



Workshop EFR/EEA - Introduction to Transfer Pricing -

Paris , 13th Jan 2010

Overview

1. Introduction
2. Introduction to Transfer Pricing – first part
Lunch break 12:00 13:00
3. Transfer Pricing – second part
4. Questions /discussion



Workshop EFR/EEA - Introduction to Transfer Pricing -

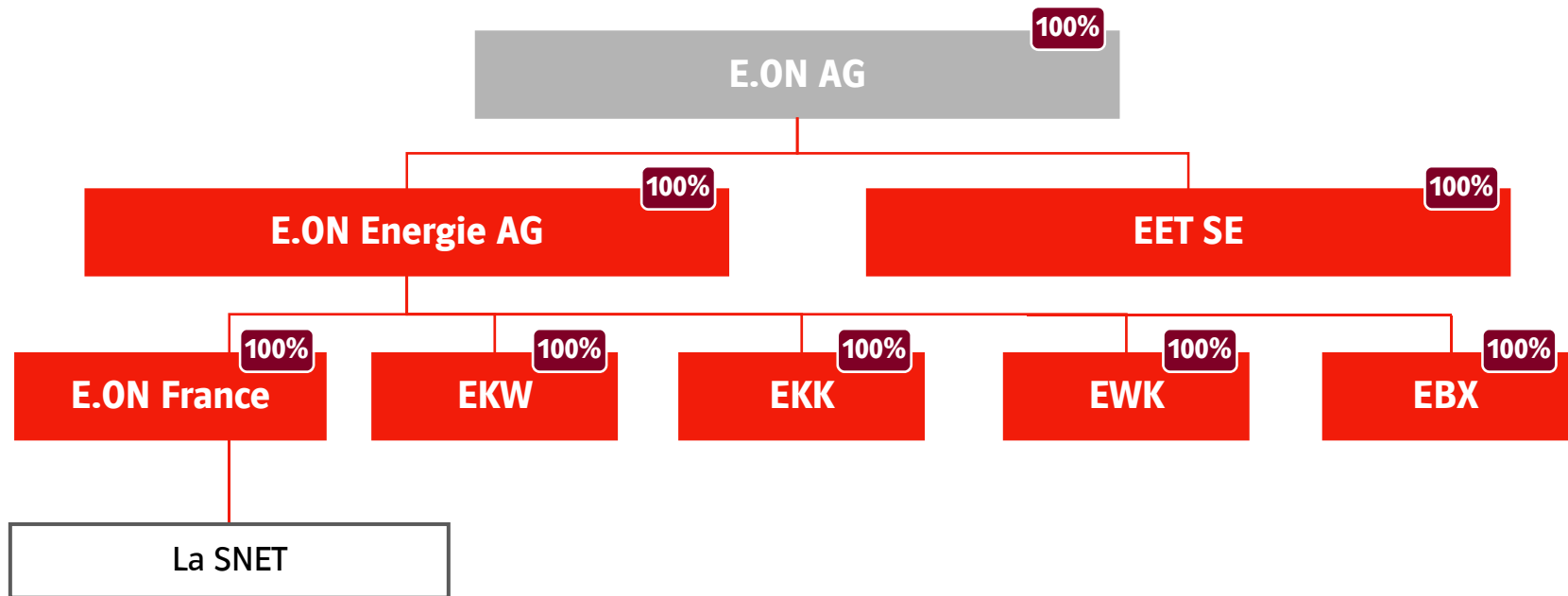
Paris , 13th Jan 2010

EA-EP - Felix Gschnell, Dieter Deisenhofer

Agenda

- 1 E.ON Energie – Overview Generation**
- 2 EET as central power marketer
- 3 E.ON Business Model for Generation: Transfer Pricing
- 4 Interface GenCo - EET: Power market
- 5 Interface GenCo - EET: Fuel procurement
- 6 Interface GenCo - EET: Ancilliary services, others...

E.ON AG, E.ON Energie and EET: Ownership Structure for Generation



E.ON Energie in Central Europe

E.ON Energie

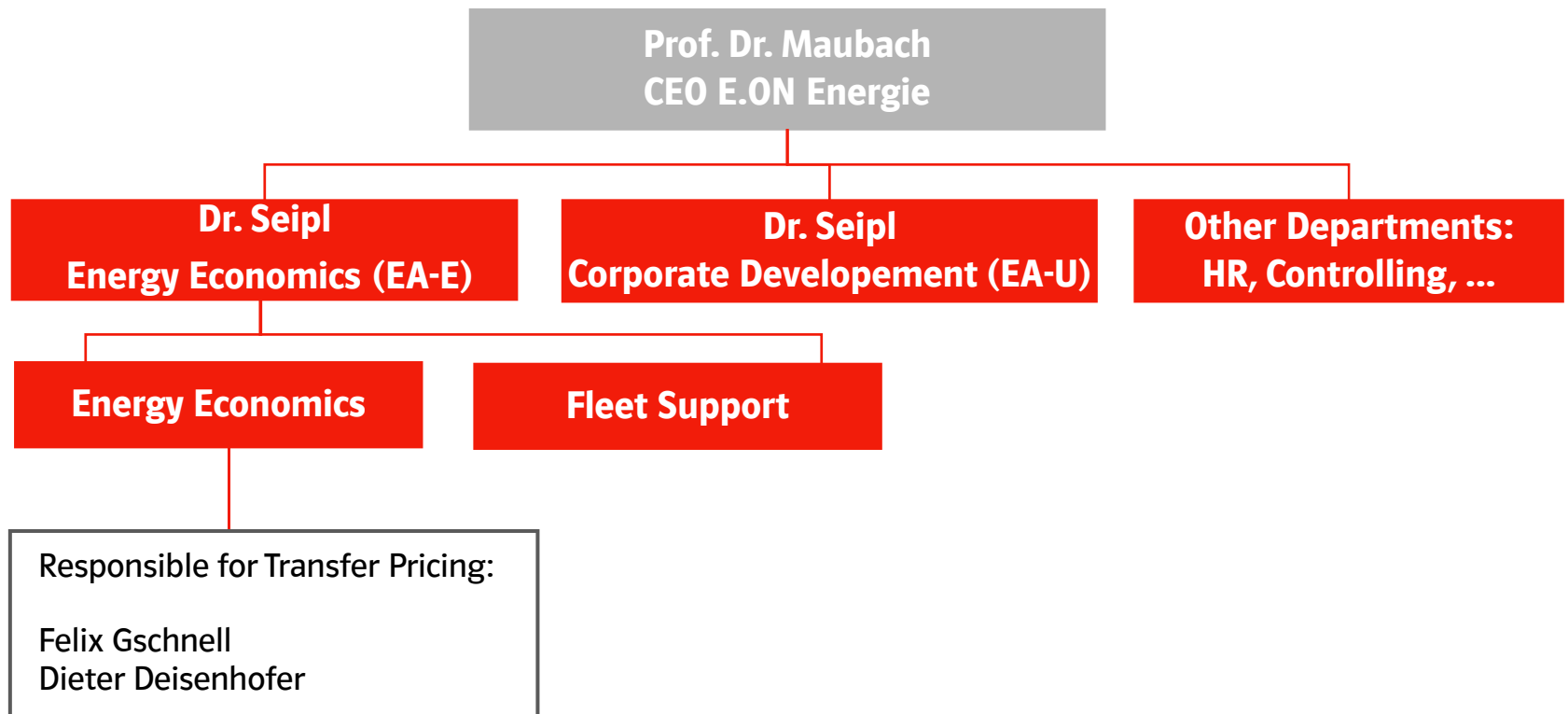
- Generation
- Distribution Power and gas
- Sales (Power, gas and heat)
- Services (e.g. facility mgt)



¹Italy transferred to new market units as of January 1, 2008.

