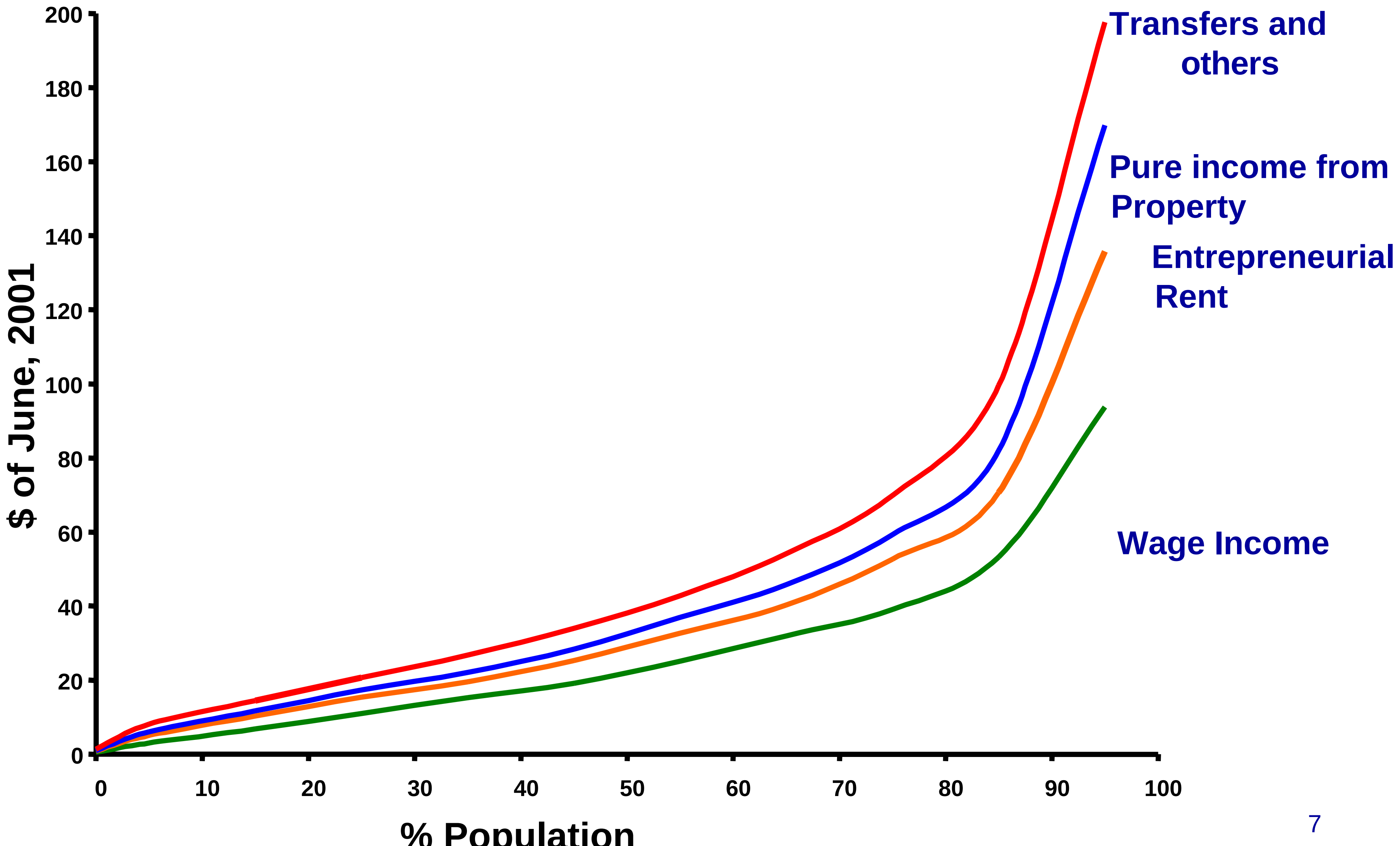
3. Determinants of income differentials

- Age d*ifferentials in households*
- *Female participation in the work force*
- *High profitability of education*
- *Formaliy Prize*

Total Current Income per capita, daily



Components of the Total Current Income per capita, daily

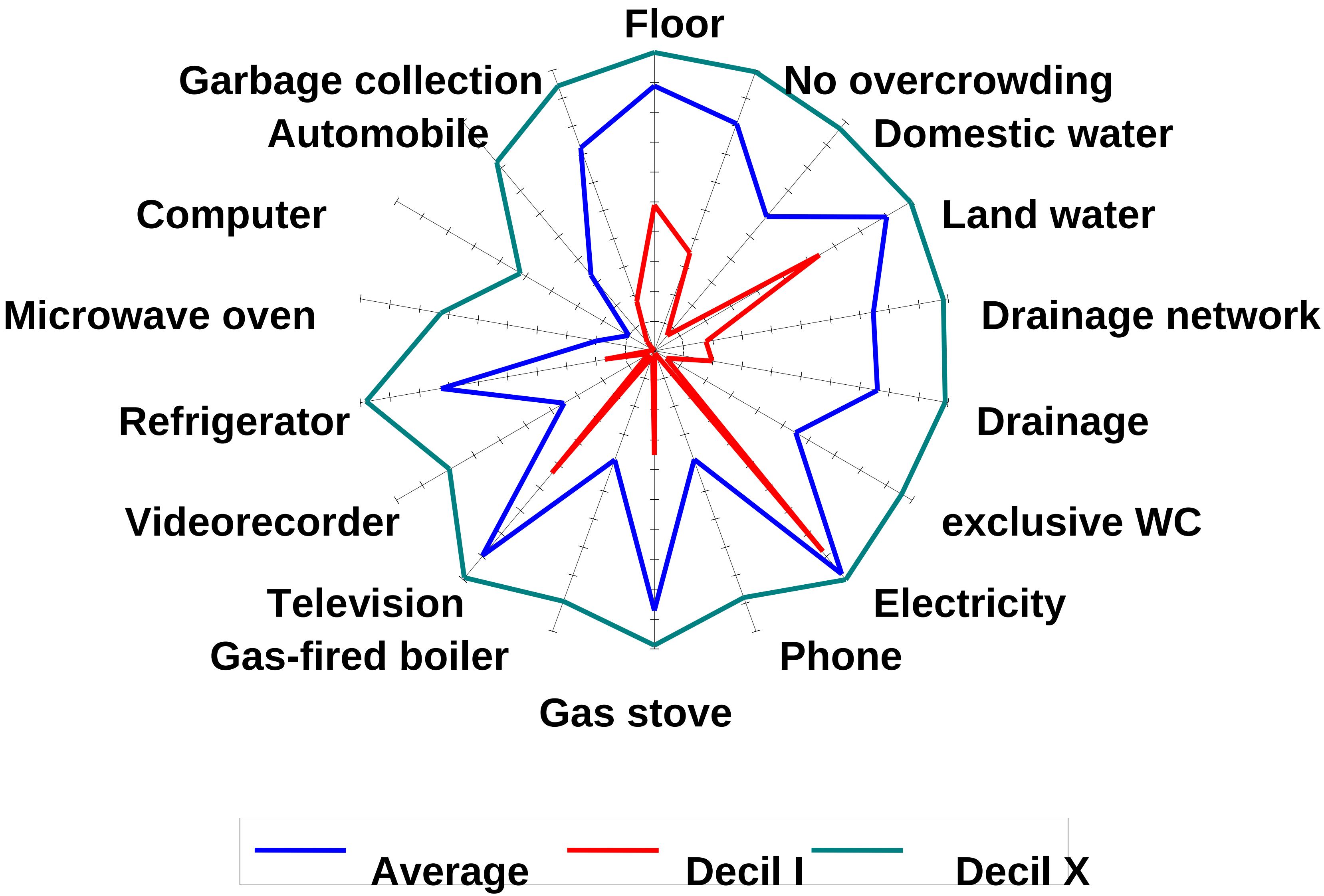


Total Current Income per capita

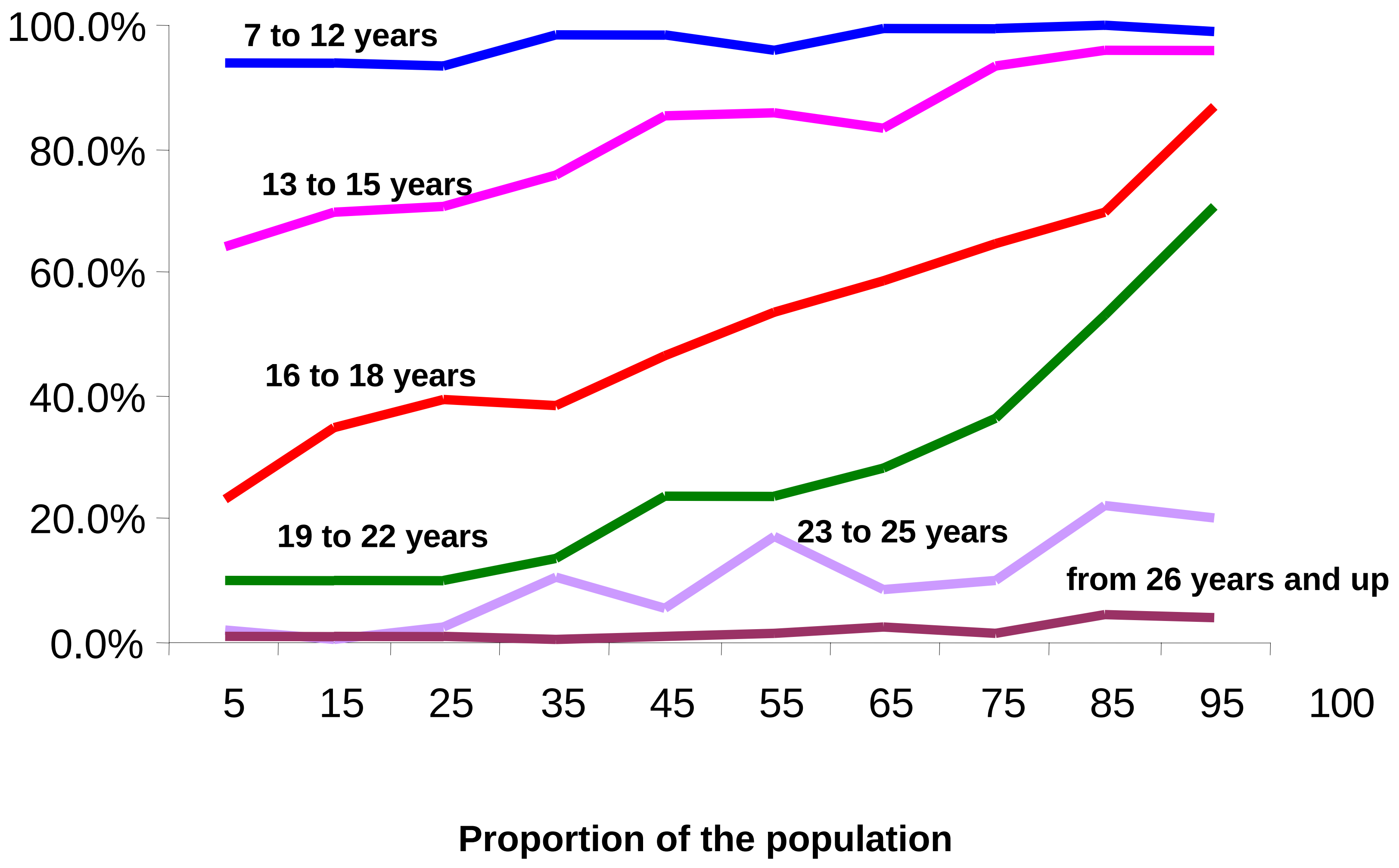
July, 2001 monthly pesos

Decil	Arithm-etic mean	Median	Lower Bound	Upper Bound
Total	**1,959**	**1,173**	**41**	**103,170**
I	239	245	41	350
II	443	441	350	536
III	627	629	536	719
IV	815	813	719	919
V	1,041	1,033	919	1,173
VI	1,310	1,301	1,173	1,462
VII	1,650	1,646	1,462	1,858
VIII	2,134	2,126	1,858	2,490
IX	3,094	3,027	2,490	3,978
X	8,237	6,009	3,978	103,170

