UC2006 **OSISOFT USER CONFERENCE**

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2006
FRANKFURT

Managing Variable Costs in Power Generation

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OSIsoft.

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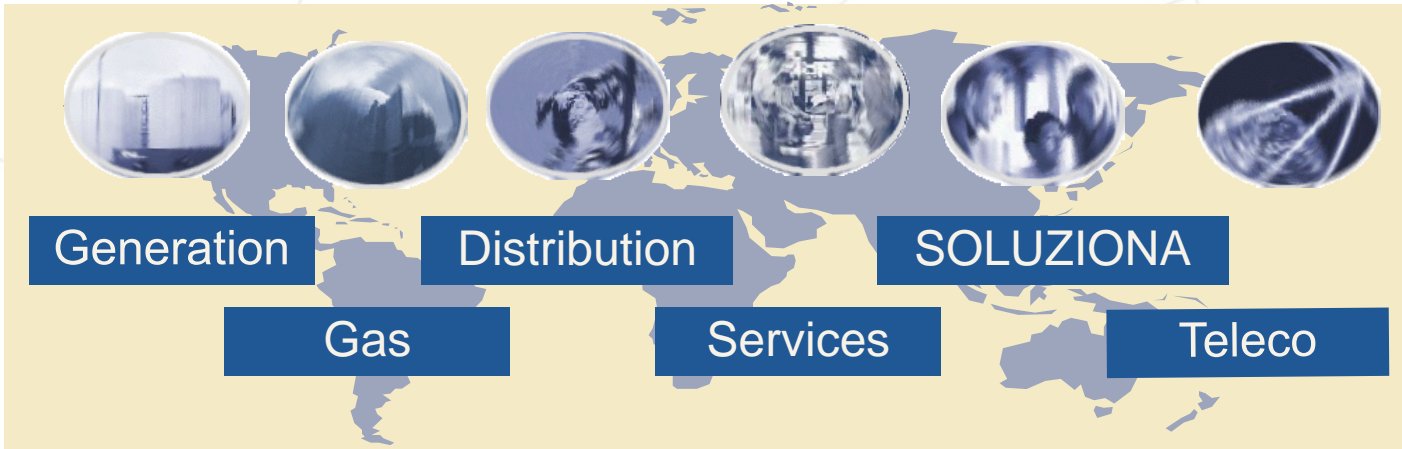
- Conclusion

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Union Fenosa

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UNION FENOSA

Areas

Core Business

| Energy | Services | Technology |

Business Divisions

Generation | Distribution | SOLUZIONA

Gas | Services | Teleco

- Group revenue surpassing seven billion US Dollars
- 25,000 employees in close to 30 countries
- More than eleven million electricity and gas customers throughout the world
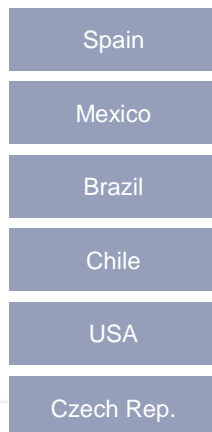
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Soluziona Strategic Positioning

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SOLUZIONA is a Multinational Technical Services Company

Mission

- Offering **Integral Solutions** with high added value in Management, Technology and Infrastructure

- Sectorial Specialisation in **Energy, Telecommunications and Infrastructures and Transport**

- Differential positioning in **Information Technologies Consulting** of a multi-sectorial nature

- A culture of **Responsibility, Quality and Commitment** to the results for our Clients

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By geographical area

Spain
Mexico
Brazil
Chile
USA
Czech Rep.

By Product

Business Solutions
Management Consulting
Technology
Engineering

By Sector

Energy & Industry	Telecom & Media	Finance & Service	Infrastructure & Govnmt

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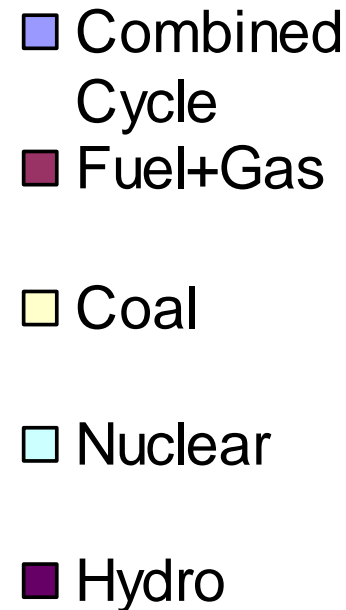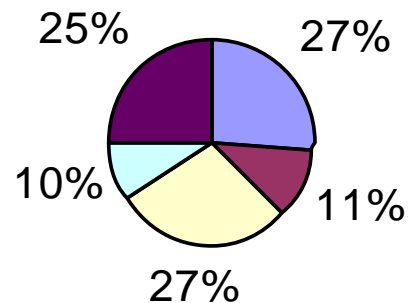# Union Fenosa

SPAIN : Approx. 6,900 Mw.