²Part of Central Europe as of June 26, 2008.

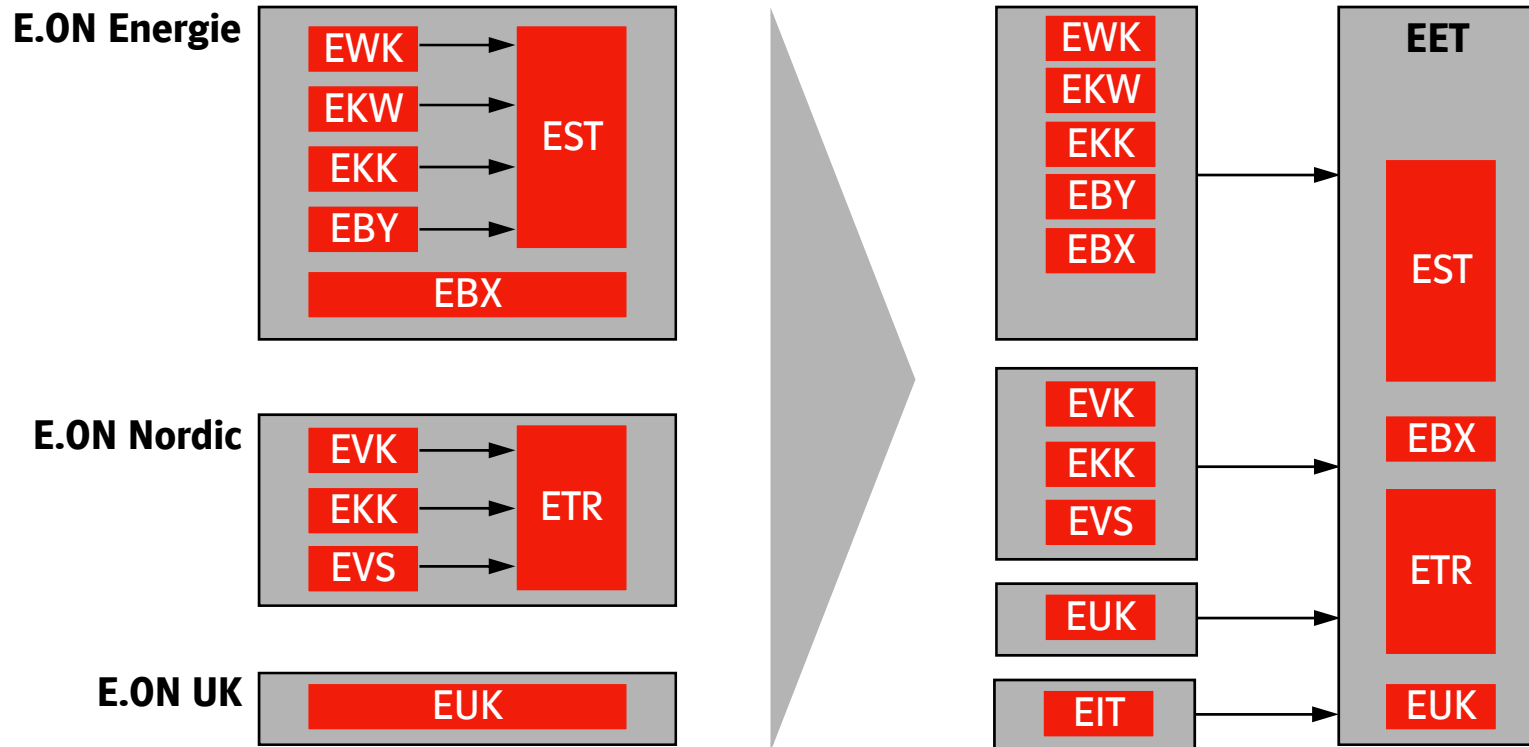
E.ON Energie, Department „Energy Economics”



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Europe.on 2007-2008: EET as central power marketer