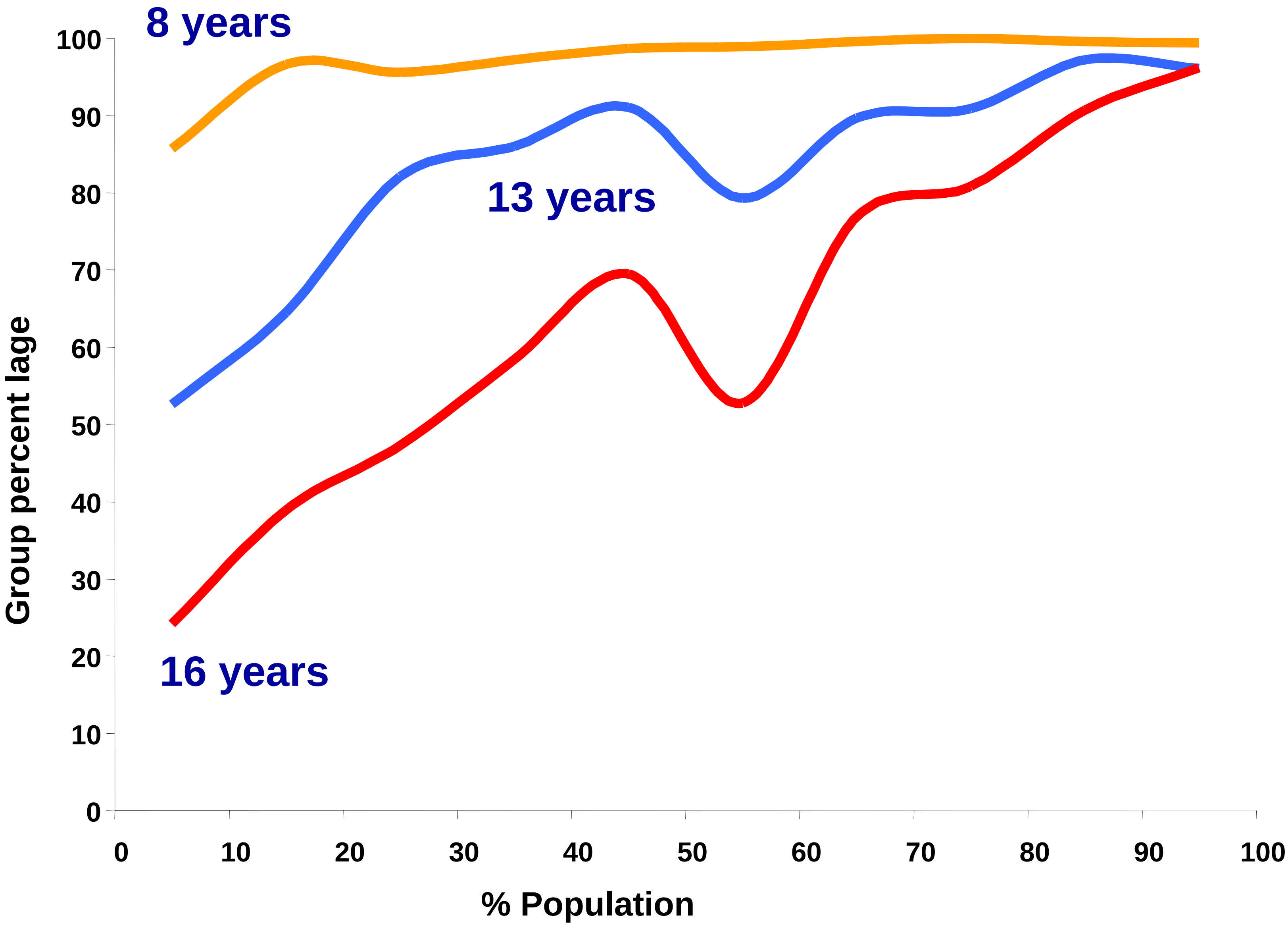
Housing and household items



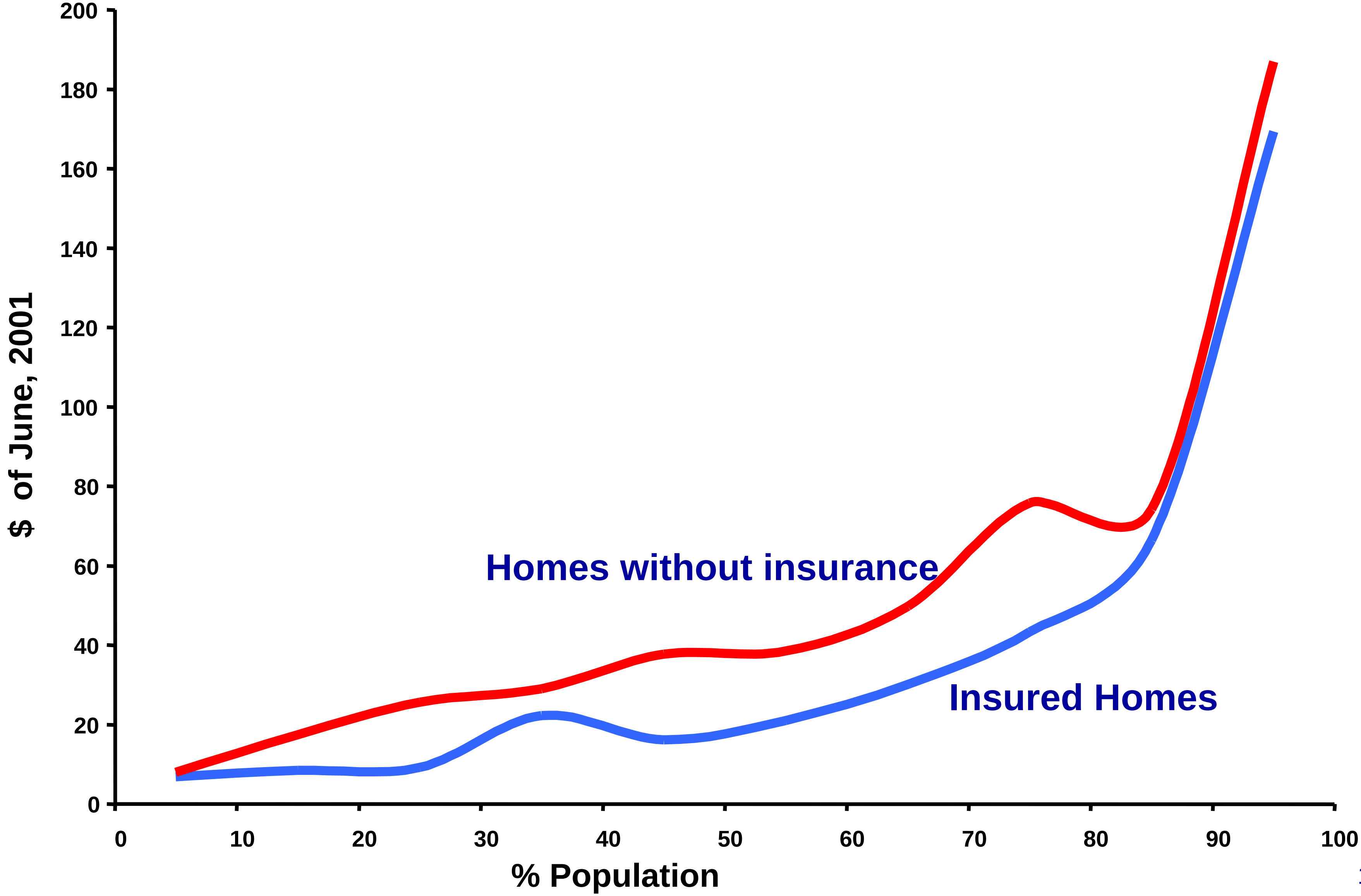
School attendance



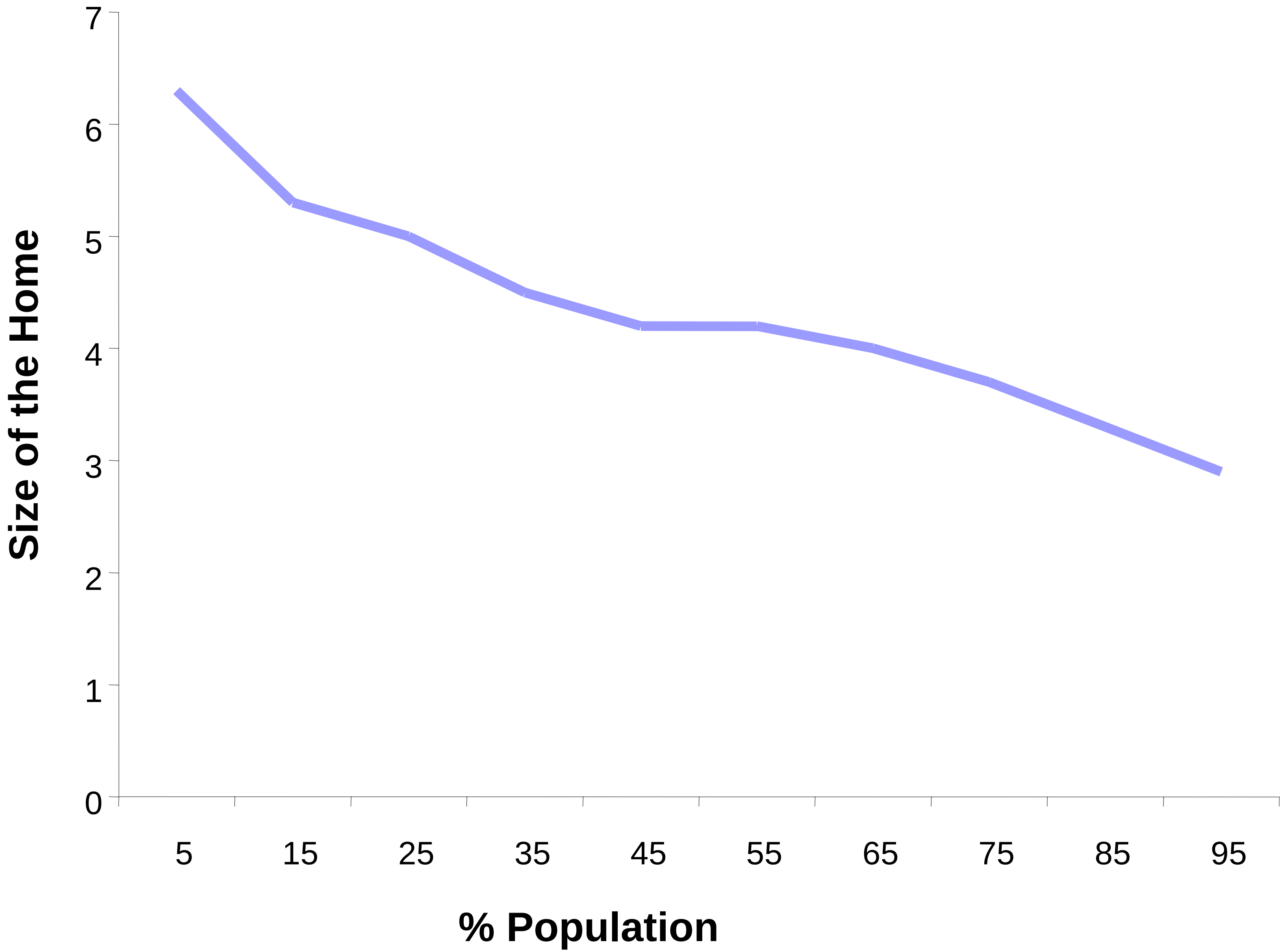
Children with one year schooling lag or less