25% Hydro, approx. 1,700 MW

54 % coal + combined, approx. 3,726 MW

Installed Capacity

25%   27%

10%   11%
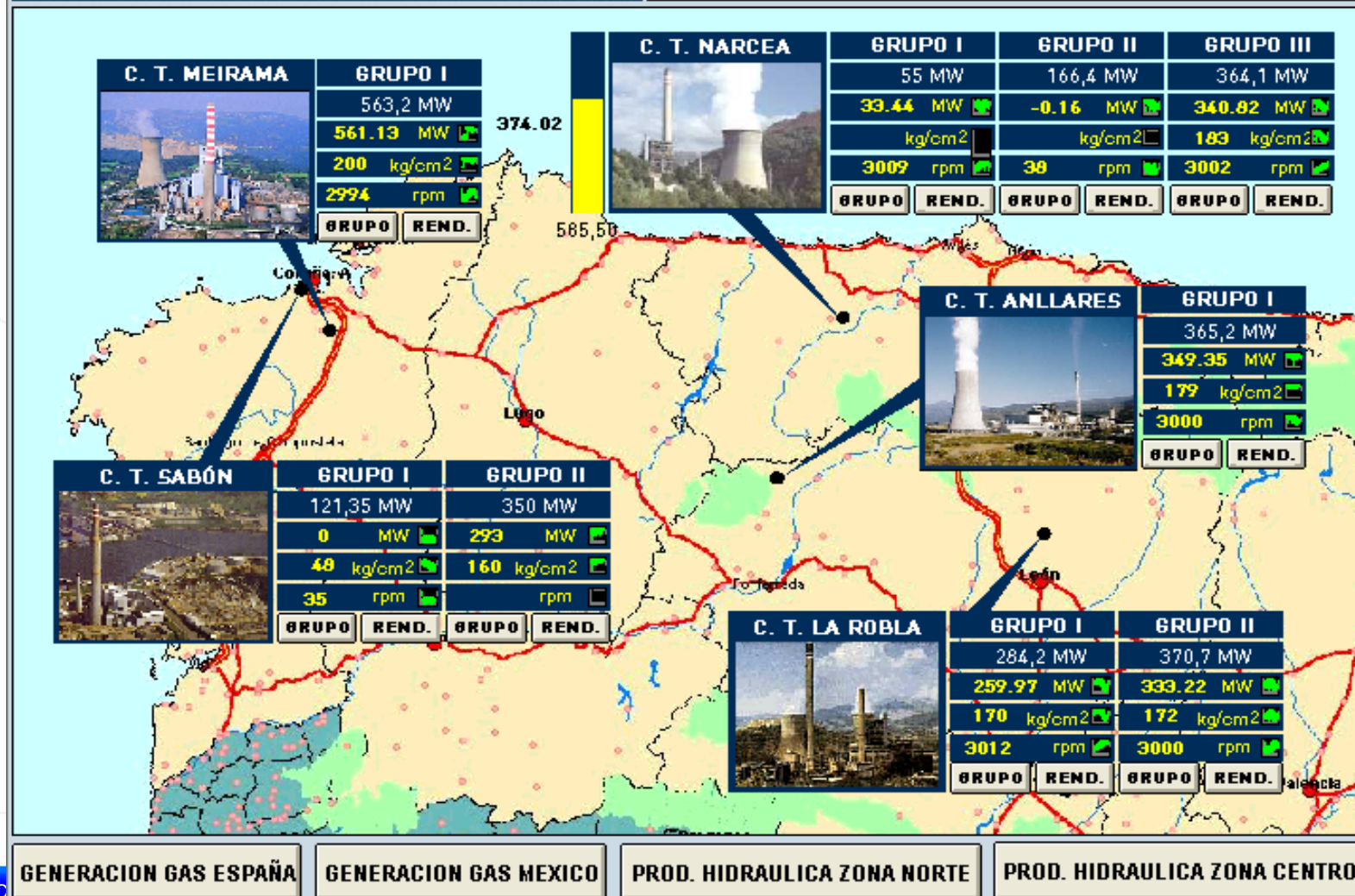
27%

- ☐ Combined Cycle
- ☐ Fuel+Gas
- ☐ Coal
- ☐ Nuclear
- ☐ Hydro

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Union Fenosa

Union Fenosa

Union Fenosa

Union Fenosa

OSIsoft Products in Union Fenosa

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RtBaseline
- o **12 PI Systems**
- o **+ 30 Smart Interfaces**

- Corporate access
- Intranet / Internet

- General
- management

OSIsoft.

CEN
Open Utilities Plants

SPAIN - Fossil Power Plants

- Plant 1
- Plant 2
- ...
- Plant N

- Real Time
- Web Portal

RtPortal

- Advanced
- Supervision
- Center

RtPortal
- o **RtWebParts**
- o **Smart Clients (ProcessBook, DataLink, ActiveView)**

SPAIN - Natural Gas Combined Cycles

- Plant 1
- Plant 2
- ...
- Plant N

- Generation
- Dispatch

- Headquarters
- Systems

RtAnalytics

CEN
Open Utilities Plants

RtAnalytics
- o **Advanced Computing Engine**
- o **Module Database**