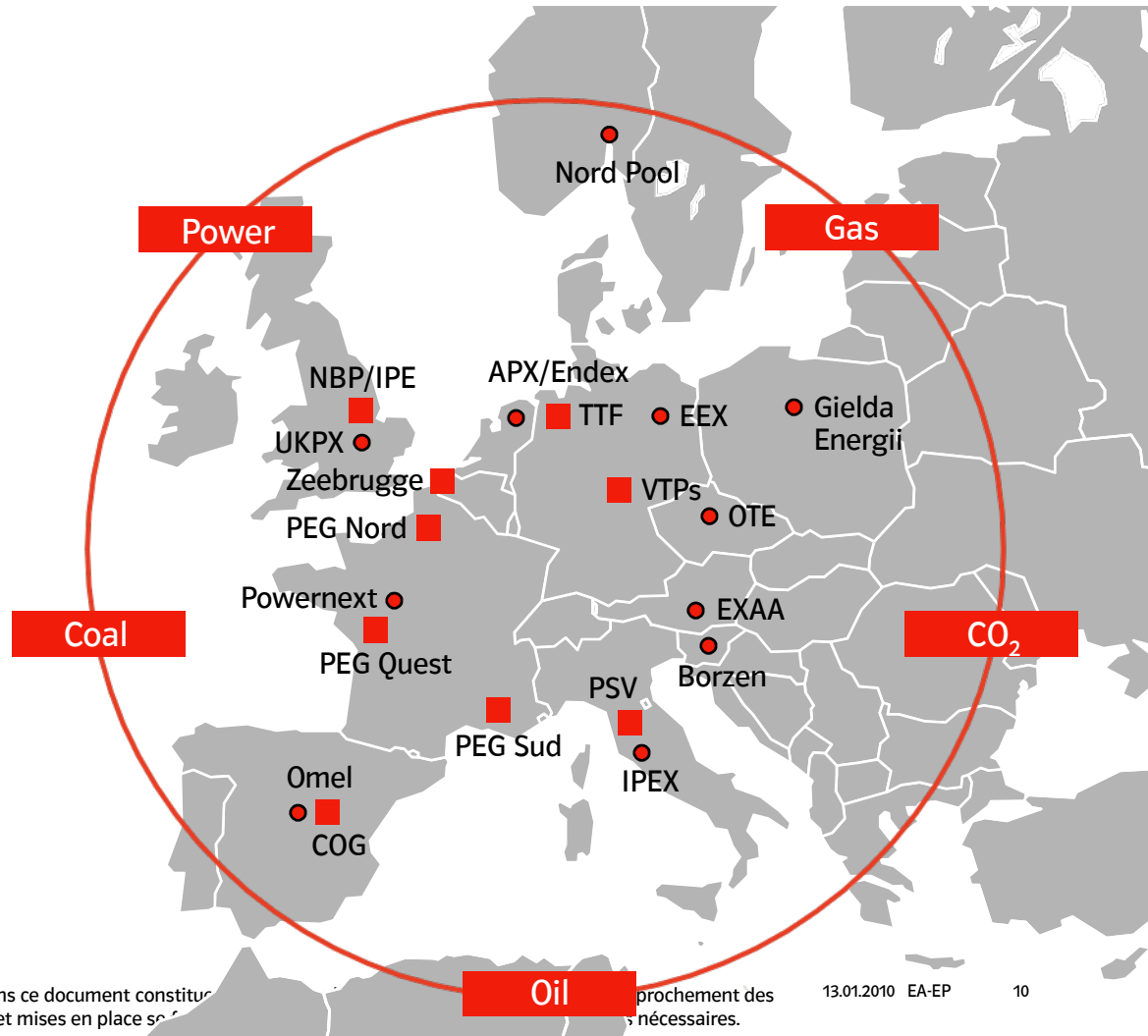


- ➔ E.ON developed a clear strategy towards integrated European Power and Gas Market
- ➔ In 2008 EET as central functional trading unit was established by integration of national units
- ➔ Marketing of generation capacity strongly affected

E.ON Energy Trading: Functional Unit for Trading in Europe

EET

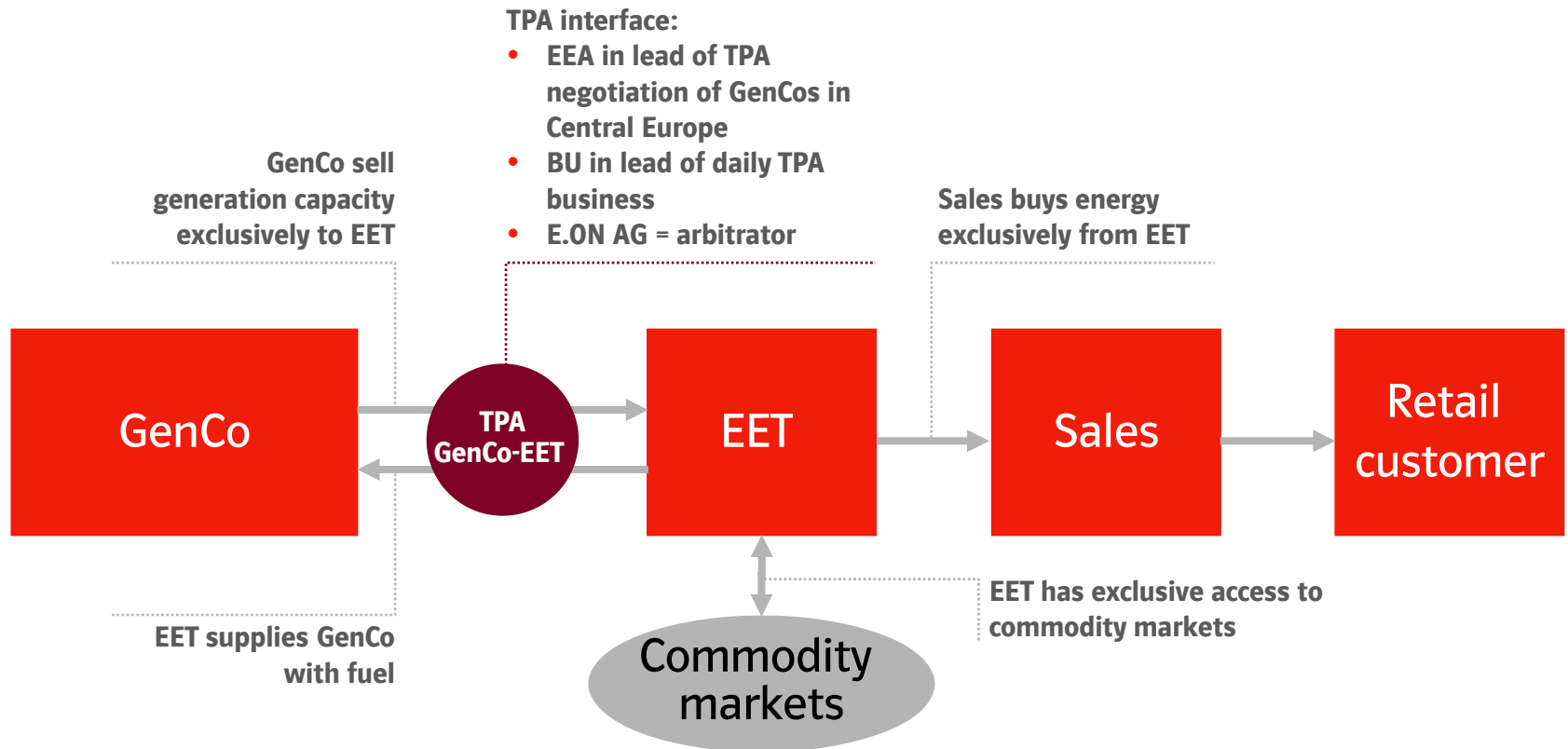
E.ON Energy Trading is Functional Unit for Commodity Trading in Europe (power, gas, coal oil, CO₂)



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E.ON Business Model: General set up of interfaces and roles



Interface GenCo – EET is defined in Electricity Supply and Service Agreement (Transfer Pricing Agreement TPA)

Main Transfer Price Principles

1

Risk allocation

- Risks are allocated to where they are best managed
- Decision makers feel decision consequences

2

Transfer prices

- MUs receive the inherent value of the assets /contracts
- Common transfer price models and principles as far as possible
- Transfer prices are based on market prices wherever possible across E.ON
- Transfer prices are fair and transparent

3

Incentives

- TP system should deliver incentives for efficient operation, they must have the correct incentives and drive the right behaviors
- Transfer prices cannot replace the active dialogue between business units

Detailed Transfer price principles

Risks are allocated to where they are best managed

- Risks are allocated to where they are best managed
- The portfolio is segmented into practical risk buckets
- There is no discretion for EET and MU on risk management
- Decision makers feel decision consequences