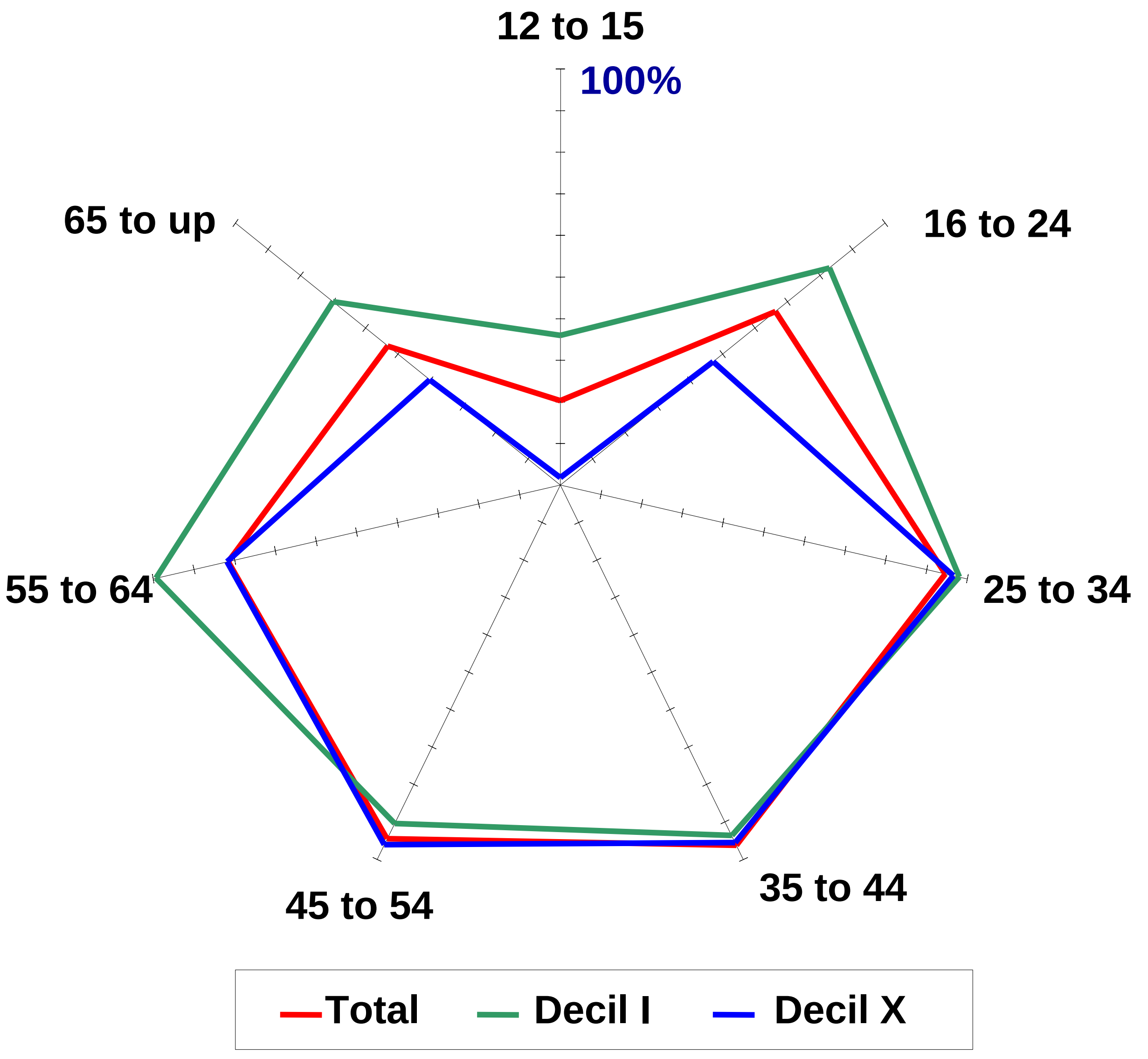
Per capita Monthly Expenditures in Health Care



