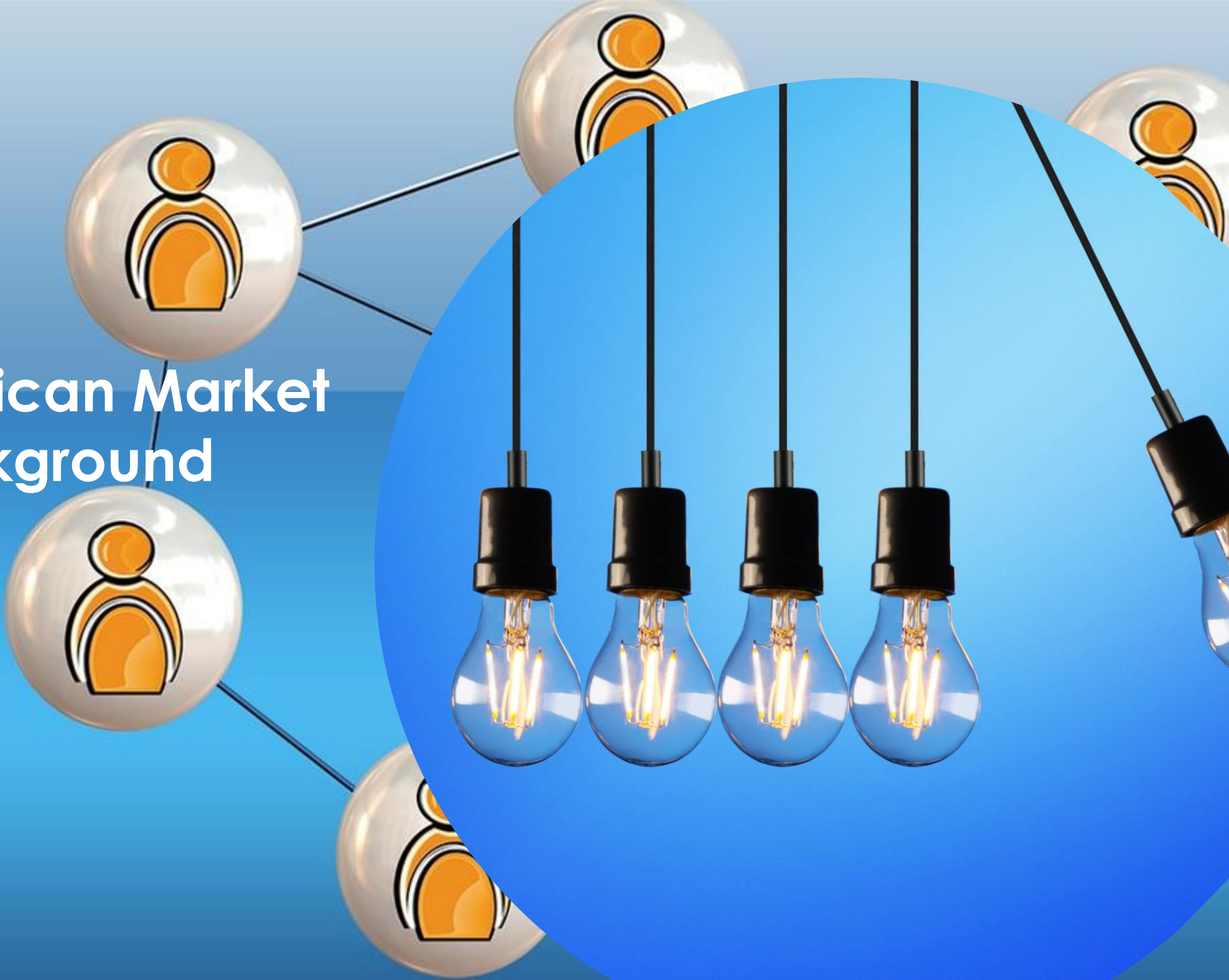




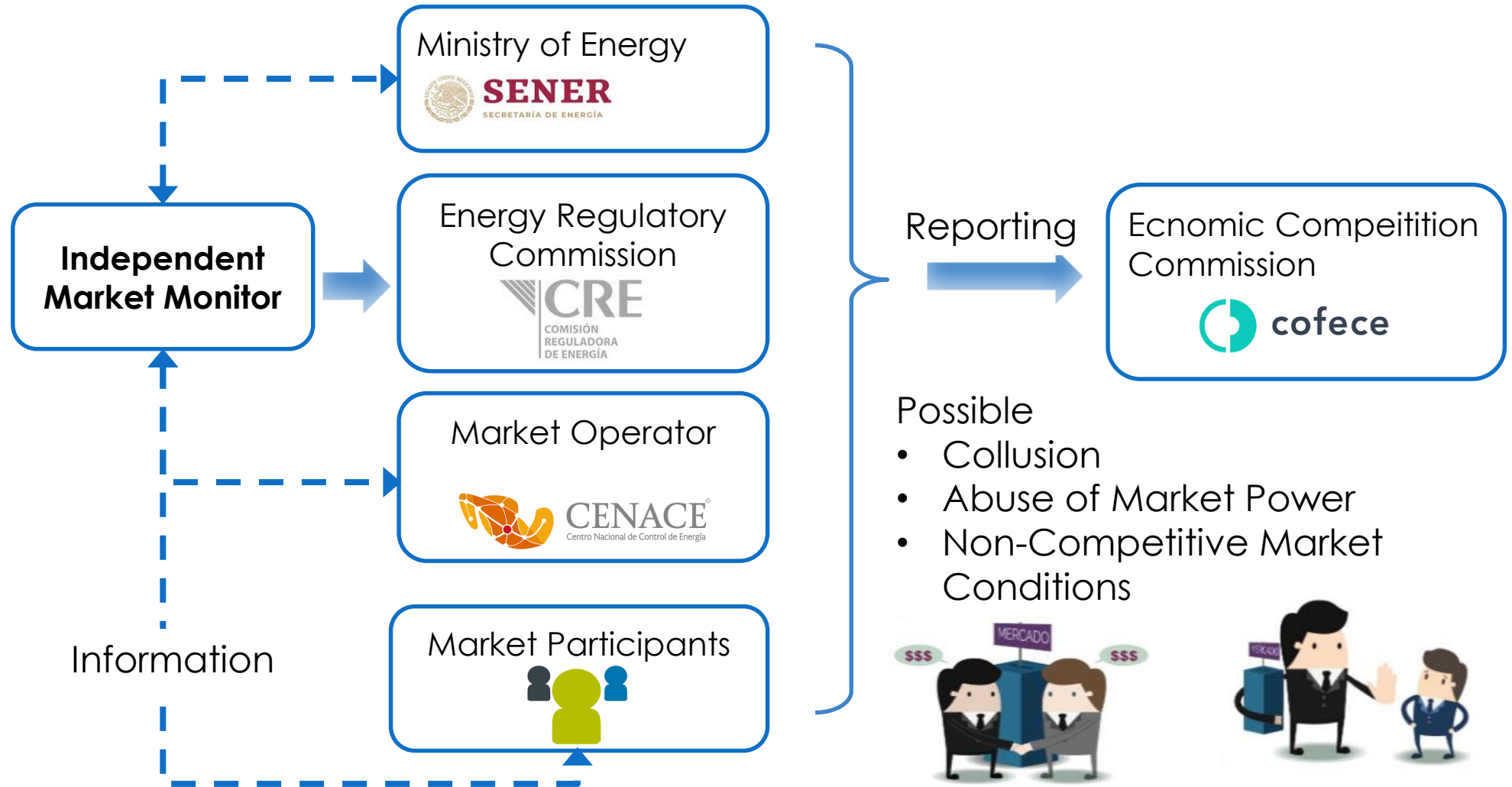
Market Surveillance in Mexico: Comparisons and Observations