Transfer prices are fair, transparent and market-based

- MUs receive the inherent value of the assets/customers/contracts
- Transfer prices provide transparency in the value chain
- Common transfer price models and principles as far as possible
- Transfer prices are based on market prices wherever possible across E.ONE

E.ON Group position is optimized

- Corporate Centre governs transfer price mechanisms
- Transfer prices must be appropriately reviewed
- CC optimize the group position

Correct incentives are set driving the right behaviours

- TP system should deliver incentives for efficient operation, they must have the correct incentives and drive the right behaviors
- TP should be in line with latest market prices info to allow optimization based on transfer prices in EET (exemptions only where they cannot be avoided)
- Transfer prices cannot replace the active dialogue between business units
- MTP sets business targets not the transfer price

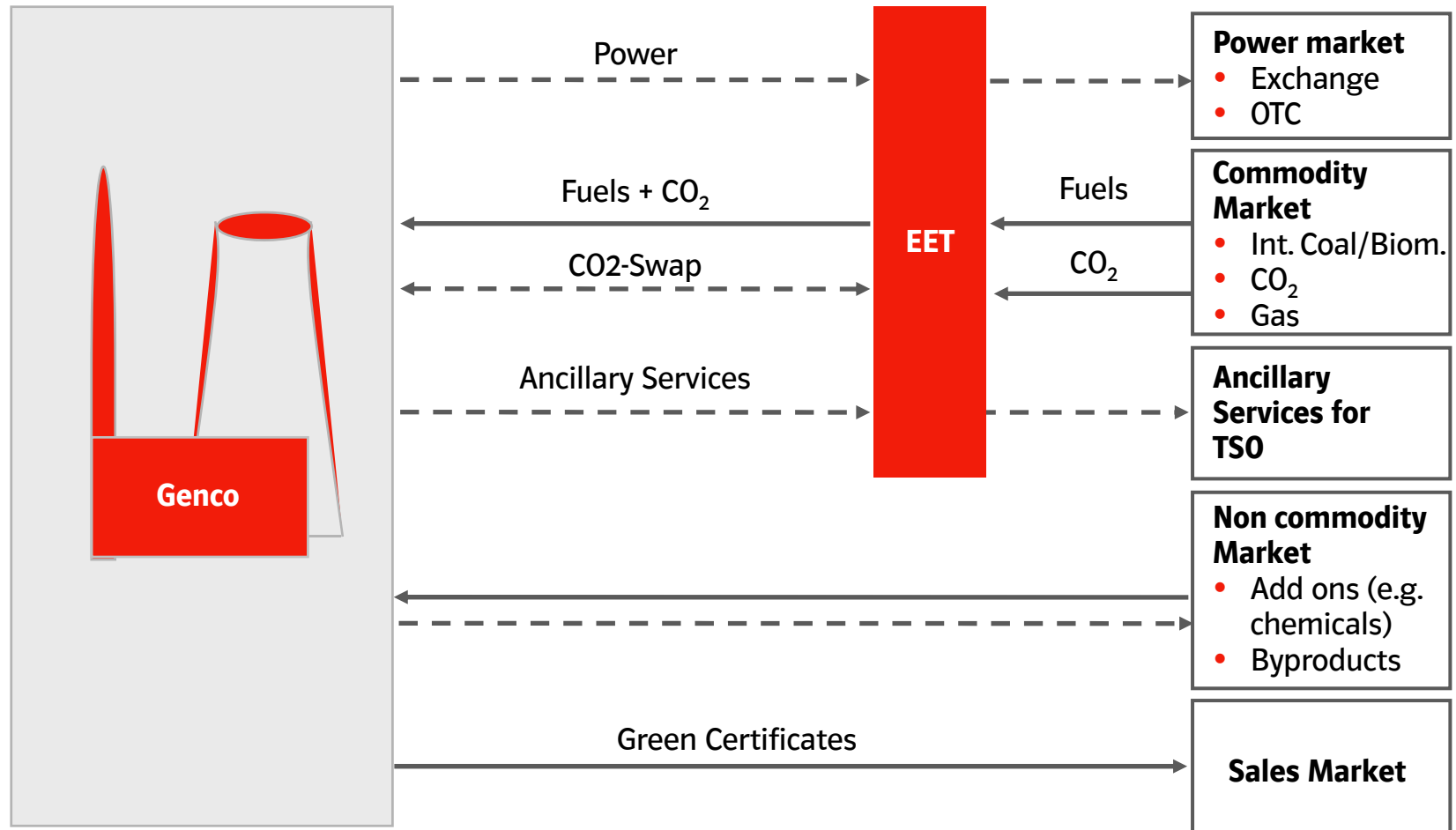
There is a balance between complexity, effort and result

- Simple (or as simple as possible) to understand
- TP system be operated with appropriate effort to achieve objectives