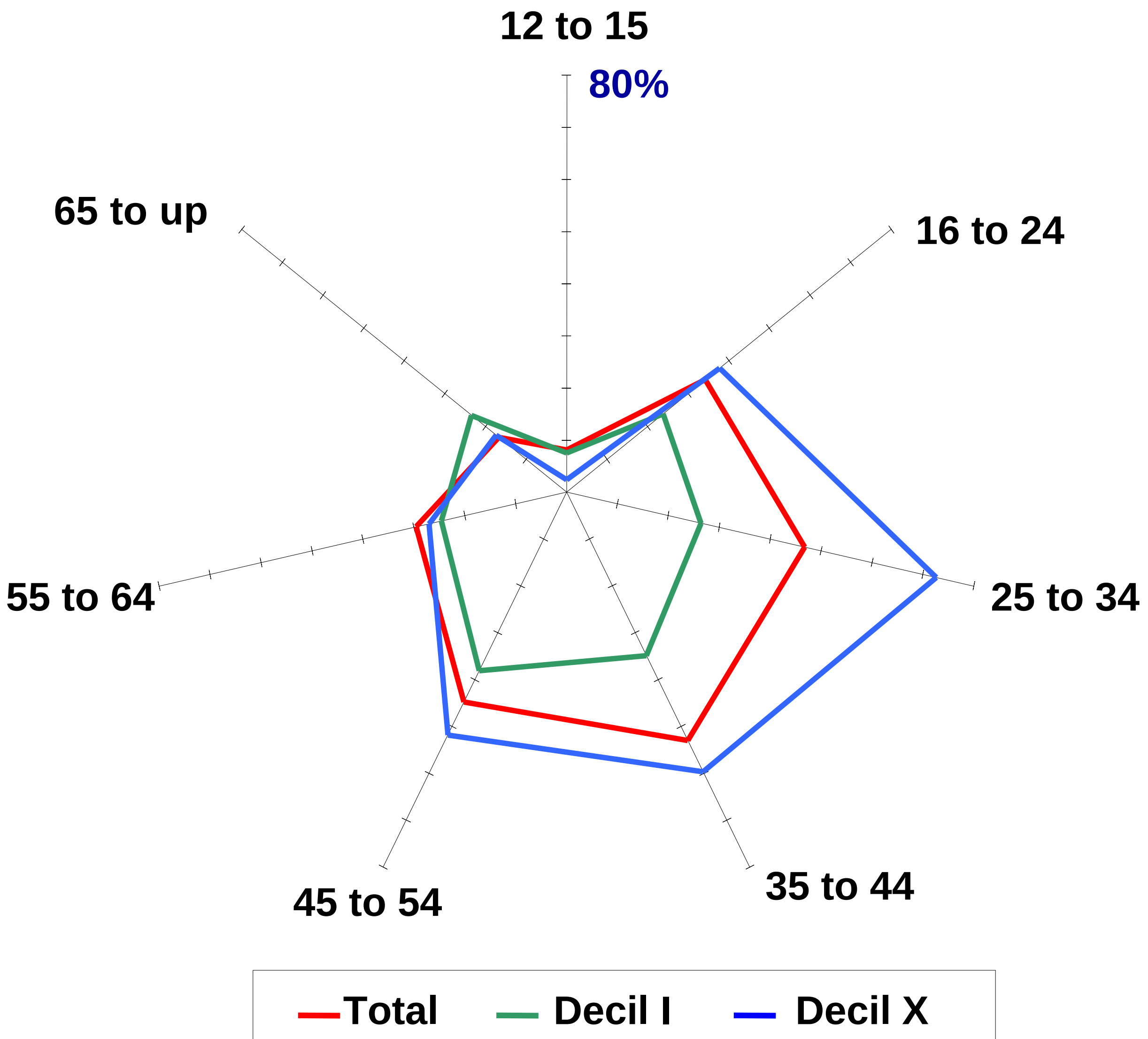
Size of the Home



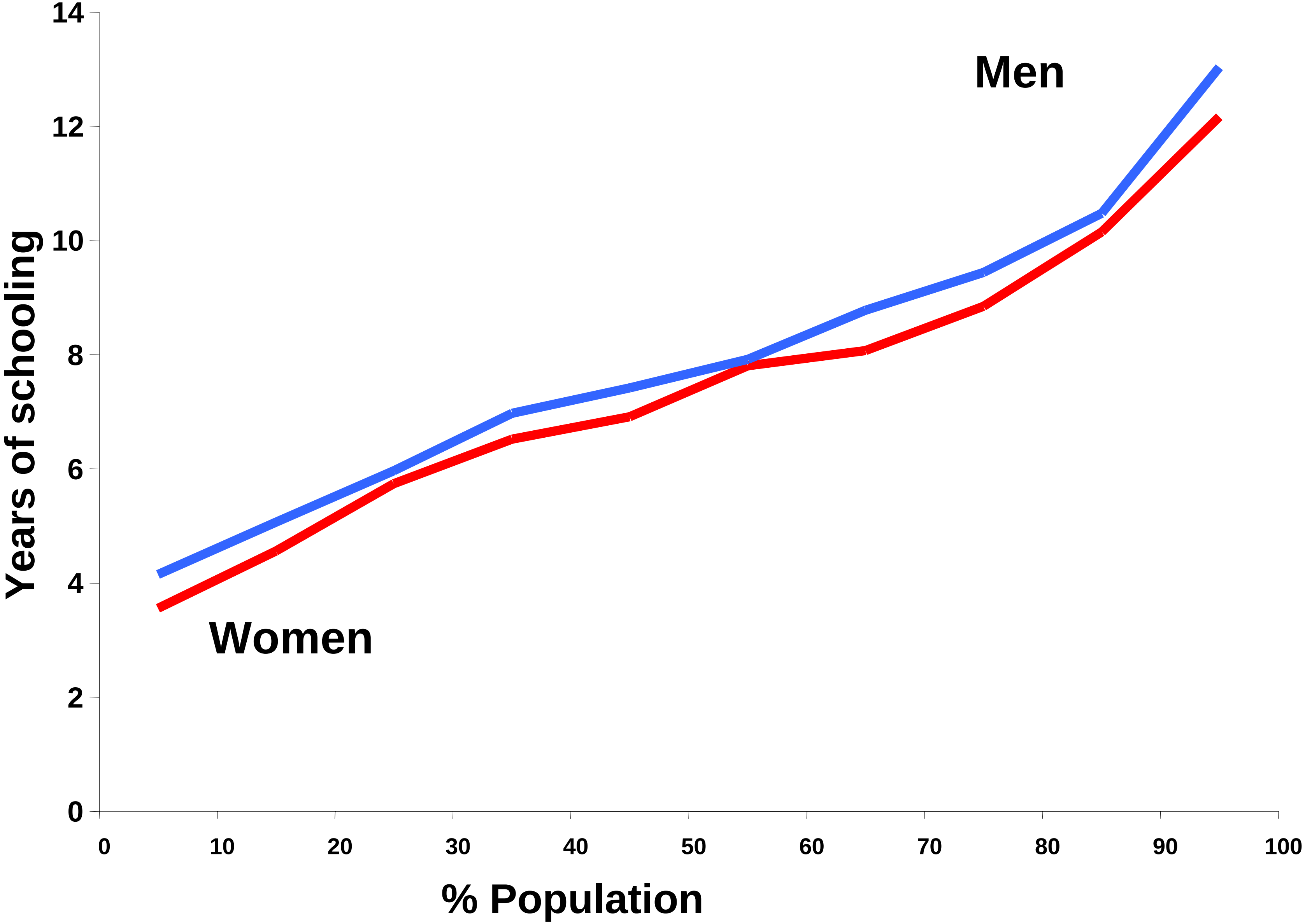
Employed / Members: Men



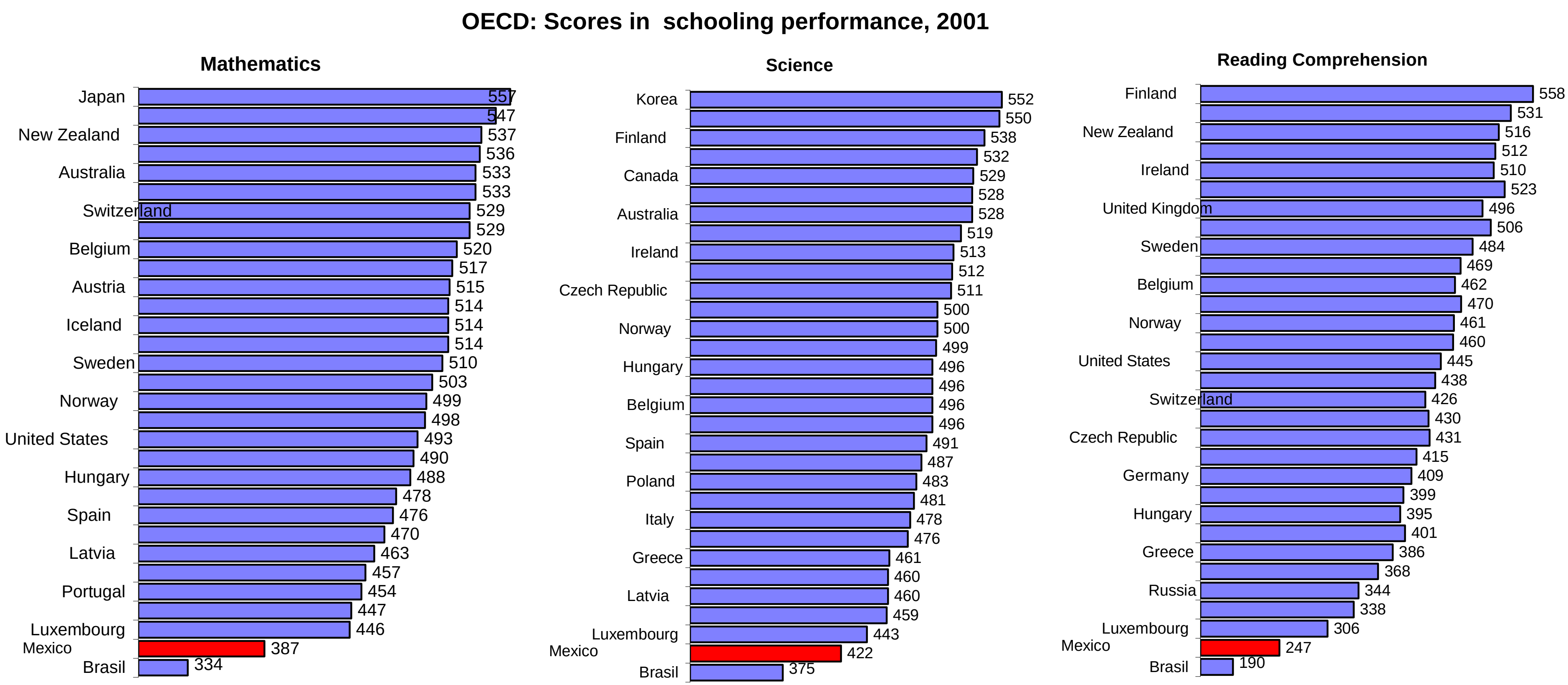
Employed / Members: Women



Schooling average: 16 to 64 years

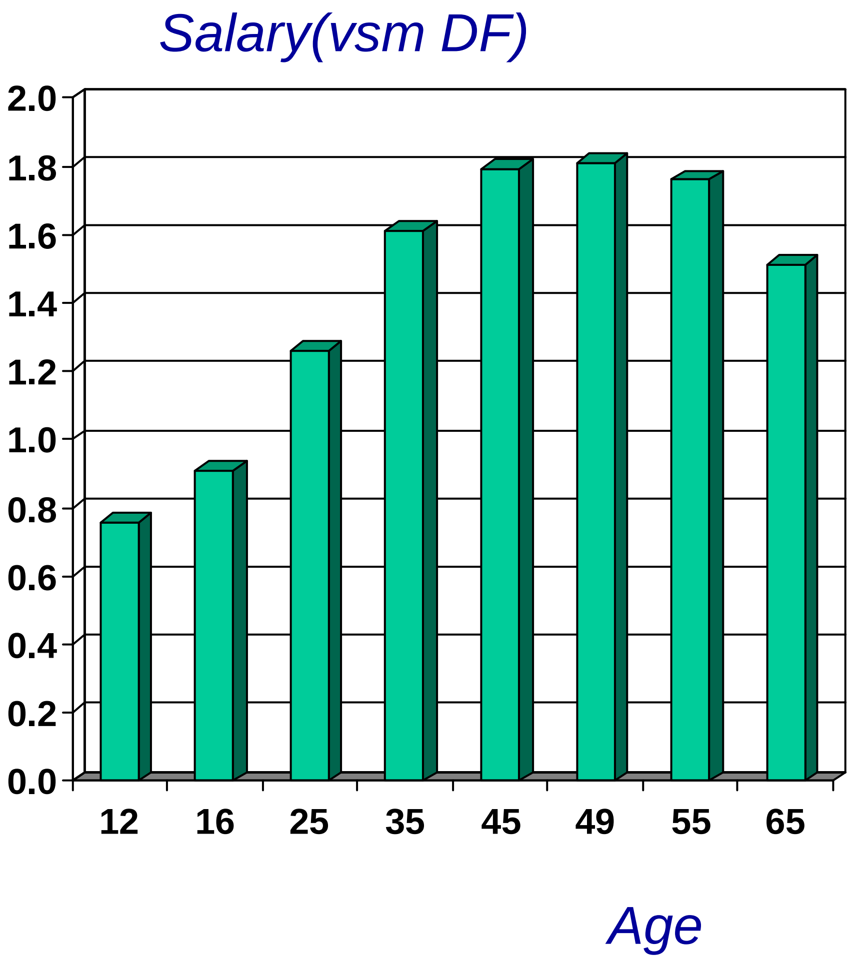


Comparative Performance in Basic Abilities



Wage of a male without education, urban literate informal salaried

Age (years)	Salary (vsm DF)
12	0.76
16	0.91
25	1.26
35	1.61
45	1.79
49	1.81
55	1.76
65	1.51



Income of a 49 year old maale, [1/] urban literate informal salaried

Schooling [2/]	Wage (vsm DF)
No education:	1.68
Half of elementary :	1.76
Complete elementary:	2.03
Half of secondary :	2.34
Complete secondary:	2.56
Complete preparatory:	3.54
2nd year of university:	4.63
Complete university :	6.31

[1/] Age in which income reaches its peak

[2/] Without post-technical education

Income of other salaried groups[1/]

Effects of:	Variation
Being illiterate:	-12.7%
Being woman:	-16.6%
Living in a rural area:	-34.0%
Being formally salaried:	34.7%
Having technical education[2/]:	
◊ incomplete	1.5%
◊ complete	28.0%

1/Age in which income reaches its peak

2/Following the last year of formal education

I. Integral treatment of the public policy design

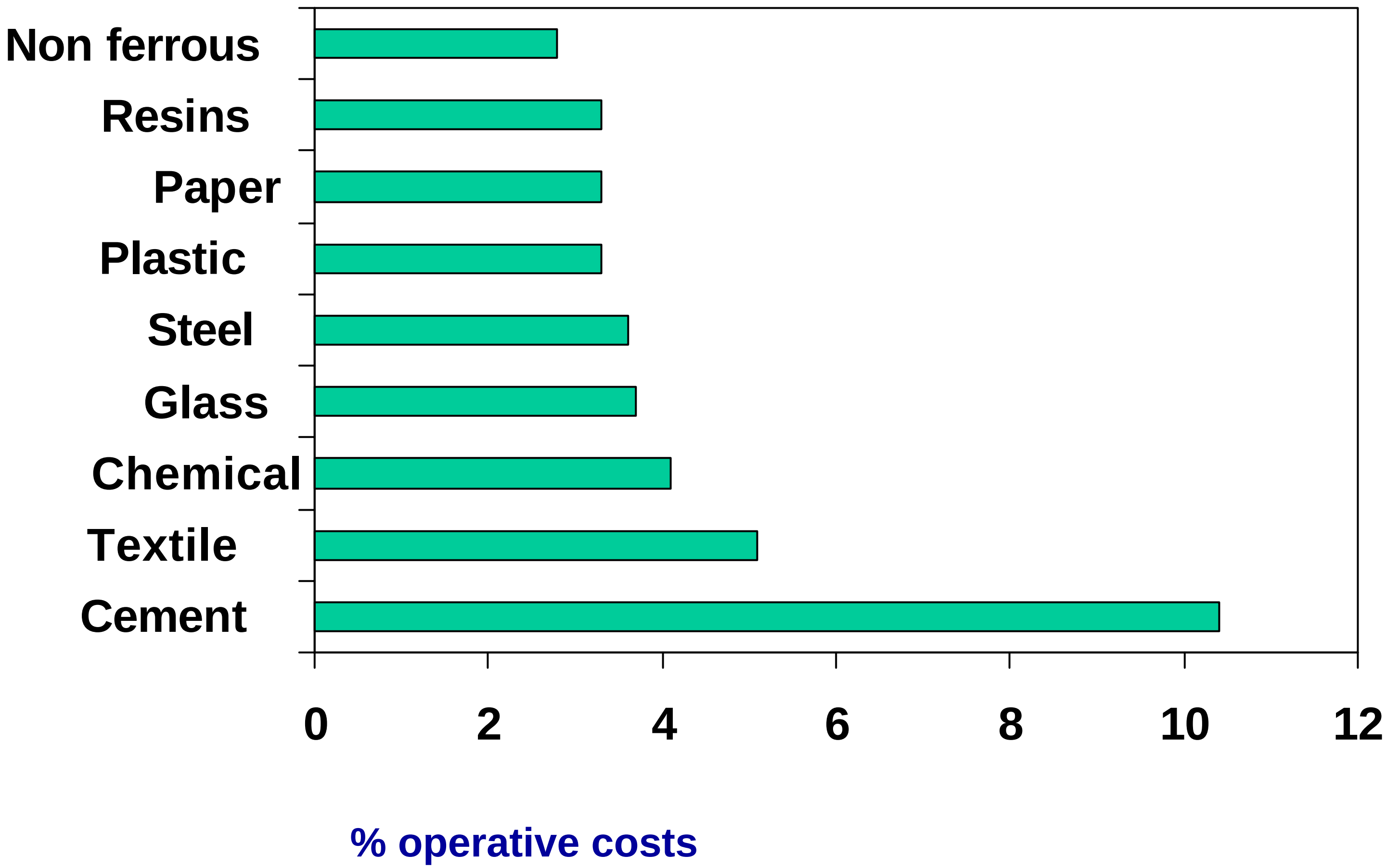
II. Population profile

III. Impacts on Firms

IV. New Alternatives in the Electric Sector

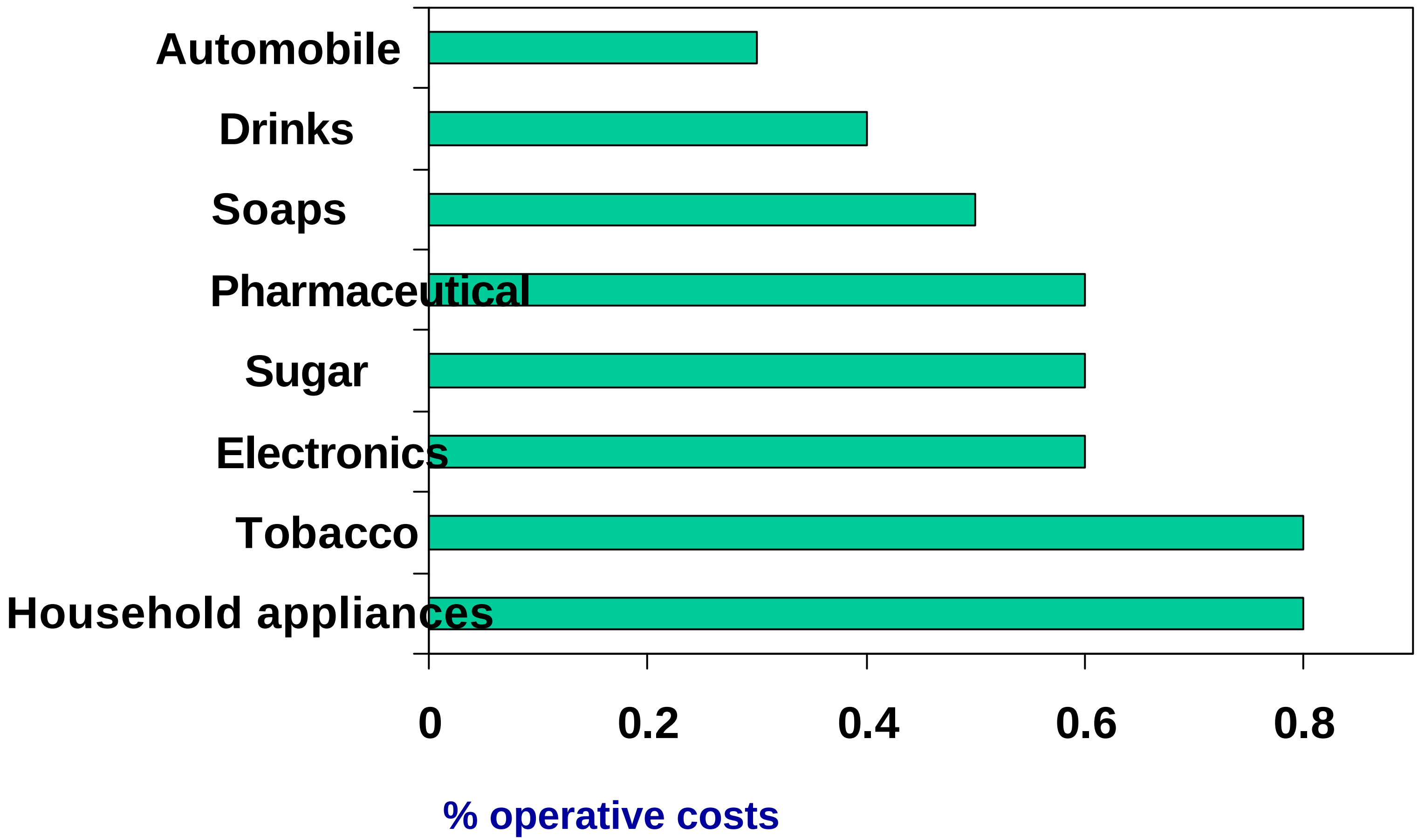
Differentiated importance of the cost of the energy among the productive sectors...

The most sensitive to the price of the energy....