Dr. Mario S. DePillis
Director, Monitor Independiente del Mercado

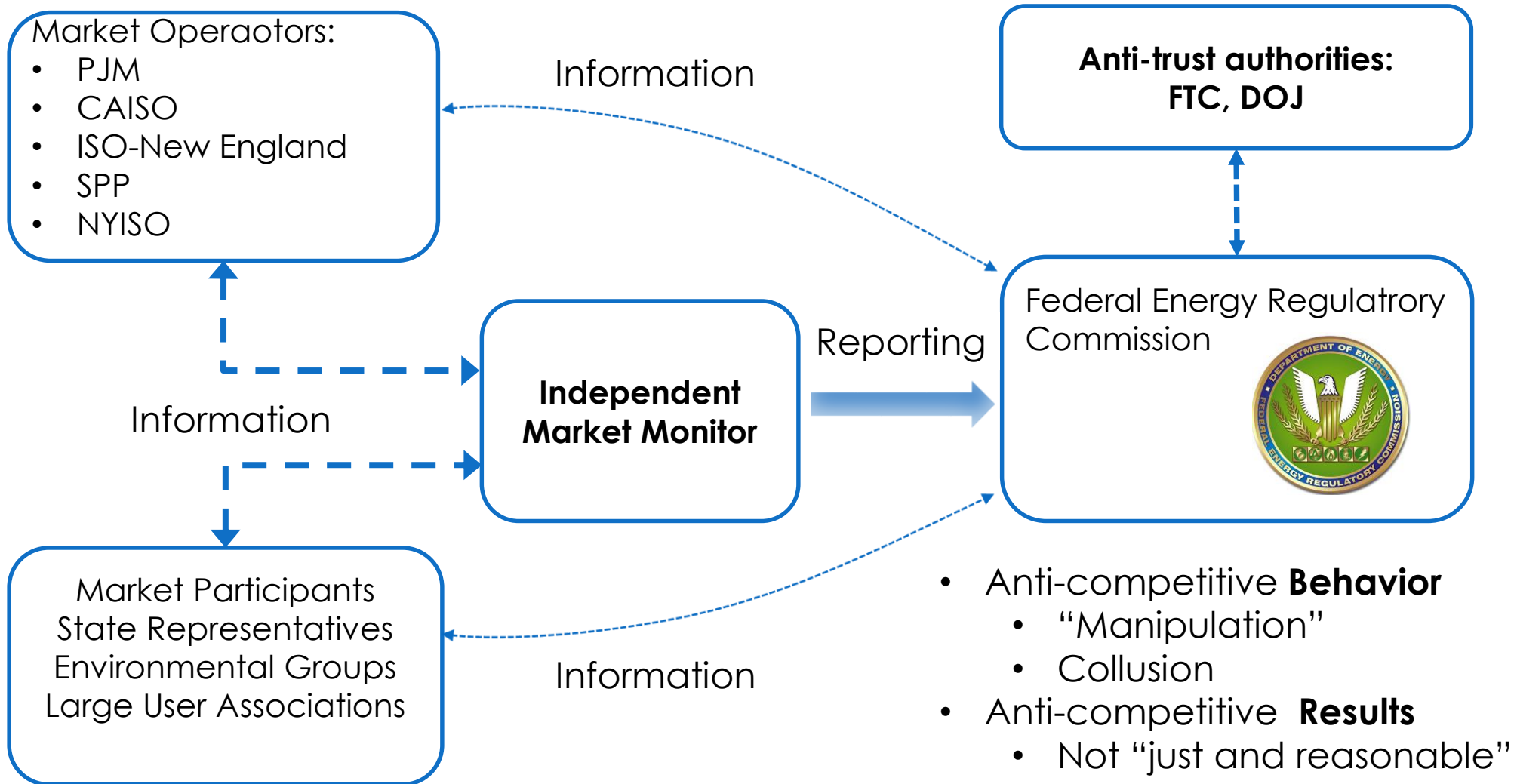
Mexican Market Background



Electricity Market Competition Regulation in Mexico



Electricity Market Competition Regulation in U.S.