Transfer prices must pass the „arms length“ test

- TP must be acceptable by the tax experts

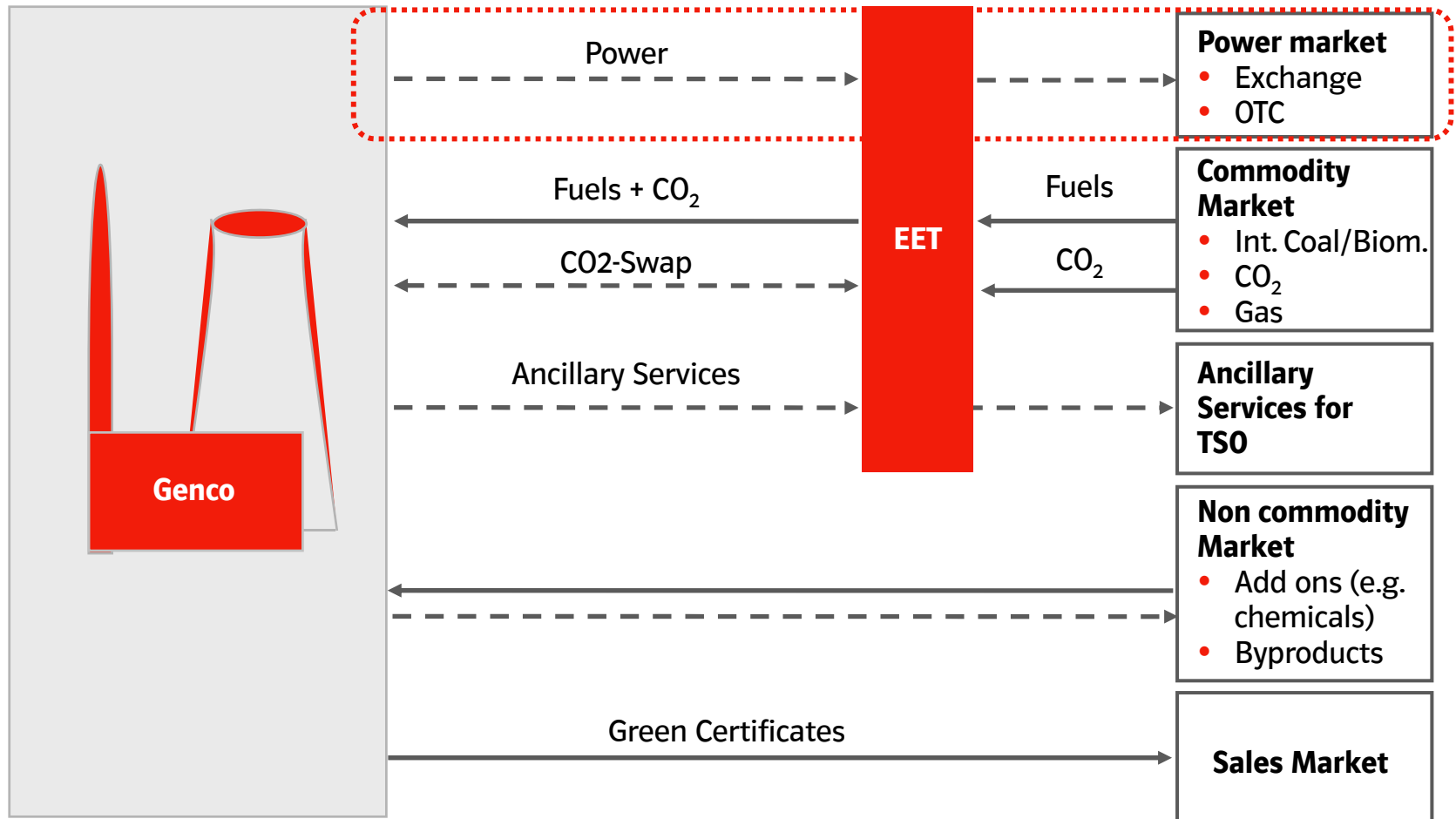
Interfaces between Genco and EET



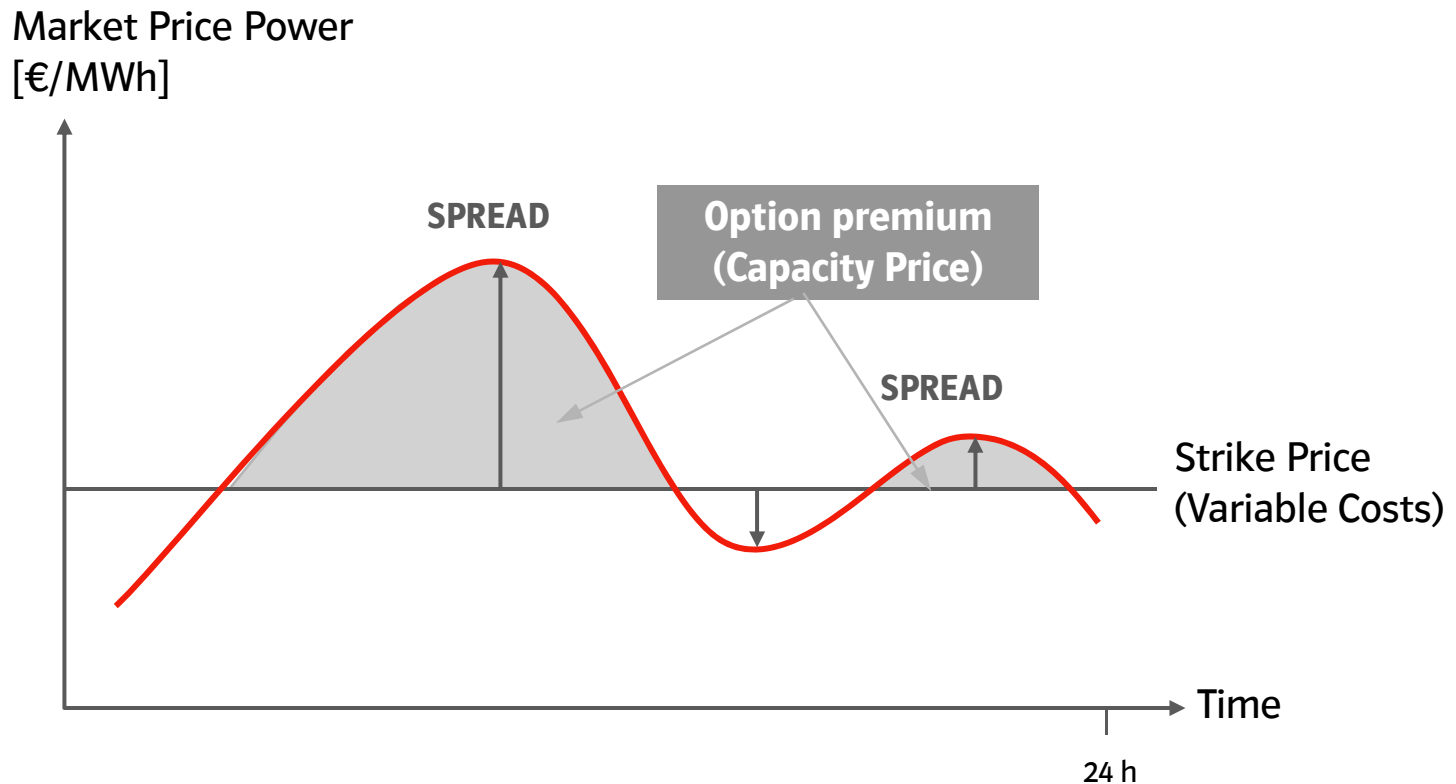
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Interfaces between Genco and EET