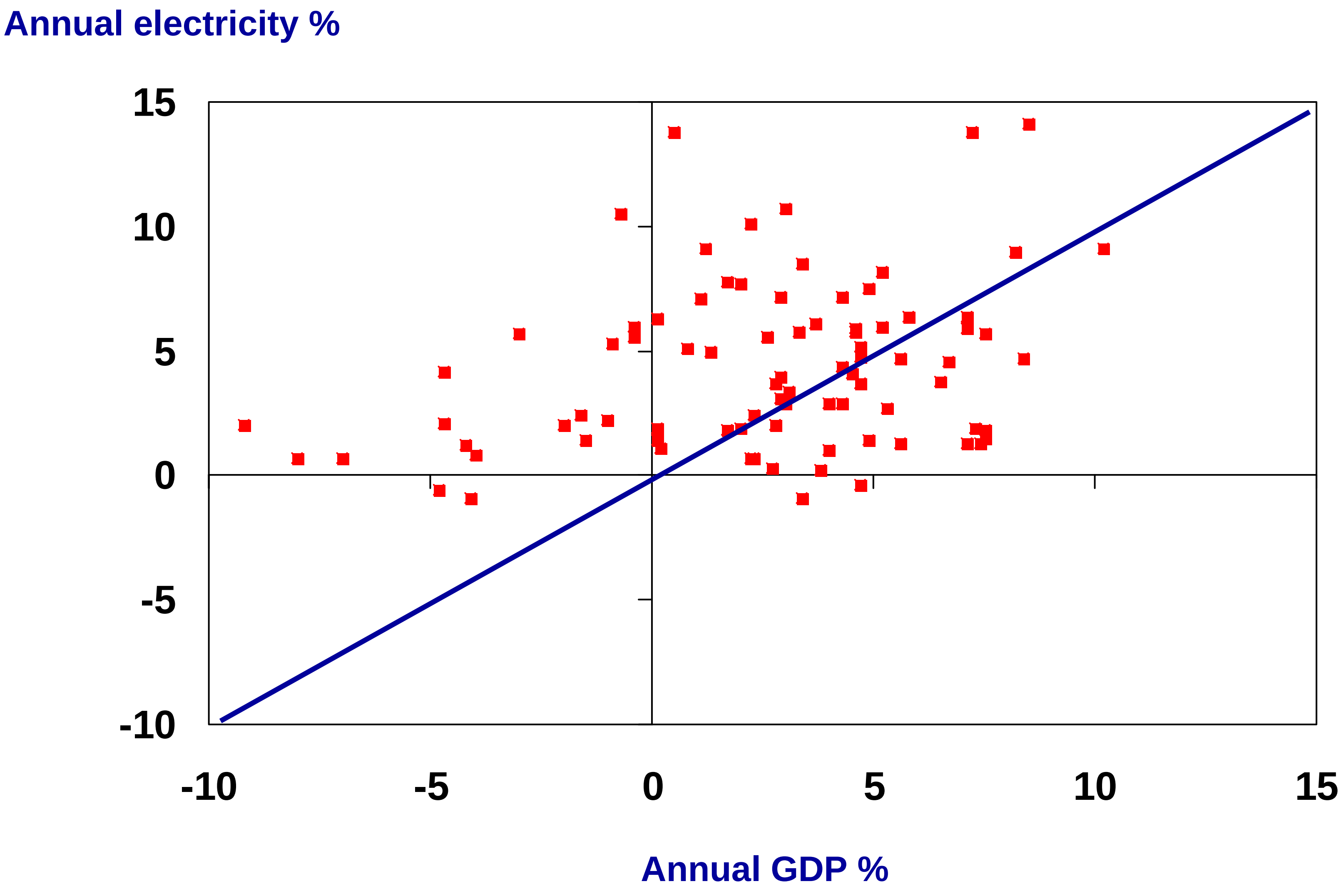


Differentiated importance of the cost of the energy among the productive sectors...

Less affected...



Relation between GDP - Electricity.



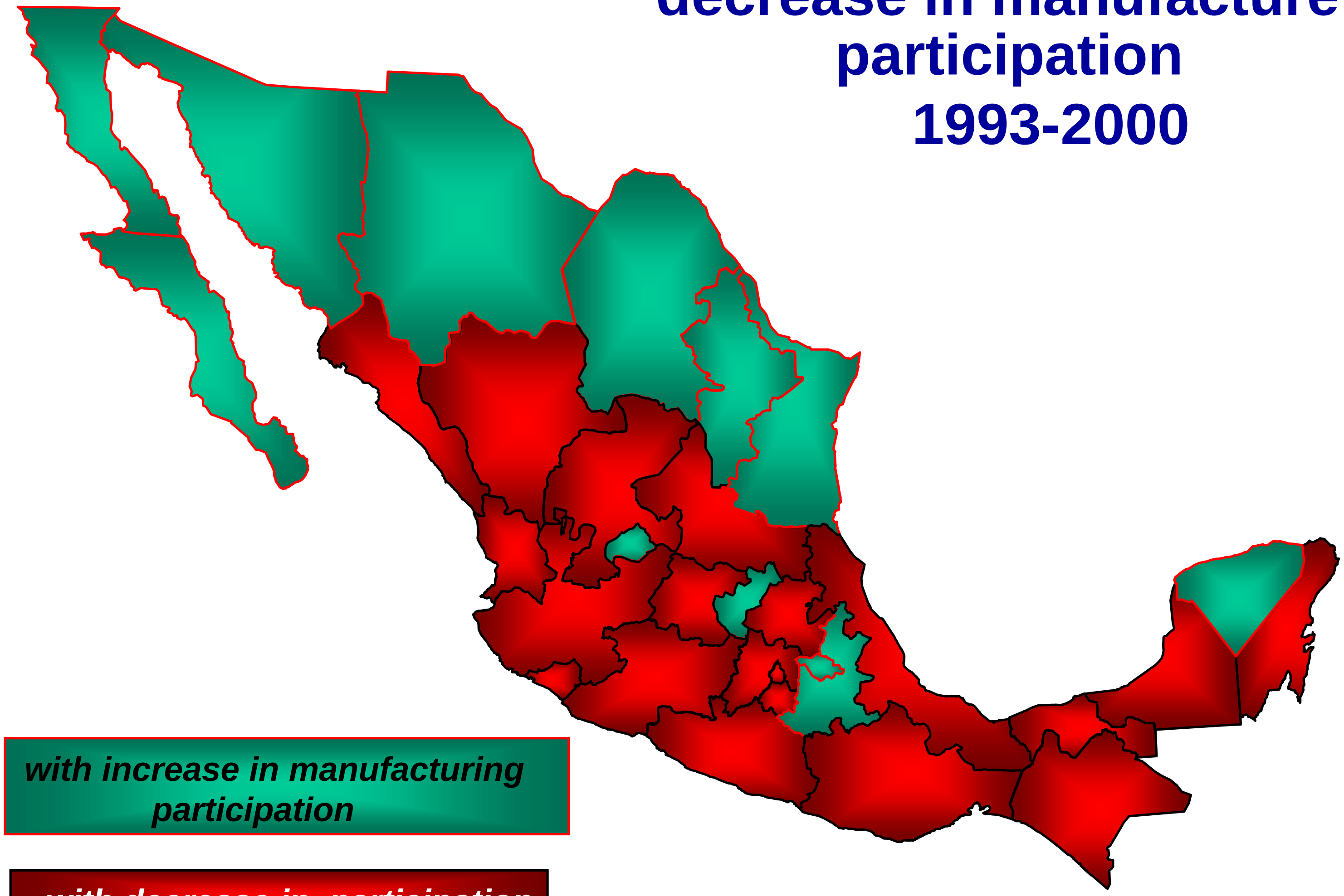
CFE: proyects in execution

MUSD: Millions of US dollars

1 Jobs created by private firms, in works contracted by CFE

Localization pattern changes with the openness.

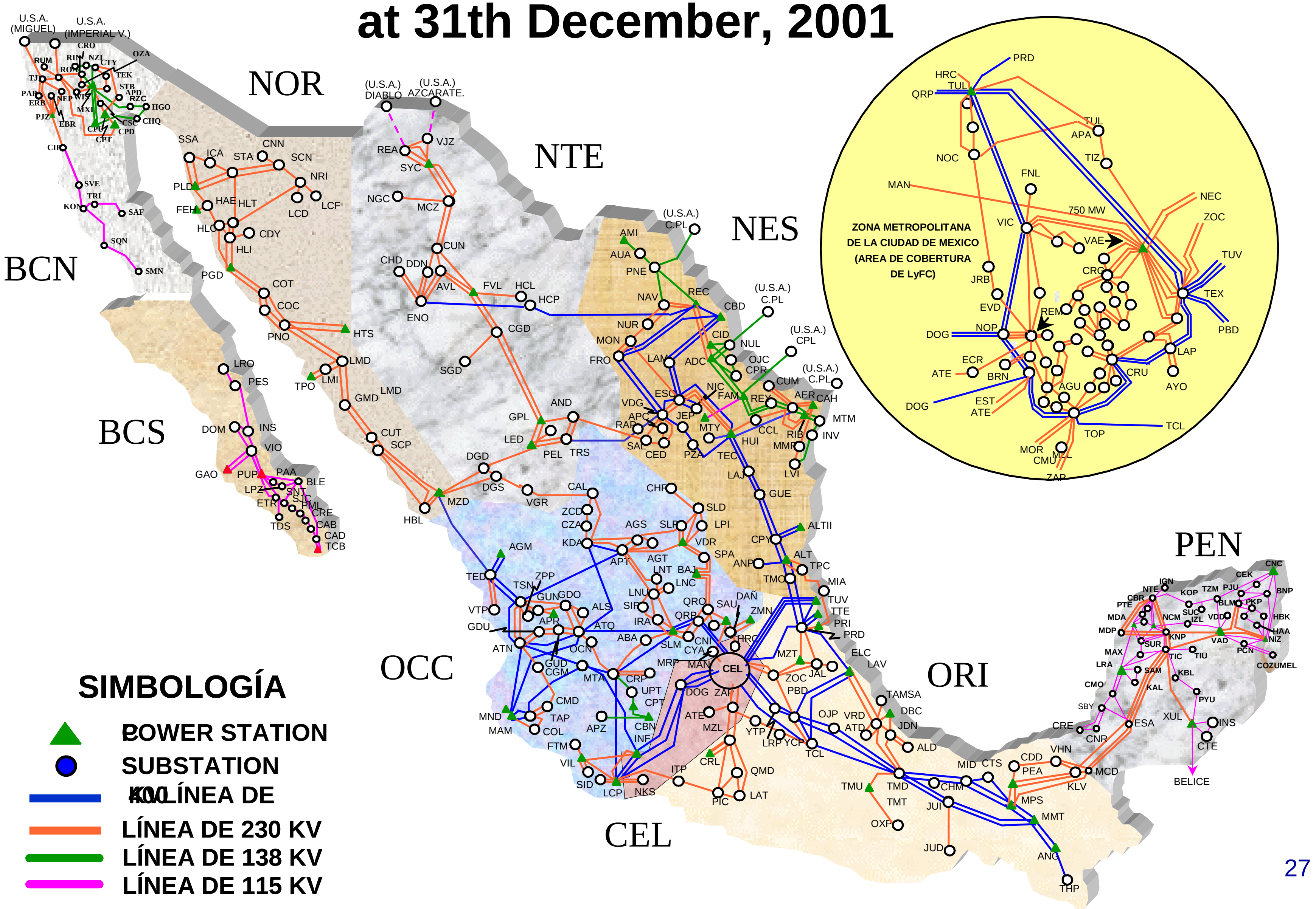
States with increase/ decrease in manufacture participation 1993-2000



with increase in manufacturing participation

with decrease in participation

Main Network of the National Electricity System at 31th December, 2001



SIMBOLOGÍA

- POWER STATION
- SUBSTATION
- LÍNEA DE 400 KV
- LÍNEA DE 230 KV
- LÍNEA DE 138 KV
- LÍNEA DE 115 KV

Users profile: Synthesis

Electricity: basic service for families' welfare

- Percentage of h*omes with electricity is high and appreciably higher than the percentage of homes with drinking water.*
- *Population with TV's is greater than with refrigerator, difference is most notable in the first income decil*

Electricity: critical factor for competitiveness, affects direct or indirectly production of all goods and services.

- *Elasticity of electric energy consumption relative to GDP is more than one, resulting from a shift in demand towards electricity intensive goods and services and the incorporation of more modern productive processes*

Demand shift: from the centre to the poles

- *Transmission network designed for a closed economy, may not match an open economy*

I. Integral treatment of
public policy design

II. Population profile

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IV. New Alternatives in the Electricity Sector

New Alternatives

Genaration

- Technological possible to integrate a competitive market of private energy producers.

Transmission

- Natural monopoly justifies that it be carried out by the State.
- Incentive problem: Public monopolies don't have good incentives to expand their infrastructure.
- Railways: these considerations and strong intermodal competition led the network's privatization, following regional segmentation *vis a vis functional* segmentation, in which the State would become the owner of the infrastructure and would operate dispatch functions

Distribution

- Natural monopoly, but with limited geographic scope.
- Public intervention is justified, but the level of government that can better exert this function is the municipal.