Examples of Market Monitor Decision Authority In U.S., ISO-New England

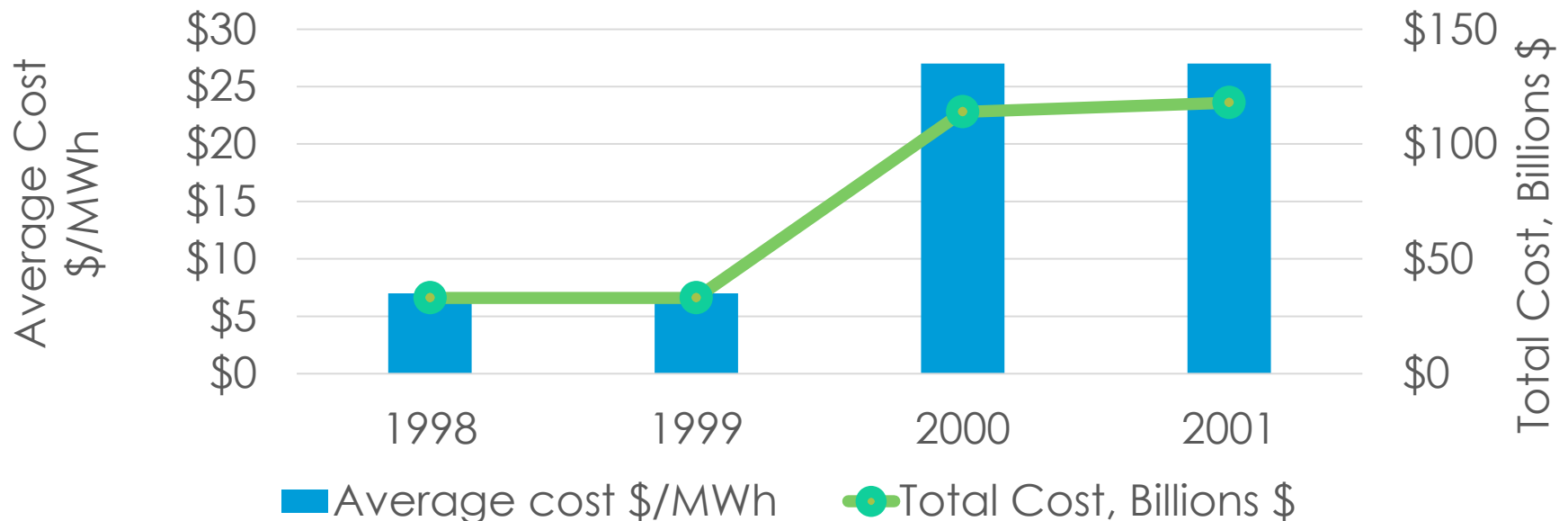
- III. A.3.1. “Consultation Prior to Offer”
 - “.. the Market Participant may contact the Internal Market Monitor to provide an explanation of the increased costs.”
 - **Decision of Internal Market Monitor to accept or reject**
- III.A.5.9. “If the Internal Market Monitor determines that there are one or more errors in the mitigation.. The ISO shall correct the error as part of the Data Reconciliation Process..”
 - **No role of Federal Energy Regulatory Commission**
- III.A.7.5.(e) “The Internal Market Monitor will evaluate cost information provided by the Market Participant in comparison to other information available to the Internal Market Monitor.”
- III.A.7.5.1. “The Internal Market Monitor’s determination of a Resource’s marginal costs shall include an assessment of the Resource’s incremental operating cost..”
 - **Decision of Internal Market Monitor, no codification of fuel index, transportation cost etc.**
- **Faster decisions, more adaptable, less market uncertainty, subject to appeal**

Why Market Monitoring and How It Is Organized?



Origin of Market Surveillance

- California Electricity Market Crisis of California: 2000-2001
 - Market started **without ability of market monitor to intervene or react to distortions**
 - Crisis led to start of strong market monitoring in the U.S.
 - CAISO market started with value of USD \$7 billion/year
 - Manipulation of market led costs of USD \$27+ billion/year
 - Governor of California lost a recall election due to the electricity market crisis



Design and Structure of Market Monitors

Monitor Can be Inside or Outside Market Operator

Inside Market Operator:

- Similar to Internal Auditor
- Reports to CEO and Board of Directors

Outside or Separated from Market Operator:

- **Competitive Contract.** Long-term contract of 3-4 years
- Financed by Market Participants (**México**)

Inside Regulatory Agency:

- Financed by the government
- Reports to government agency (**México**)

Supplementary Monitoring

- **Market Surveillance Committee:** committee of consulting experts selected by Market Operator or Regulatory Agency

International Examples of Market Monitor Implementations

Inside the Market Operator: Southwest Power Pool, California ISO, ISO-New England*



External to the Market Operator: New York ISO, PJM, Texas (ERCOT), ISO-New England,* Alberta, Midwest ISO, **México**



Inside the Regulatory Agency: Alberta, Singapore, Australia, Colombia, **México**



Supplementary Market Surveillance Committees: California ISO, Ontario, New Zealand (1994-2003)