MEXICO - Natural Gas Combined Cycles

- Plant 1
- Plant 2
- ...
- Plant N

- Integrated Control Center

- SPAIN – Hydroelectric Power Plants

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Benefits from PI

- Continuous process improvement obtained by means of monitoring and diagnosis in real-time (making decisions based on costs, production conditions and cost-effectiveness)

- OSIsoft products make possible:

  – Help business units in supervision and analysis tasks (O&M decisions)

  – Provide standard information for detailed analysis

  – Data sharing between several business areas and units, and to make easy benchmarking tasks – compare and improve – between the units

  – Improving the efficiency and reliability of the plants

  – Procedures and Regulation can be corroborated by data
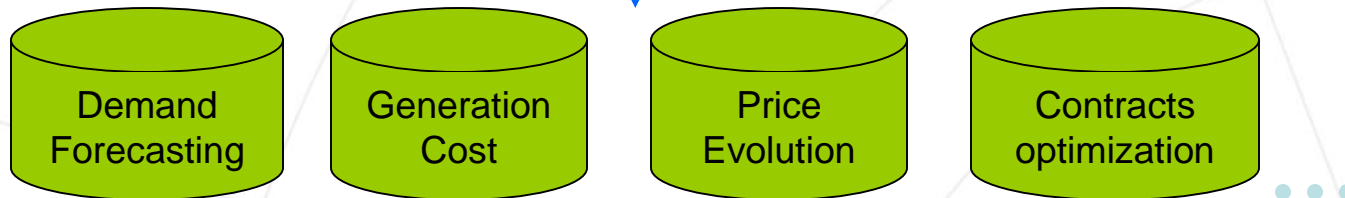
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Modeling Variable Costs

What is a Model?

MODEL: Algorithm whitch represents a business process which is simulated from data and hypothesis for obtaining results.