GOBIERNO DE CHILE
COMISION NACIONAL DE ENERGIA

Regulation and Competition in Electricity Markets

Carlos Piña R.
Jefe Area Internacional CNE

Rodrigo Iglesias A.
Jefe Area Eléctrica CNE

Mexico

May 30 - 31, 2002

CONTENTS

1. Introduction (1)

- **Chile was an early starter in economic reform, particularly in the energy sector (privatization carried out in the 80's)**
- **Investment decisions are private and the government has a regulatory role**
- **Price Policy**
  - Electricity:Prices free for large consumers, fixed by the National Energy Commission for small consumers; they must reflect the actual costs of production, transmission and distributing power in an efficient manner
  - Oil and gas: non regulated prices; follow international market prices.

1. Introduction (2)

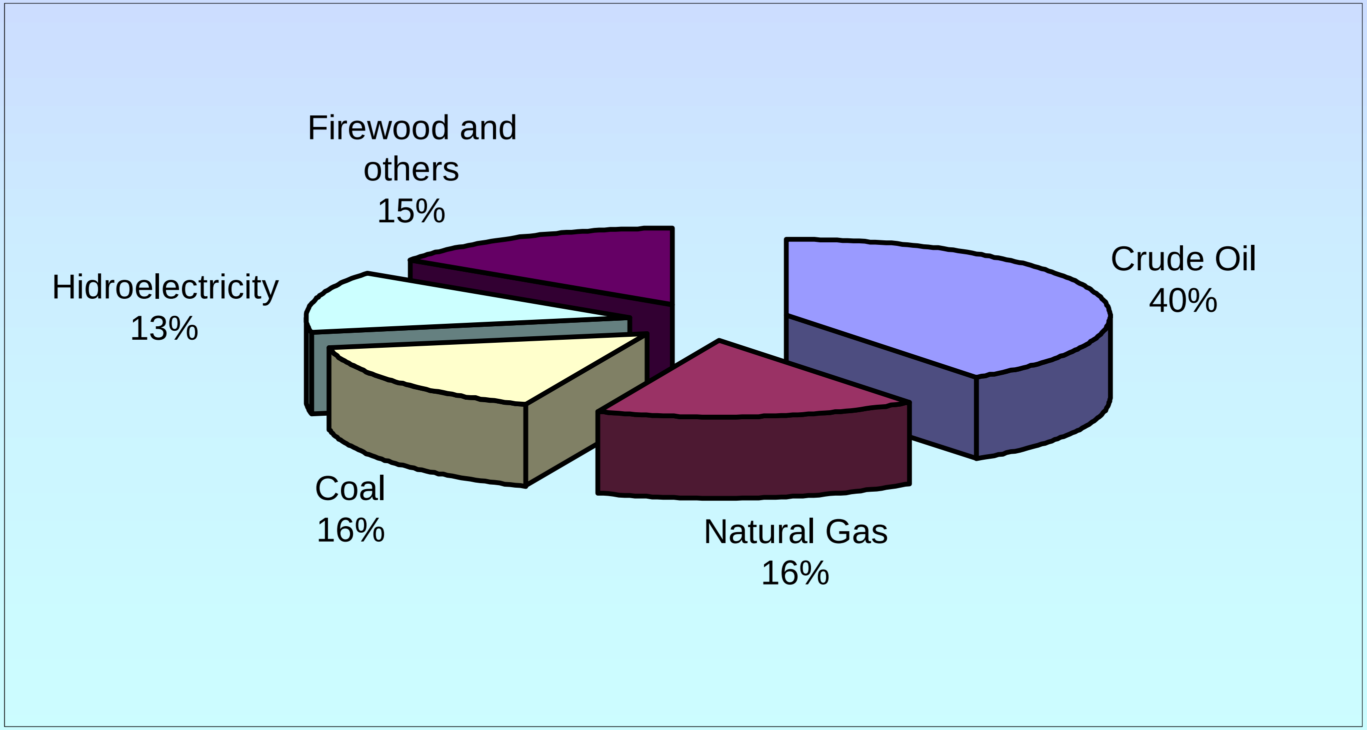
Consumption of Secondary Energy 1978-2008

Teracalories					
	1978	1988	1998	1999	2008[e]
Oil and Natural Gas Derivatives	54%	45%	43%	41%	39%
Natural Gas	6%	7%	13%	16%	28%
Coal and Coke	12%	16%	17%	17%	7%
Electricity	8%	10%	11%	11%	16%
Firewood and other	20%	22%	16%	15%	10%
Gross Consumption	96,964	127,857	264,754	286,266	550,533
Index	100.00	131.86	273.04	295.23	567.77
Average Rate of Growth		2.8%	7.6%	8.1%	7.6%
e: Estimate					
Considers electricity with a caloric equivalence of 860 Kcal/KWh.					

Source: CNE

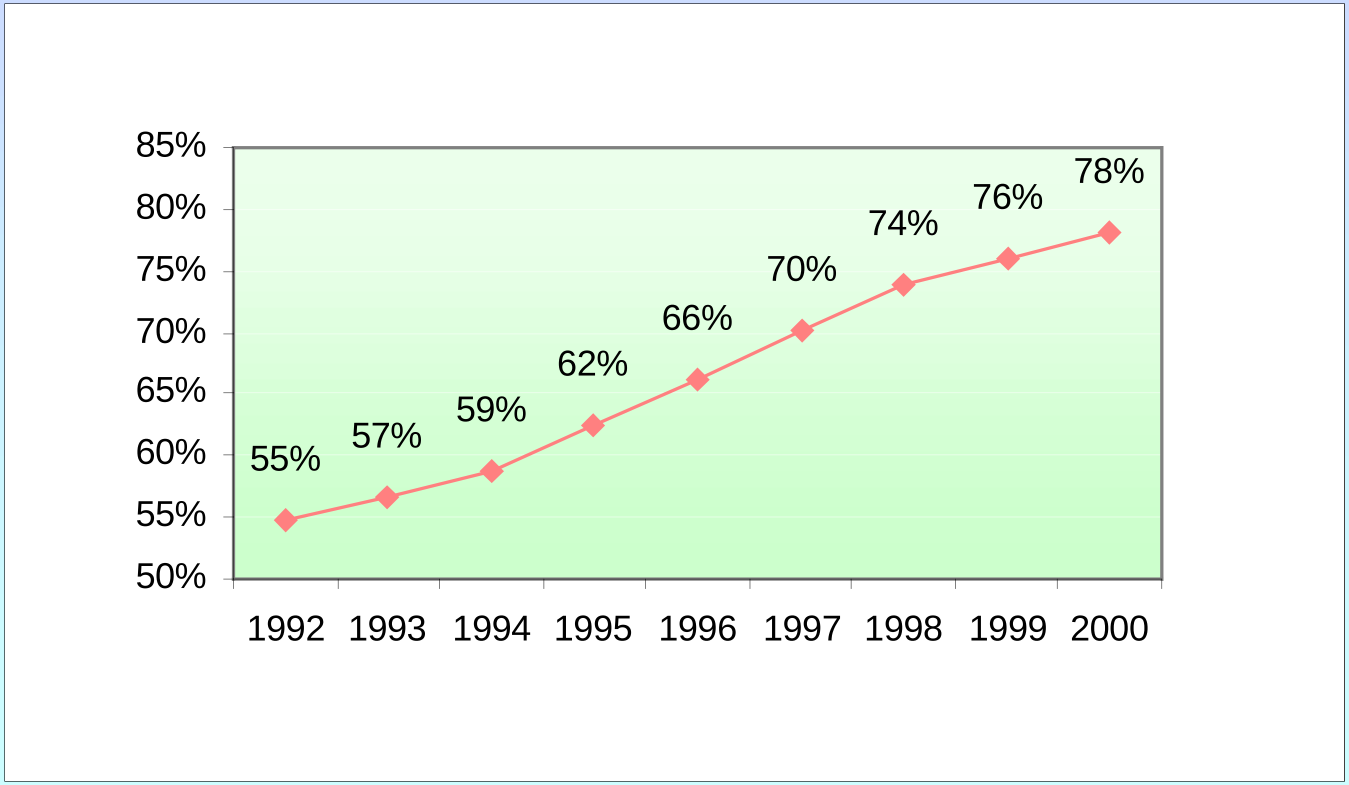
1. Introduction (3)

Energy Matrix 1999 in Teracalories



1. Introduction (4)

Evolution of Rural Electrification Coverage, 1992-2000



2. The last decade (1)

- **Gross Domestic Product (GDP) shows an average annual growth of 6.6% (1990-2000)**
  - Sustained economic development of the country requires constant expansion in the energy sector (demand grows at 7%-9% per year)
  - Strong investments (US$7,500 million 1997-2000)
- **Evolution of the energy market:** increasingly competitive
- **Gradual energy integration with neighbor countries:** gas and oil pipelines.

2. The last decade (2)

- **Internationalization of the energy sector:** new foreign investments due to a stable regulatory framework, macroeconomic and institutional stability.

- **Substantial progress in environmental protection:** Gradual implementation of the environmental legal framework.

- **Definition of a regulatory framework to explore and exploit national geothermal resources (1998)**

2. The last decade (3)

Electricity

- **Investment reached US$ 3,300 millions (1997-2000)**

- **Installed Capacity: average annual growth 9.1% (1990-2000)**
  - 4,400 MW in 1990 to 10,650 MW in 2000
  - thermal / hydraulic: 45% oil and coal / 55%hydro in 1990 ;
    62% gas, oil and coal / 38% hydro 2000

- **Generation: average annual growth 8.5% (1990-2000)**
  - 18,370 GWh in 1990 to 41,600 GWh in 2000

- **Rural Electrification Policy** (Coverage 55% in 1992 v/s 78% in year 2000)

2. The last decade (4)

Electricity

Total Installed Capacity (MW)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Thermal	2,013	2,016	2,091	2,169	2,168	2,667	2,928	3,450	4,405	5,914	6,624
Hydraulic	2,431	3,101	3,111	3,254	3,280	3,287	3,788	3,828	4,018	4,027	4,027
Total	4,444	5,117	5,202	5,423	5,448	5,954	6,716	7,278	8,423	9,941	10,651
Annual Variation		15.1%	1.7%	4.2%	0.5%	9.3%	12.8%	8.4%	15.7%	18.0%	7.1%

Total Power Generation (GWh)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000e
Thermal	9,447	6,833	5,623	6,792	8,350	9,633	13,910	14,338	19,544	25,250	21,929
Hydraulic	8,927	13,128	16,698	17,213	17,248	18,748	17,171	19,567	16,415	14,283	19,669
Total	18,374	19,961	22,321	24,005	25,598	28,381	31,081	33,905	35,959	39,533	41,598
Annual Variation		8.6%	11.8%	7.5%	6.6%	10.9%	9.5%	9.1%	6.1%	9.9%	5.2%

3. Investments in the Energy Sector

Investments in the Energy Sector (Millons US$)

	1997-2000	2001-2004
TOTAL	7,441	4,852
Natural gas Transportation	1,463	117
Natural gas Distribution	552	354
TOTAL NATURAL GAS SECTOR	2,015	471
Oil Exploration and production	85	40
Oil Refining	318	322
Distribution of oil derivatives and gas manufacture	541	280
Transportation and storage of oil derivatives	104	130
Petrochemical	1,090	1,377
TOTAL OIL AND PETROCHEMICAL SECTOR	2,138	2,149
Generation	2,554	1,317
Distribution	642	555
Transmission	89	330
TOTAL ELECTRICAL SECTOR	3,284	2,202
TOTAL OTHER (Coal, Geothermal, Renewable)	5	30

4. Electric Power Prices

Electricity

Electric power prices charged to end-users

ZONE	Residential US$c/KWh	Commercial US$c/KWh	Industrial US$c/KWh
North	**10,78**	**9,62**	**5,53**
Central	**8,6**	**8,17**	**5,39**
Aysen	**17,89**	**17,18**	**11,57**
Magallanes	**14,51**	**12,82**	**9,19**

In Short...

Electricity

- Reform and privatization of the 80´s has been fairly successfull
- During the 90´s investment was very dinamic until 1997
- Some degree of diversification and cost reduction was achieved through introduction of natural gas from Argentina (5 pipelines built between 1995 and 1998)
- Regulation shortcomings started to show their effects increasingly since 1996.
- Energy deficit of 1998-1999 resulted in a loss of public credibility of the energy sector "model"
- Political sectors have try to introduce legal reforms that could distort economic rationality in the sector; with very limited success
- Efforts are been made by government to propose integral "renewal" of regulatory framewok, correcting shortcomings but preserving economic basic design.