*ISO-New England has both an internal and external market monitor

Monitoring: The People and The Tools

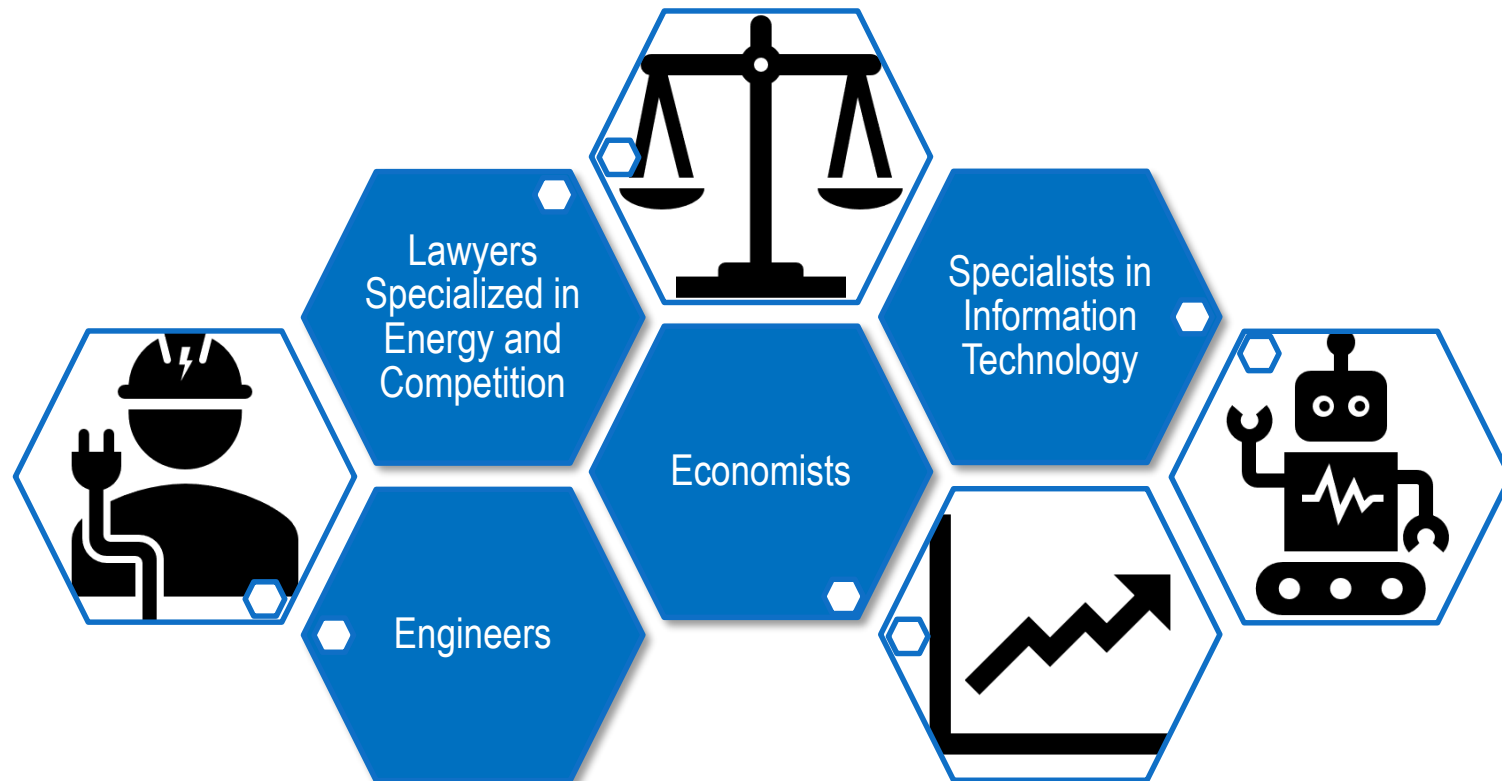


People and Tools: The People

Doctorates (8)

Masters Degree (7)