Examples

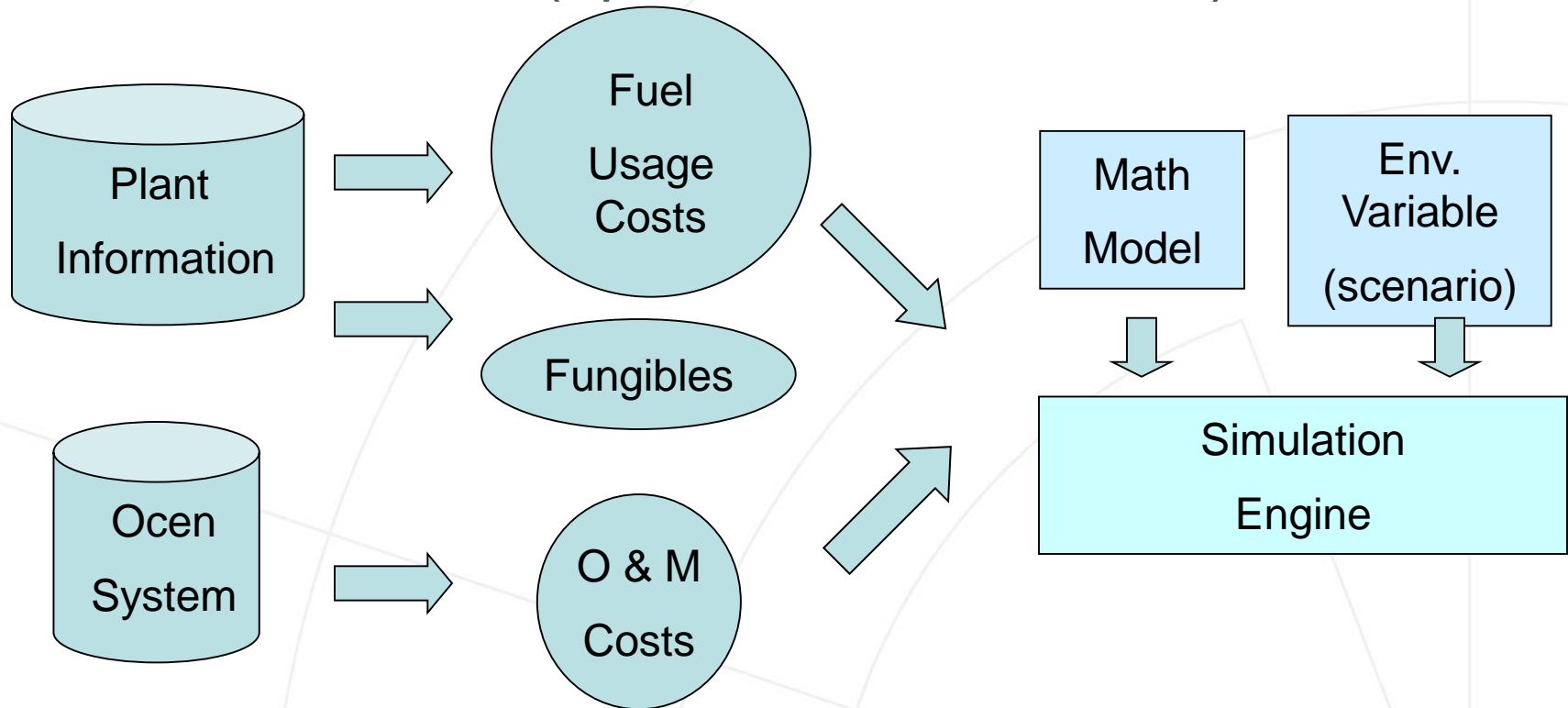| Demand Forecasting | Generation Cost | Price Evolution | Contracts optimization |

- Every department or company has different models according to its needs.

- Models are critical for the right development of the business process.

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Modeling Variable Costs

Inputs : Plant Information, OCEN (Operation & Maintenance Modules)

Fungibles : Water, oil, filters, calcium carbonate, etc...

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Modeling Variable Costs—Benefits

- Continuous Variable Costs Follow-up, comparing real data obtained from PI, with calculated data obtained from the simulation engine.

- Bidding strategy considering maximum, minimum, start-up, shut down costs, other conditions.

- Annual Planning of maintenance overhaul considering several plants and taking into account maximum benefits and demand requirements.