5. Coming Ahead (1)

Electricity

- **Production:** According to the Government´s indicative plans, 5,000 new MW will be needed between 2001 and 2009 (62% combined cycle plants) to supply the estimated demand

- **Distribution:** New investments are needed to reach the necessary quality

5. Coming Ahead (2)

Electricity

- **Transmission:** According to government planning, 2,500 new MVA will be needed between 2001 and 2009 (improvement of the actual network, new national and international connections)

- **120,000 rural homes without electricity:** Renewable energies to reach disperse communities
  - -North: high solar radiation ==> fotovoltaic systems
  - -Coasts and Center: wind ==> wind-power systems
  - -South: wind, waterfalls ==> wind power and micro hydraulic plants

6. Main trends and policy priorities

- **Sustained growth of electricity needs**, about one combined cycle per year (400 to 600 Mw up to 2009).
- **Introduction of new renewable resources** (geothermal, wind, solar) for interconnected and isolated rural systems
- **Open entrance to private investment in** geothermal development, rural electrification, electricity generation.
- **Government commitment with** policy that preserves economic health of energy development; special priority to international integration /gas and electricity interconnections, and market flexibility.
- **Legal electricity framework reform** to improve competition, reduce market barriers for entrance, deregulate prices, stimulate access of new investors to the market (second generation reform)

7. Electricity sector main challenges

- **Short term problems and decreased rate of investment due to financial crisis, drought, and over investment between 1994 and 1997**
- **Reduction of security and reliability at the generation-transmission systems**
- **Precarious balance supply-demand for next 3 years**
- **Need to update regulatory framework, to enhance competition, open access to markets, and security and quality of supply.**

7.a Electricity regulation major shortcomings

- **Substantial limitation to entrance of new suppliers to the market:** uncertainties related to transmission fees, behavior of spot market, and a very small market of non regulated consumers.
- **Absence of a real whole sale market:** distribution companies and large consumers do not participate in spot market, free choice of supply is limited by lack of effective open access to transmission and distribution lines.
- **Transmission price system has made increasingly non viable transmission expansion economic viability.**
- **Systems of price regulation at supply and distribution levels have lost credibility, and are perceived as discretionary in excess.**
- **System operators are contaminated in excess by commercial interests, over reliability an eficciency of supply**

8. Second Generation Electricity Reform (1)

- **Main features:**
  - Focus on competition "for the market"
  - Focus on long term bilateral contracts between supplier and consumer.
  - Deregulation of consumers 200Kw to 2000 Kw.
  - Creation of short term "adjustment market" managed by independent entity (energy exchange)

8. Second Generation Electricity Reform (2)

- **Main features:**
  - Creation of independent operator of interconnected systems
  - Introduction of the "energy broker"
  - Explicit definition of supplier responsibility in contracts
  - Improvement of price setting administrative processes, to enhance transparency, consumers participation, and reduce conflicts
  - Transmission charges regulated, based on centralized calculation of use fees, for each segment of the main systems.

8. Second Generation Electricity Reform (3)

- **Market organization:**
  - Independence of Market and System Operator
  - Main Transmission Systems own and operated by companies independent from Generators and Brokers.
  - Deregulation of consumers 200Kw to 2000 Kw.
  - Energy broker,supplies energy through long term contracts, arranges fees for use of transmission and distribution systems.

8. Second Generation Electricity Reform (4)

- **Regulated segments:**
  - Access fees for Main Transmission and distribution systems fixed by Regulator, administrative processes open to participation of different stake holders.
  - Access fees equivalent to medium term average development cost for an optimal system.
  - Introduction of an Independent Body in charge of solving regulated prices controversies.

8. Second Generation Electricity Reform (5)

- **Expansion of Transmission Systems**
  - Transmission systems can be private or subject to open access and regulation.
  - Main Transmission access regulated, payments by users (all agents that buy and sell) is mandatory.
  - Transmission owner responsible for system expansion, according to agreed expansion plan (regulator, owner, and users participation).
  - New Interconnections (National or International) defined by agreed expansion plan. Developed by company that submits best offer.

8. Second Generation Electricity Reform (6)

- **Regulation of Distribution Systems**
  - Separation of “transportation” from “marketing” costs.
  - Transportation cost to became a “regulated distribution system access fee” for independent suppliers.
  - Redesign of regulated rate setting procces: one study, subject to public access; participation of distribution co´s, suppliers, brokers, large consumers, consumer associations, etc.
  - Introduction of an “Permanent independent technical panel” to act as final decision maker in cases of conflict between regulator and stake holders.

9. Short-Medium Term Government Strategy (1)

- **Main features:**
  - Sound economic policy at the sector level, to assure energy sector competitive presence in the investment markets.
  - Realignment of regulated prices to real cost.
  - Recuperation of electricity investments rate of return.
  - Stability of rules and policy, to reduce regulatory risk.
  - Improvement of norms transparency and clarity, through more precise regulations of current laws.
  - More precise definition of capacity price, to use it as a clearer signal for capacity reserve

9. Short-Medium Term Government Strategy (2)

- **Legal Reform in two stages:**

- **Ley I (Called "short law"):** to be presented to Congress during March 2002; includes aspects that relate more directly to availability of energy in the medium term (2003-2006)
  - Transmission rates and conditions reform.
  - System interconnections regulation (national interconnections)
  - Tarif regulation reform for isolated, non competitive systems
  - Creating secondary services market
  - Better regulated generation price adjustement to the free market average.

9. Short-Medium Term Government Strategy (3)

- **Legal Reform in two stages:**

- **Ley II (called "ley larga"),** to be presented to congress after Ley I is approved, includes long term effort of market liberalization (may need longer time of debate):

  – **Market reform:** expansion of non regulated market, creation of independent system and market operator, introduction of independent energy broker.

  – **Reform of rate regulation at the distribution level.**

Some problems to be solved for the improvement for the electric sector regulation

1

Economic development and social well-being are compromised if we lack a timely, sufficient and efficient supply of electric power.

2

Reason for the lecture

- "In order to discourage investment even more, deputies agreed on rejecting constitutional reforms on electricity".

Heading of the column "*Marcapasos*" of *Refoma* Newspaper, Business Section, page 1, Wednesday 29th of May 2002.

Contents

Restructuring of the CFE and LFC

- Aspect related to the industry's restructuring
- The matter is crucial, especially if the Constitution is unmodified.
- A market of electric power at wholesale needs various buyers and sellers whose decisions are independent and do not have substantial power.

Restructuring of the CFE and LFC

- It is necessary to define public policies applicable to organizations in relation to:

- Generation
- Transmission
- Distribution
- Economic dispatch

Restructuring of the CFE and LFC

- It is necessary to define public policies applicable to organizations in relation to:

- Connection of imports-exports (CFE)
- Existing capacity and electric power contracts with independent producers (CFE)
- Commercialization

Restructuring of the CFE and LFC

It is necessary to define public policies applicable to organizations in relation to:

- The mandate created by each organization.
- Alignment of incentives between the organization and the mandate. Maximizing social well-being?
- Rules of corporate government.
- Protection to minority shareholders –not administrators.

Restructuring of the CFE and LFC: Theoretic Exercise

- Subject to the restriction of not modifying the Constitution and supposing legal problems are solved,
- if it was possible to restructure enterprises and implement an “ideal” institutional design,
- it would be even possible to implement the “ideal” design without constitutional restrictions.

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Restructuring of the CFE and LFC: Theoretic Exercise

- If the former is correct, an important implication is that opposition to the reforms comes mainly from those who oppose the restructuring of enterprises.
- Mexicans are cautious of those who oppose to the restructuring of enterprises.

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Autonomy of Action

- Evoked Principle: suppliers must be freed from the chains imposed by the SHCP, SEDOCAM and other dependencies or organs.
- Banner: that the SHCP and the government stop "milking" our electricity enterprises.
- False conclusion: Mexico does not need to restructure the sector and its enterprises, it only needs to "free" them and provide financing through pension funds, preferably by suppressing their degrees of freedom.

Autonomy of Action: Problems of argumentation

- No law in vigor has the elements to resolve the problems previously described: corporate government and an alignment of incentives that ensure the maximum well-being to Mexicans.
- Neither does any law currently discussed have them.
- Unfortunately, it is not even perceived that the matter is being considered.

Autonomy of Action:
Problems of argumentation

- The simple "freeing" of organizations implies leaving the door open for the CFE, LFC, its administration or labor unions to "milk" Mexicans: as users or potential "minority shareholders".
- Control through their government boards (administration councils) does not work, has not worked and will not work if the pointed aspects are not solved.

Autonomy of Action:
Examples of the argumentation error

- Lawsuits of environmental authorities and others, to state-owned enterprises imply a waist of government resources.
- Good wishing does not turn into reality automatically.
- That is, the alignment of incentives with the objective is not automatic.

Electricity Tariffs: What does the Law say?

- Fixed by the SHCP
- Proposed by the CFE – "LFC" follows the CFE
- SENER and CRE "intervene"
- SE "gives an opinion"

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Electricity Tariffs: What does the Law say?

- There is no explicit, transparent procedure with phases and terms so dependencies "intervene" or "give and opinion".

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Electricity Tariffs: Level and Structure

- By setting tariffs, the SHCP dominates the fiscal criteria.
- The procedure is also vulnerable before those who seek redistribution and achieve it.
- When they do, such achievement is not necessarily accord with a redistributive public policy.

Electricity Tariffs: Level and Structure

- Regions
- Stations
- Times of the day
- Level of tension
- Users / Uses

Electricity Tariffs: Level and Structure

- We need tariffs that allow the operation, maintenance and expansion of the system.
- That allow the transfer of costs, according with best practices, to users – "pass through"
- That they motivate organizations to minimize costs.
- Explicit processes are required where there is participation that adds value.

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Electric power market at wholesale

- An electricity power market at wholesale requires of various buyers and sellers whose decisions are independent and do not have substantial power.

- The ideal would be to count with many enterprises of distribution that participate as buyers, along with other consumers.

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Electric power market at wholesale

- If we stay with the scheme in vigor or a similar one, the CFE would be the great buyer of electric power.
- The scheme in vigor never worked.
- The regulatory challenge would be still enormous.
- It will be impossible without instruments.
- Less than 1 GW of self-supplying capacity and cogeneration in almost 10 years has been constructed.

Acquisition of electric power by suppliers

- Article 36 BIS, LSPEE
- "For the offering of public service of electric power it must be used, in the short and long term, the production of electric power that results of least cost and offers, as well, optimum stability, quality and safety of the public service".

Acquisition of electric power by suppliers

- Capacity for the surplus of electric power has never been paid.
- The excuse has been that the CFE is not obliged to do so.

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Acquisition of electric power by suppliers

- The lack of obligation has caused a good part of the problem.
- Another problem has been the deficiency of access to the net and other services.
- It was established in the Law that private entities must convene with the CFE all of these aspects.

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Acquisition of electric power by suppliers

- Monopolic discrimination (1st and 2nd). No "dispatch".
- If it does not suit the CFE, it does not give access or buys electric power. The same happens with capacity.
- In general, the elements to verify the abiding of acquisition of electric power at the least of costs are non-existent.

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Acquisition of electric power by suppliers

- The tragedy is that while the CFE wins, Mexicans lose.
- We lose the opportunity of using the capacity of cogeneration much more cheaper than combined cycles.
- We lose the opportunity of this low-priced capacity being built.

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Complying with the Law

- The only parameters of quality of service are not accomplished (frequency and voltage).
- There is no knowledge that the CFE or LFC have been sanctioned for it.

Complying with the Law

- In general, laws do not establish sanctions to organizations for not complying with their obligations nor the means to verify them. For example, in buying and using the least-priced electric power.
- Some obligations that should exist, do not. For example, give access or paying the capacity if this is the cheapest.
- That is, to comply with the quality standards of the service or productivity, according to the best international practices.

Conclusion

- It is necessary to restructure enterprises.
- It is necessary to align incentives with objectives.
- It is necessary to correct problems of process, structure and level of tariffs.
- It is necessary to avoid situations where organizations make and apply their own law.
- Autonomy of action is not that organizations apply the “Law of Herod”.

CRE

Challenges of the Energy Regulatory Commission

Seminar on Market Regulation and Competition

May 31st, 2002

CONTENTS

I. The Energy Regulatory Commission

Background

- From 1995 onwards, significant legal and institutional reforms have been implemented to open up new areas and regulate private participation in the energy sector.
- As a part of the institutional reform, in October, 1995 the Congress approved the Energy Regulatory Commission Law (CRE Law).

  CRE Law:
    - Concentrates in the CRE regulatory instruments that were scattered among different governmental agencies (SENER, SE, SHCP, PEMEX, CFE).
    - Transforms the CRE into a deconcentrated body of the SENER, with technical and operative autonomy.
    - Assigns to the CRE regulatory powers in electricity, natural gas and LP gas (pipes) activities.

Function separation

Please refer to image on page 5 of of this document’s Spanish version.

Main principles

EFFICIENCY

From 1995 to date, the CRE has registered annual savings ranging between 5 and 13% of its budget.