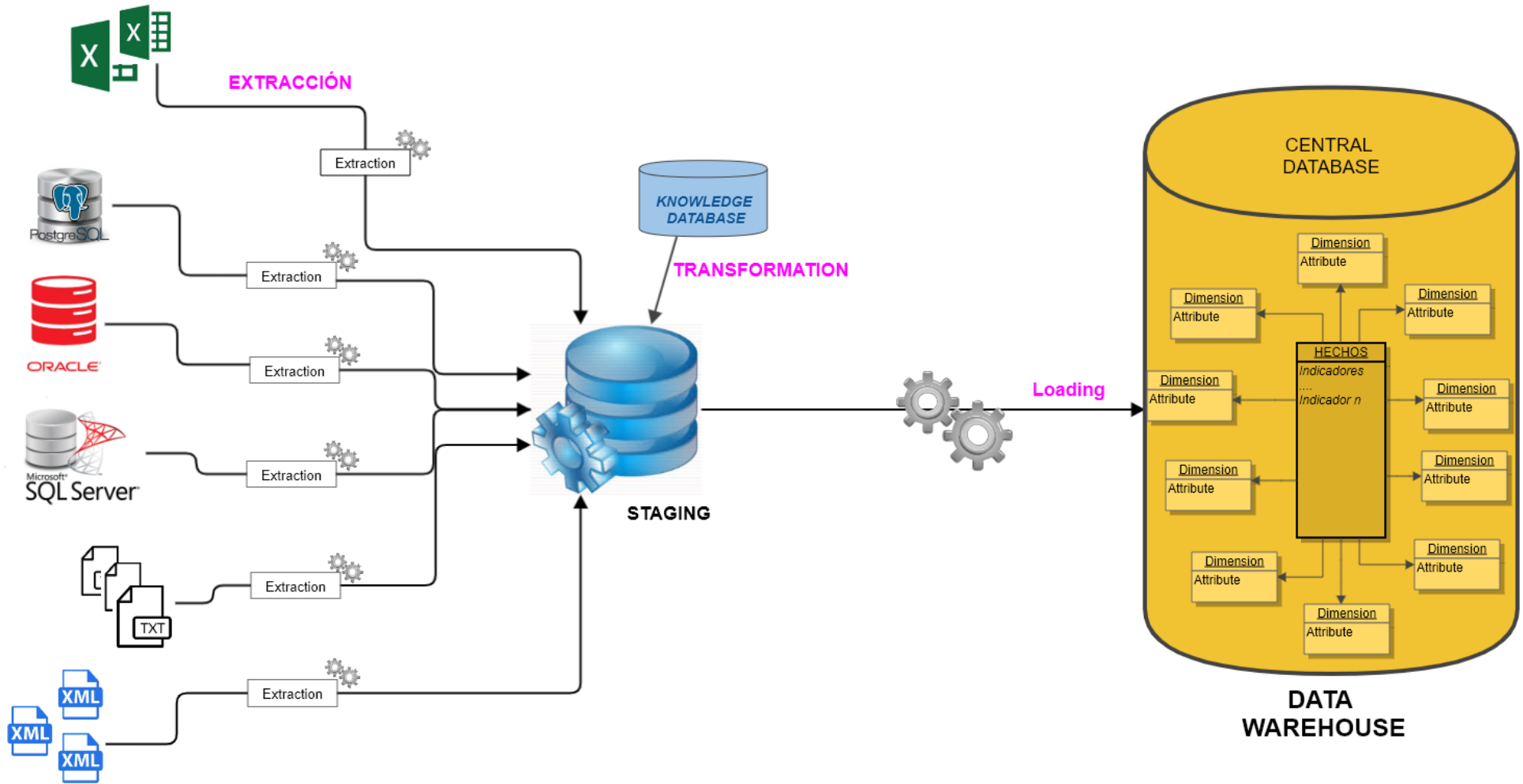
Licenciatura, "BA" (7)



People and Tools: The People



People and Tools: Data Infrastructure



People and Tools: Simulation and Analysis Tools

- Data Analysis
 - Custom indices
 - Statistical packages, AI
- Market Simulation
 - Access to actual market model
 - Rerun market cases to evaluate market and operator decisions
 - Mexico: What if transmission line were rated 10% higher?
 - Mexico: What if wind farm offered 100 MW instead of 0 MW?
- Market simulation allows calculation of cost savings due to Market Monitor recommendations.