Outputs

Simulation

Engine

Plant Efficiency

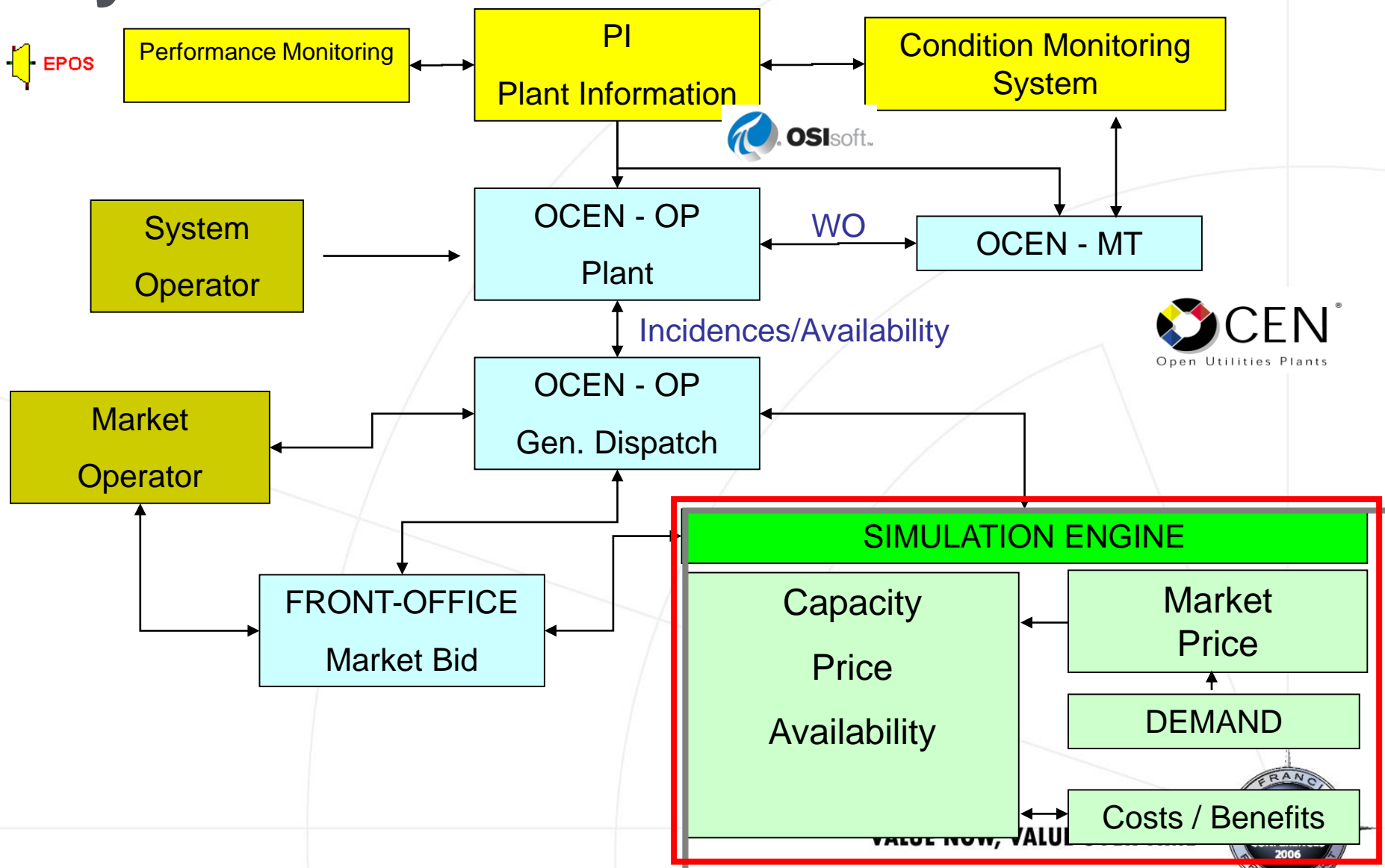Bidding Strategy
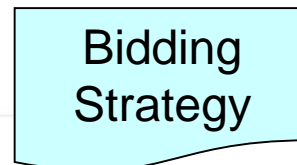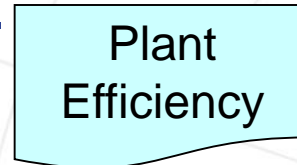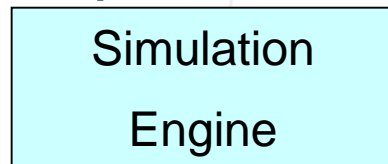
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Modeling Variable Costs—Comments

- Weather conditions can produce variations of more than 5% in heat rate (KJ/KWh). Other variations are due to plant degradation.

- Power plant production schedule should consider heat rate, its degradation due to operating hours and its availability.

- Power output forecast is important for market bidding, because of unit cost and maximum power output constraints (calculated by the model). And it is basic for natural gas nomination/prevision.

- Complex processes can be analyzed combining several models.