EFFICACY

ISO-9002 Certificate (pioneer on an international level)

QUALITY

SECODAM Special high quality distinction in the Public Administration, year 2000.

Operation Principles

The regulatory activity of the CRE is characterized by the following operation principles:

- *Clarity* through precise and simple rules.
- *Stability* as a result of a long term vision of the electricity industry.
- *Transparency* through a collegiate decision-making
- *Equity* on the law enforcement
- *Autonomy* on technical and operative matters

Powers

Currently, the CRE is vested with the following powers in electricity energy matters:

- To grant private generation permits
- To participate in supply tariff setting
- To approve the methodology to calculate payments for electric energy acquisition for public service
- To approve the methodology to calculate payments for the conduction, transformation and delivery of electricity services.
- To verify that energy acquired for public service provision represents the lowest cost for CFE and LFC.
- To verify the fulfillment of established conditions in permits and authorizations granted.
- To impose administrative sanctions.

II. Advances and challenges for the Electricity Industry

Advances 1995-2002

193 out of 213 generation permits granted by the CRE are still in force for a total of 19,043 MW.

MW Capacity of authorized permits in force by generation mode (1994-May, 2002)

Cogeneration 2,100 MW 11.09%

Self-supply 5,900 MW 31%

Exportation 2,218 MW 11.6%

Importation 154 MW .8%

Independent Power Producers 8,759 MW 45.9%

MW Capacity of authorized permits in force by stage (1994-May, 2002)

About to initiate works 666MW 3.61%

Inactive 407 MW 2.21%

In operation 6,769 MW 36.72%

In construction 10,005 MW 57.34%

NUMBER OF TOTAL AUTHORIZED PERMITS IN FORCE 193

Limited private participation

Nevertheless, private participation in the electric sector has been insufficient and under the current institutional and legal framework, it develops in unfavorable conditions for the government

From 1994 to date:

Total Capacity authorized by the CRE	19,043MW
Excluding PEMEX and IPP in operation	8,429 MW
In operation	1,777 MW
New investments	1,057 MW
Regularization	720 MW

… Advances 1995-2002

The following regulatory instruments have been issued:

(Firm and interruptible sources)

- Interconnection Contract to allow private agents to receive National Electricity System Services.
- Backup Contract to allow CFE and LFC to provide support energy to permit holders.
- Dispatch Agreement to transport private agents’ energy to any other network point.
- Energy Purchase Agreement to allow private agents to sell their energy surplus to CFE or LYFC.
- Methodologies to calculate the charges that CFE and LFC make to the permit holders for services rendered (dispatch or ancillary services)

Electricity Sector Challenges

- Within the next 10 years, electricity demand will grow at a rate close to the 6% per annum.
- During 2001 to 2010 it will be necessary to install new capacity for 26,300 MW (investments close to 590 billion pesos, including transmission and distribution)
  - 12,050 MW are under construction or public bidding.
  - 14, 250 have not been assigned.

Electricity Sector

- Weakness of the Transmission and Distribution Networks
- Tariffs that do not reflect real costs
- Exhausting of the transitory solution (PIDIREGAS) to finance new infrastructure
- 1992 and 1995 reforms proved to be insufficient.

… Challenges of the Electricity Sector

- The CRE has powers to regulate private enterprises' participation
  – It is necessary to strengthen the powers of the CRE aimed to induce efficiency in public enterprises.
  – In the case of electricity sector restructuring, the regulatory framework should be defined last, in order to ensure its consistency with the industry structure and the powers of public enterprises.

III: Regulatory Framework Strengthening

CRE Strengthening

- For public and private sectors to concur in electricity industry it is indispensable to have:
  - A legal framework that provides certainty
  - An efficient industrial organization
  - A stable and predictable regulatory framework

  The attraction of new investments without State guarantees will only be achieved this way.

  To guarantee the above mentioned, it will be necessary to technically and functionally strengthen the CRE.

Strengthening Scenarios

Scenario 1. Strengthening without Electricity Reform

Independently of any modification to the legal framework, it is necessary to strengthen the CRE aiming to induce higher efficiency and to introduce transparency to electricity industry operations:

- Establish terms and conditions for the supply of electricity.
- Establish tariff regulation for the public service
- Accounting separation and establishment of regulatory accounts
- Approve and issue electricity dispatch rules

Strengthening Scenarios

Scenario 2. Strengthening with Electricity Reform

In addition to the powers described above, an electricity industry reform entailing, among other issues, qualified users, system operator independence, and legal and accounting unbundling of CFE and LFC, implies the need to endow CRE with the following powers:

- To manage the registry of qualified users
- Approve and issue system rules, and in its case, for the electricity market
- Establish tariff regulation for each of the regulated activities
- Revise the extent of the sanctions with respect to the new regulated activities

Industry Regulation

(Please refer to the image on page no. 19 of the Spanish version).

IV. CONCLUSIONS

Conclusions

- In the event of an electricity sector restructuring, the regulatory framework should be adequated with the object of:

  - Extending the reach of regulated activities in order to include those performed by public organisms.

  - Strengthening the CRE in order to efficiently regulate activities

  - International experience demonstrates that regulation cannot substitute for the organizational structure deficiencies and the electricity market design deficiencies.

  - An adequate coordination between the CRE and the CFC is required to guarantee the efficient performance of the industry.

WWW.CRE.GOB.MX

Regulation and Competition in Electricity Markets

Topic 4. Challenges for Regulatory and Competition Commissions in Electricity Markets.

"Challenges for the Federal Competition Commission"

Fernando Sánchez Ugarte

May 31, 2002

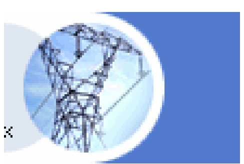
CFC's Objectives are to:

- Encourage and develop competition in the Mexican economy, including the public sector.
- Combat and prevent monopolistic practices and concentrations.
- Foster a regulatory framework favorable to the competition process and free market access.
- Ensure equal and non-discriminatory access to public permits necessary to perform an economic activity.

Competition is important for economic activity and development because:

- It promotes investment and employment, facilitates economic growth and the flexibility to face national and international crises.

- It encourages reductions in consumer prices and improves the quality and variety of goods and services.

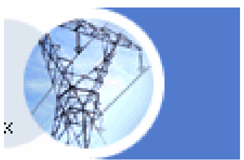


Competition is important for economic activity and development because:

- It promotes the efficient allocation of resources based on their relative scarcity.

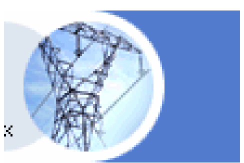
- It maximizes social welfare.

Competition policy favors proper market operation and competitiveness in the domestic industry, and contributes to social welfare.



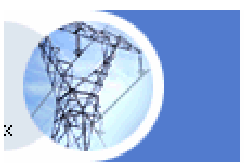
The State´s Acts

- The direct actions of the State as a productive economic agent that produces through state-owned entities in strategic areas, influence diverse markets.
- Although these roles do not constitute monopolies as noted in the LFCE, they are subject to its dispositions.



CFC's Activities in the Energy Sector:

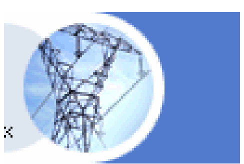
- Analyze the effect of concentrations on competition.
- Combat anticompetitive practices in the energy sector.
- Assess private agents interested in obtaining permits to construct and operate plants to generate electricity, as well as those interested in natural and LP gas markets.



CFC Activities in the energy sector:

- Opine on competition issues within the regulatory framework of the sector.

- Declare the non-existence of competition conditions, regarding activities in the natural and LP gas markets.



Structural Reform of the Electric Sector:

- Today the structural reform of the electric sector is being analyzed.
- It must guarantee society that the supply of electricity is sufficient, reliable, of good quality, and at competitive prices.
- It is unclear what is the scope of the reform to be defined and approved by the Legislative Power. Without a doubt it will require an effort by the institutions involved in the sector to reach their set goals.

Structural Reform of the Electricity Sector:

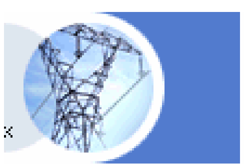
- There are several reform projects, each one with different levels of access for private investment.
- Competition must play an important role in the sector´s reform since it provides incentives for:
  - Increased productivity and efficient operation of businesses.
  - Service innovation and diversity.
- Even without opening the sector to private investment, competition may strengthen efficiency in our electricity industry. For example, generator plants must compete against each other.

Electricity Reform Challenges

- Structural change must respond to the individual needs of both population and industry.
- It must ensure that the reform has a favorable impact on final consumers.
- The reform process must be fast so as to avoid uncertainty that negatively affects investment.

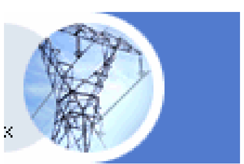
Benefits of an Electricity Reform

- Benefits expected from the reform must include:
  - More efficient structures in the sector.
  - Savings in investment costs.
  - Increased labor productivity.
  - Improved services for the population.



OECD studies suggest that, faced with an imminent reform in the electricity sector, active participation by the competition agency is essential because:

- Oligopolistic conditions prevail in generation, favoring anticometitive practices.
- It may be necessary to develop markets that did not exist previously.
- Concentrations with negative effects on competition must be avoided.



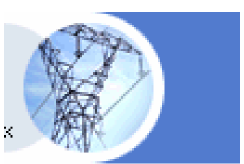
In the event of a reform, the CFC Must reinforce its actions of:

1. Combating anticompetitive practices.
2. Controling concentrations (paying special attention to vertical integrations).
3. Issuing declarations of substantial market power and effective competition.
4. Supporting the definition of regulations, to include pro-competitive principles.
5. Ensuring non-discriminatory access to national transmission and distribution infrastructures.

Institutional Participation

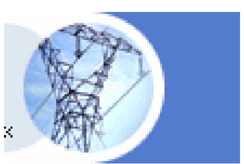
- For this task, the CFC requires effective cooperation from the regulatory body.

- The faculties of the CRE must be defined to minimize duplication of roles with CFC, promoting legal certainty.



CRE

- International experience suggests that independence and regulatory competence of the regulating body must be strengthened.
- It must apply transparent and pro-competitive processes.
- **Technical regulation.** Establishing norms that ensure compatibility, efficiency, safety, and enviromental protection.
- **Economic regulation.** Adopting measures to control monopolistic prices and ensure consumer protection.

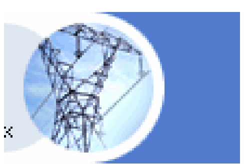


CFC-CRE cooperation is necessary to:

- Reinforce CRE's knowledge of competition principles.

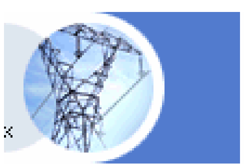
- Reinforce the CFC's technical knowledge and experience in the sector, to enable it to perform its role.

- Participation by both institutions in the defense and promotion of competition is essential.



Administrative Collaboration Agreement

- Signed last May 8 by the CFC and CRE.
- Established the general foundations for coordination and execution of acts in common interest areas.
- Actions seek the efficient development of activities, as well as the exchange of information that facilitates the timely compliance of each of their legal mandates.
- Joint work between CFC and CRE will allow them to take advantage of synergies, as well as each institution’s experience.



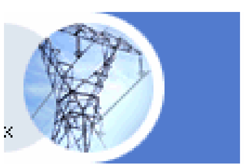
Collaboration Agreement

The agreement includes, among other items:

- Common objectives.
- General coordination fundamentals.
- Committments and responsibilities.
- Protection of confidential information.

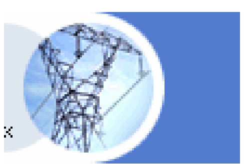
International Experience

- Experience in countries like the United Kingdom and Italy shows that when regulators have faculties in competition matters, they disregard the application of competition policies in order to fulfill immediate social demands.



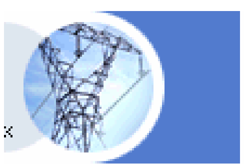
International Experience

- Even in Australia, the competition authority has faculties to develop economic regulation in addition to enforcing the competition law in the electricity sector.
- This same authority regulates access to telecommunications networks and will soon be doing something similar regarding natural gas ducts and electricity transmission lines.



Competition Challenges

- Satisfy special needs and supply in the most efficient way.
- Persuade CFE and LyFC to operate based on market considerations in order to reduce costs, as well as increase efficiency and the quality of services they provide.



Conclusions

- Competition policies favor the efficient functioning of the electricity sector, contributing to social welfare.
- The CFC faces important challenges in the introduction and consolidation of competition in the electricity sector.
- The agreement between the CFC and CRE will expedite the effective implementation of the regulatory framework in the sector and the LFCE.