The Role of Market Monitoring



Goals of Market Monitoring

- Efficient Investment
 - Investor confidence in a level playing field
 - Efficient prices, energy, reserves, capacity
 - Long-term investment that leads to lower costs and reliable operation
- To assure level playing field Market Monitor reviews:
 - Curtailment of solar and wind plants by operator
 - Solar and wind plant forecasts by market participants
 - Generator outages and operational parameters submitted by participants
 - Calculation of transmission limits set by market operator

Taking Action: Ex-Ante vs. Ex-Post

- Early detection, early warning
 - Identify
 - Document
 - Communicate with Market Participant or Market Operator
- Goals
 - Avoid immediate damage to market
 - Avoid expensive and time-consuming lawsuits
- Examples
 - CAISO, **Ex-Post: 18 Years** to solve lawsuits overmarket manipulation
 - PJM and ISO-New England **Ex-Ante:**
 - Automatic correction of FTR inappropriate profits
 - Avoids legal prosecution, no involvement of regulatory agencies needed

Reporting and Transparency (Mexico)

- Regular Reports
 - Daily (**public**)
 - Monthly
 - Quarterly
 - Semi-annual
 - Annual (**public**)
- Special Reports and Internal Consulting
 - Outages
 - Abnormal Prices
 - Operator Decisions
 - Generator operating parameters and costs

Daily Public Report

REPORTE DIARIO DEL MERCADO DEL DÍA EN ADELANTO (MDA)

Día de operación: 18 sep 2019

Monitor Independiente del Mercado (MIM)

Precio Marginal Local (PML) promedio por Sistema [\$/MWh]

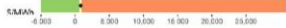
Sistema Interconectado Nacional (SIN)

2,108



Sistema Interconectado Baja California (BCA)

814



Sistema Interconectado Baja California Sur (BCS)

4,977



Análisis preliminar

Se presentaron PML entre \$5,176/MWh y \$6,842/MWh en la GCR Peninsular durante 6 horas.

El margen de capacidad para el BCA, después de considerar requerimientos de reservas, registró un valor mínimo de 2.21% en la hora 20. Las importaciones máximas asignadas fueron de 351 MW a la hora 17.

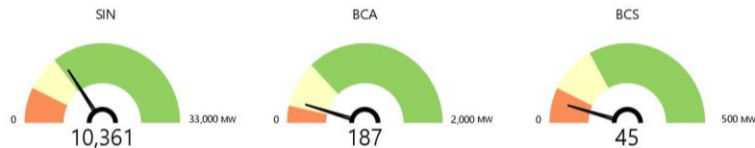
El margen de capacidad para el BCS, después de considerar requerimientos de reservas, registró un valor mínimo de 0.02% en la hora 17. Se presentaron PML entre \$5,007/MWh y \$6,715/MWh en el 100% de los nodos de BCS, durante 13 horas.

Noticias relevantes

El 17 de septiembre se presentaron 13 Estados Operativos de Alerta en Tiempo Real: 3 en el BCS, 2 en la GCR Oriental, 2 en la GCR Noroeste, 1 en la GCR Noreste, 1 en la GCR Central, 1 en la GCR Norte, 1 en la GCR Occidental y 1 en el BCA.

De las 16:57 h a las 21:06 h del 17 de septiembre, el BCS estuvo en Estado Operativo de Emergencia al contar con un margen de Reserva Operativa menor al 4% y no soportar la Contingencia Sencilla Más Severa. [Enlace](#)

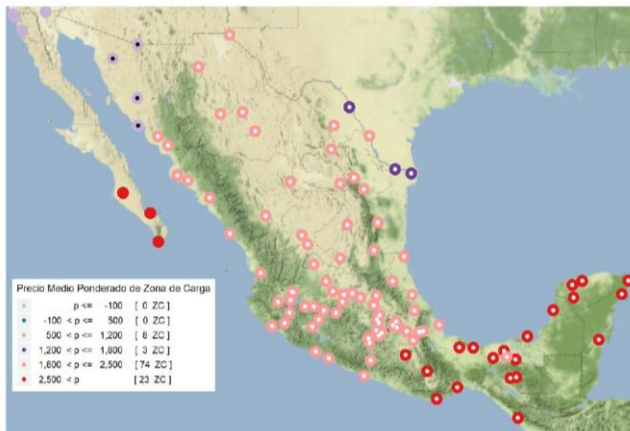
Margen de capacidad promedio del día después de reservas [MW] [1]



Margen de capacidad mínimo después de reservas [%]