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System Architecture

EPOS

Performance Monitoring

PI

Plant Information

Condition Monitoring System

OSIsoft

System Operator

OCEN - OP

Plant

WO

OCEN - MT

OCEN

Open Utilities Plants

Incidences/Availability

Market Operator

OCEN - OP

Gen. Dispatch

FRONT-OFFICE

Market Bid

SIMULATION ENGINE

Capacity

Price

Availability

Market Price

DEMAND

Costs / Benefits

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Modeling Variable Costs

- **Unavailability forecast (programmed+long duration)**

Legend: ■ Nuclear □ Carbon □ CC ■ Fuel ■ Gas
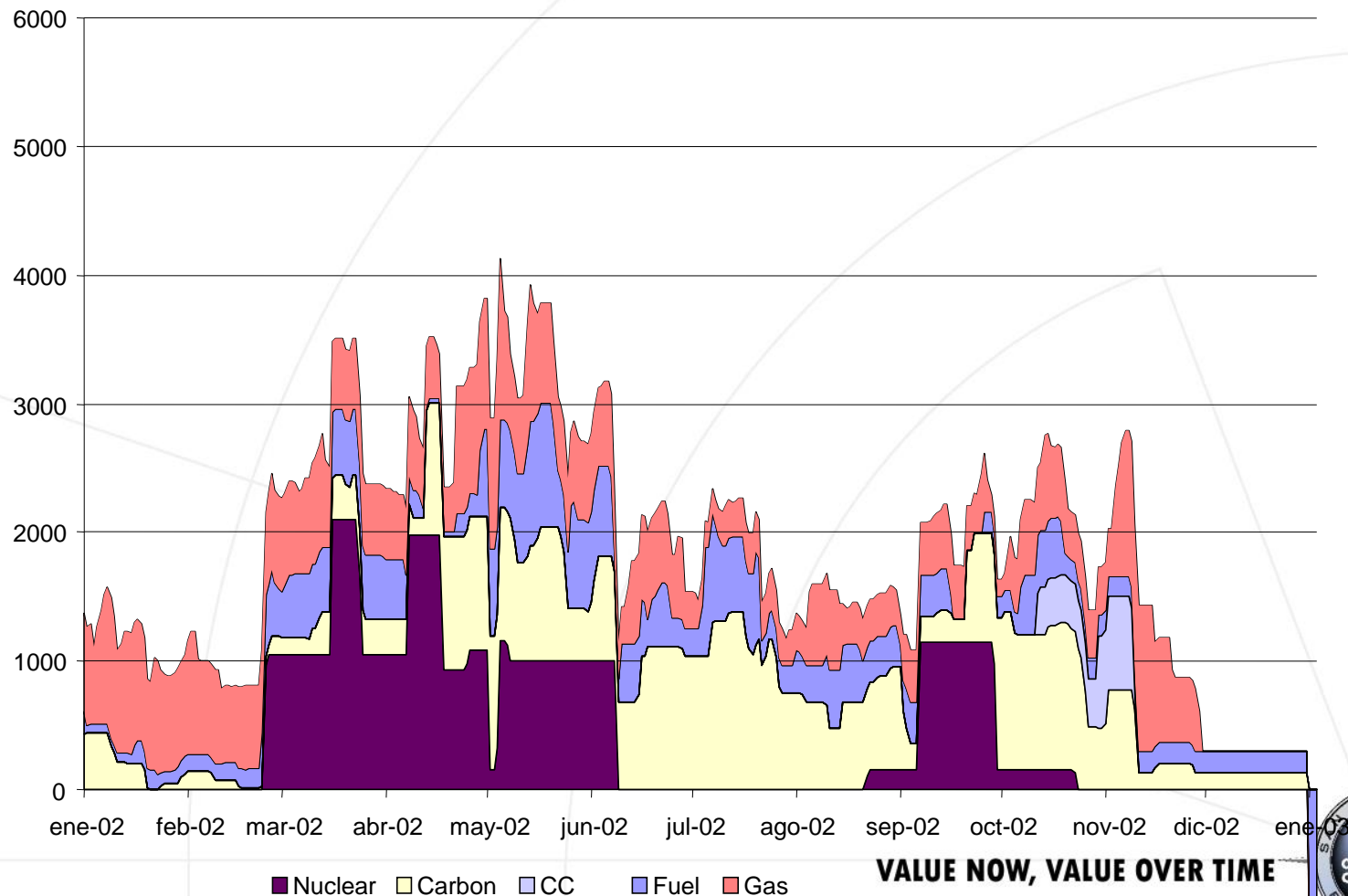
Conclusion

- PI is an excellent tool for real costs monitoring, and as input for system modeling.

- Model for Market bidding should consider fungible and O&M costs.

- Fungible and O&M costs are about 20% of Variable Costs.

- Analysis of "what if" scenarios is facilitated using the Simulation Engine.

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- Questions ?

Thank you for your attention