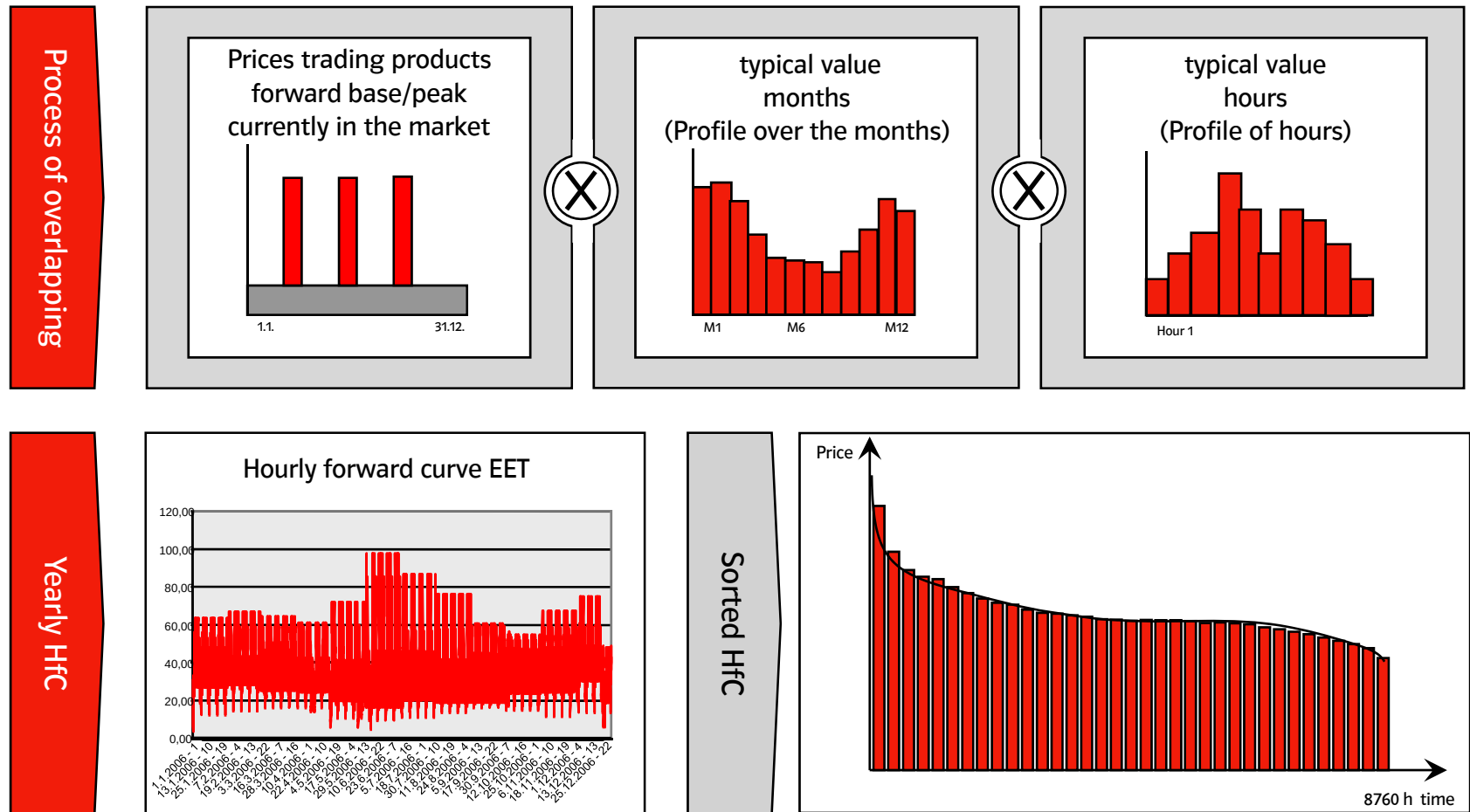


Capacity Price Calculation: Real Option Valuation



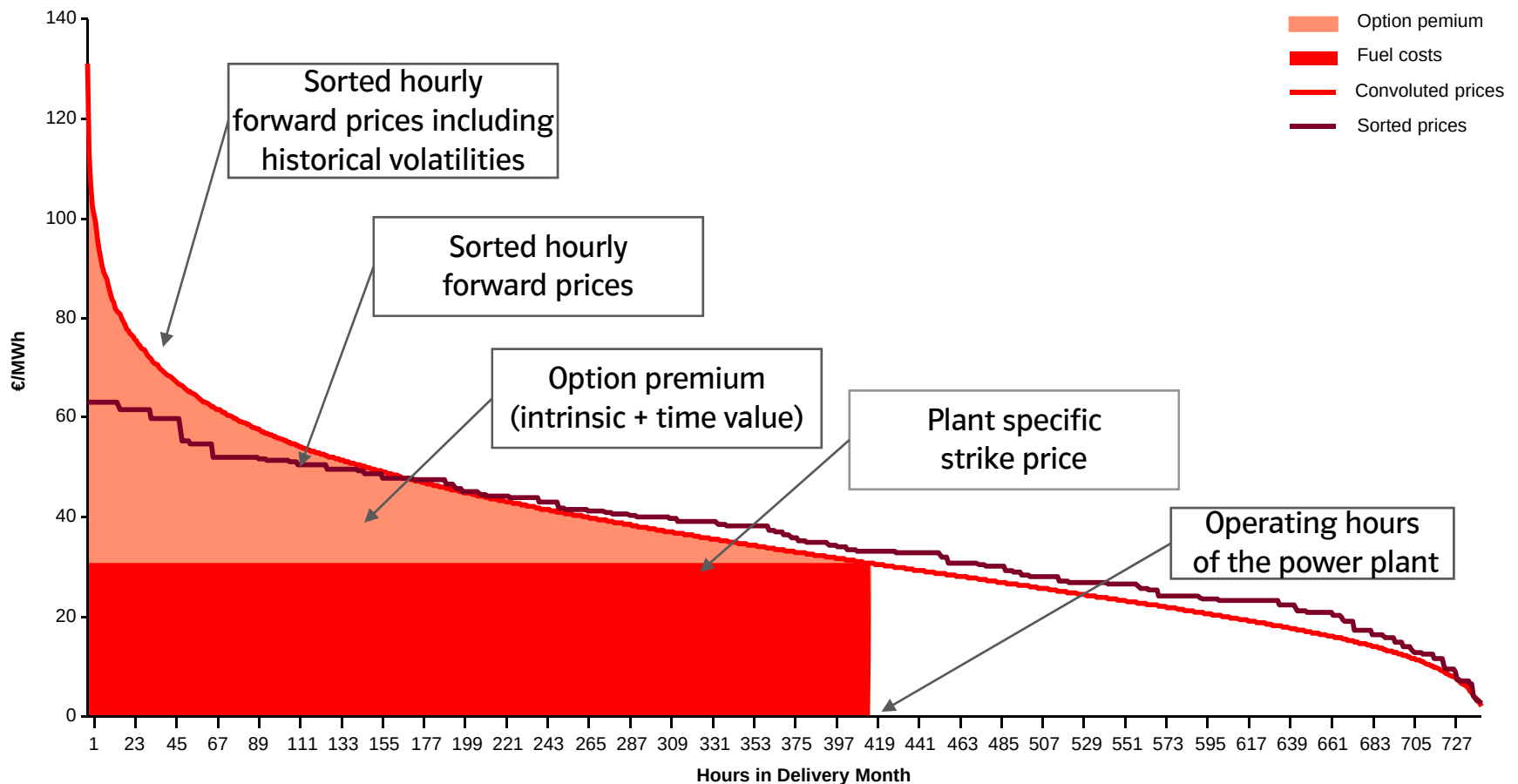
Value of power plant is the sum of positive spreads multiplied by capacity

Real option valuation based on hourly Forward Curve



Real Example: Price Duration Curve – sorted hourly Forward Curve

Hourly Power Price



Unit Performance Parameters / Constraints

Performance:

Pmax, Pmin

Efficiency / heat rate

Emission factor

Constraints:

Availability

Coal blend

Technical restrictions (e.g. start up ramp)

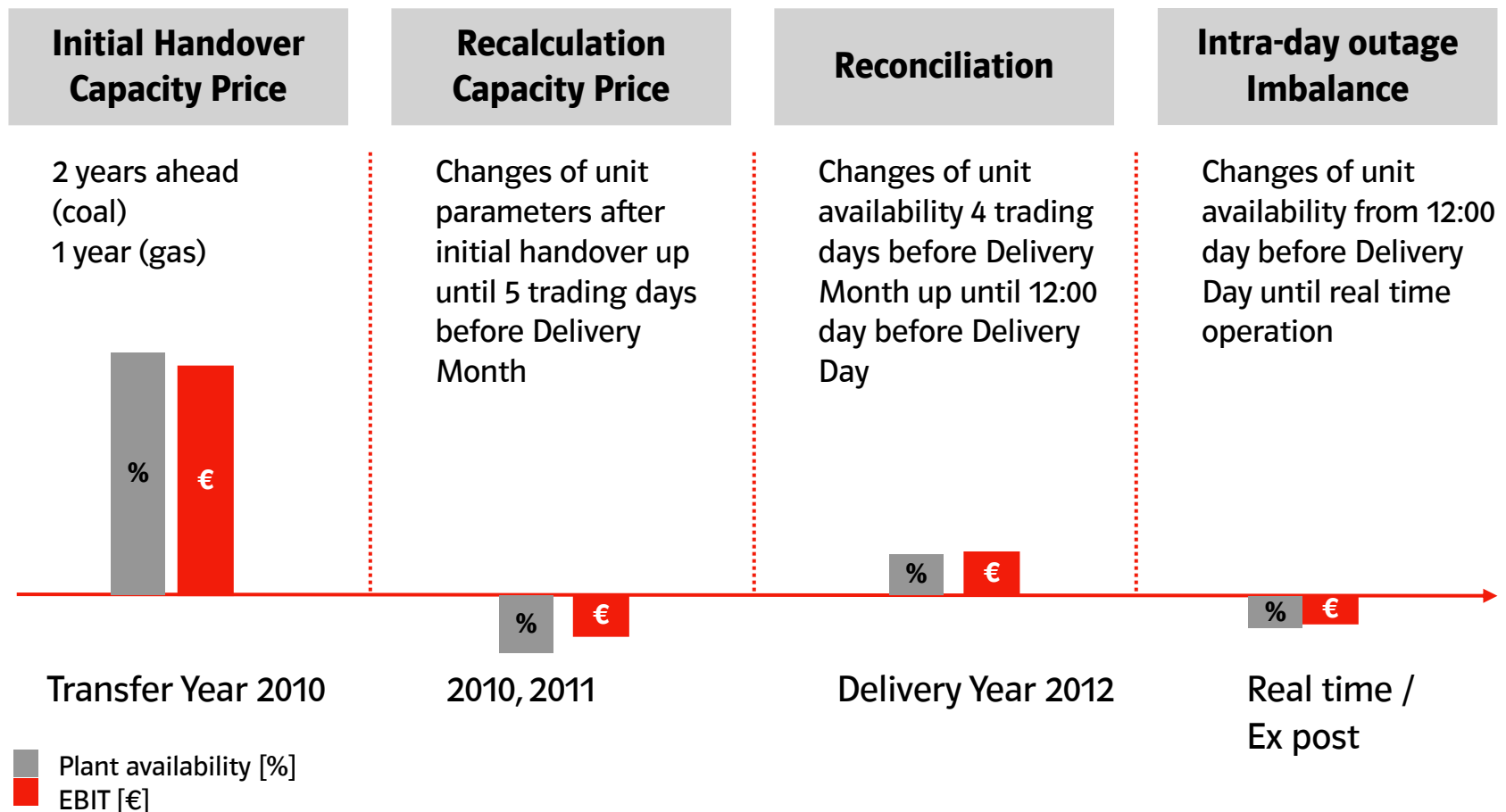
Min down time, Max up time

Ramp time

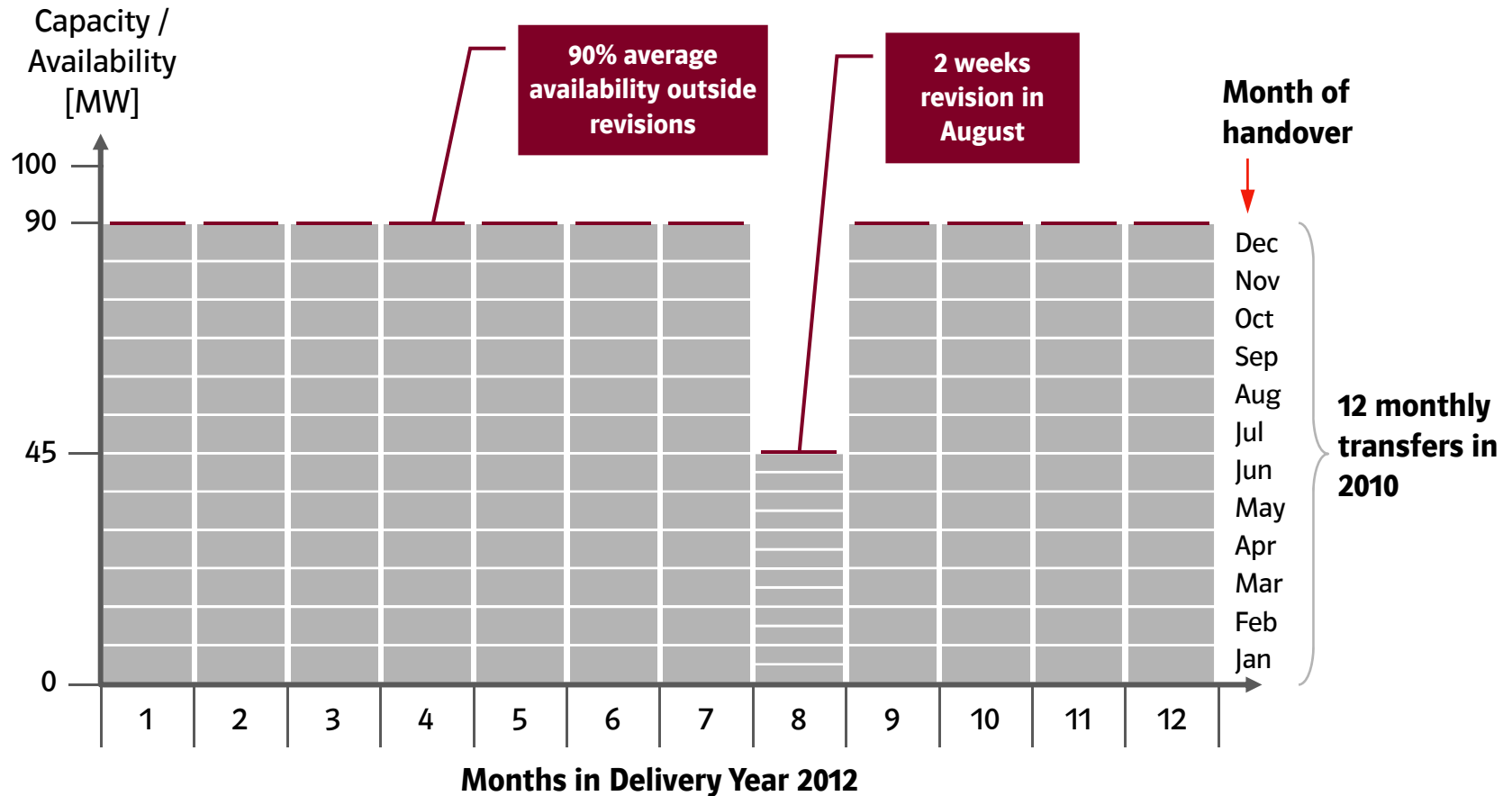


Parameters reflect risks GenCo can influence

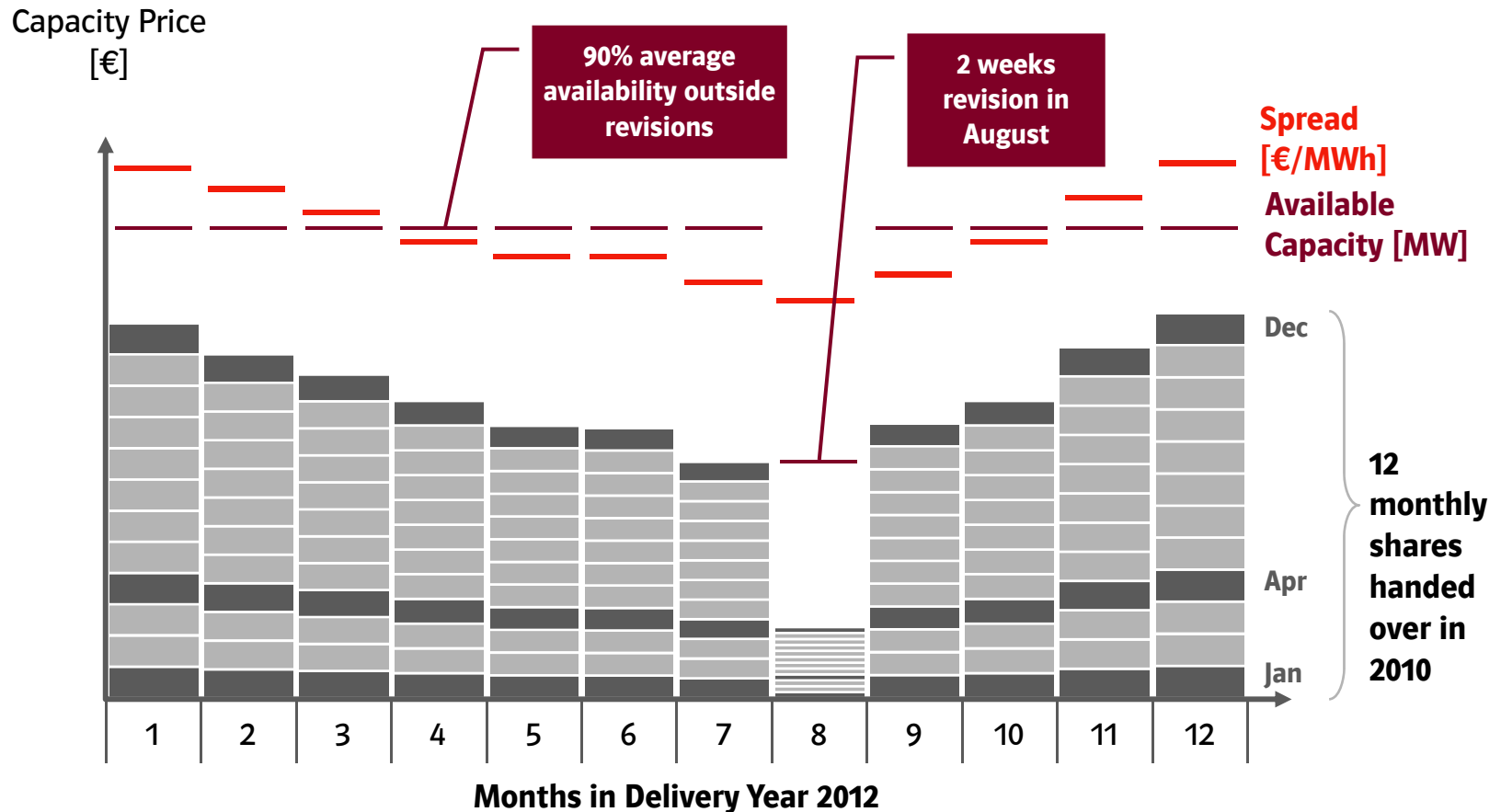