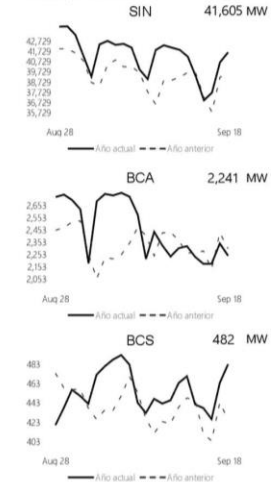
Sistema	Hora	Día de operación (%)	Promedio 21 días (%)
BCA	20	2.21	2.46
BCS	17	0.02	1.64
SIN	21	13.65	15.45

Precio Medio Ponderado de Zona de Carga, promedio diario [\$/MWh]



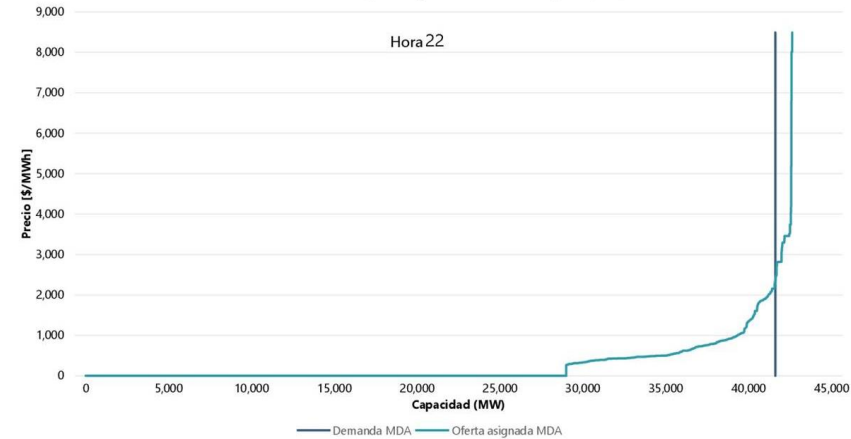
Congestión positiva (Centros blancos) indica que el costo de entrega de energía en este punto es mayor que el costo de la entrega en el nodo de referencia.
 Congestión negativa (Centros negros) indica que el costo de entrega de energía en este punto es menor que el costo de la entrega en el nodo de referencia.

Demanda pico [MW] [2]



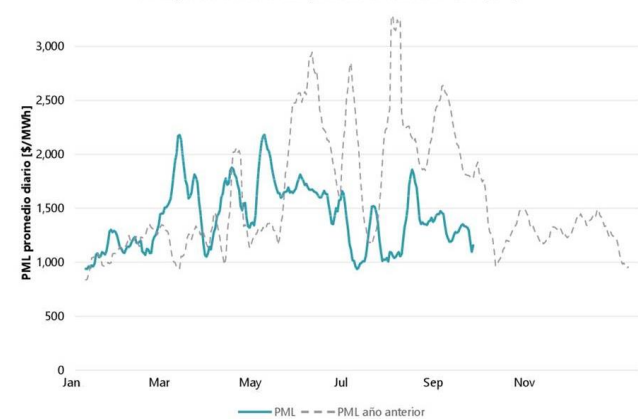
Análisis de la hora pico MDA [\$/MWh, MW, MWh, y %]

Curva de oferta asignada y demanda, hora pico (SIN)



Análisis de largo plazo MDA [\$/MWh y MW]

PML promedio diario, promedio móvil 7 días (SIN)



Daily Activities

Data Collection and Analysis

- 05:00 AM Verification of data
- 08:30 AM Attendance at daily operations review in offices of Market Operator
- Review of Market Operator report on previous day results, expected vs. actual results:
 - Transmission limits and flows
 - Generation and Transmission Outages
 - Hydro and renewable
- Review of other logs, outage and maintenance reports, etc.
- Review of geographic areas of special interest

Documentation and Discussion

- Documentation of analysis results in internal, confidential daily report:
 - Deviation generation, outages with price impacts
 - Changes in temperature and load
 - Saturation of critical in interfaces
- Documentation of daily public report
 - Indicators, dispatch by Interval, etc.
 - Identification of abnormalities
 - Review of notices published by Market Operator
- 12:30 PM Discussion of the two reports with the CRE Unit of Market Vigilance
- Publication of Daily Report

Questions?