Change of Parameter – Adjustment of Remuneration



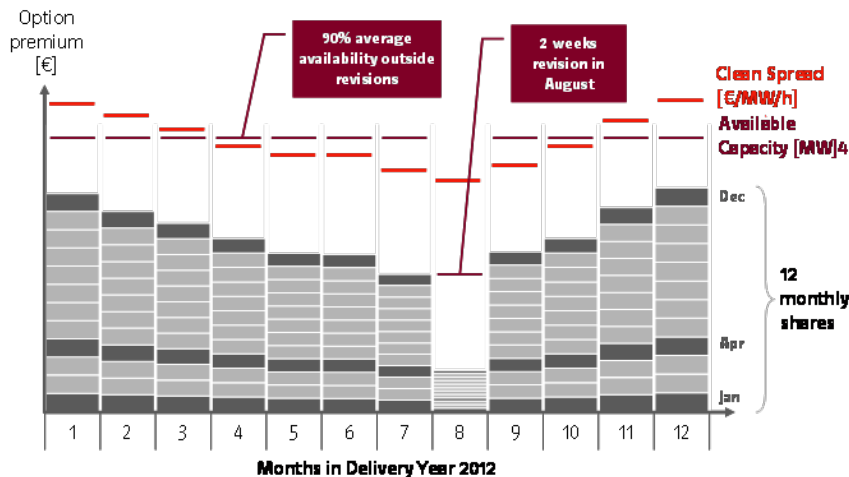
Initial Handover of Available Capacity („Phase In“)



Initial Handover and EBIT for GenCo



Initial Handover



Capacity/Volume:

- 12 equal shares of expected availability for delivery in each month during 2012
- transferred at forward prices
- during 2010 (2 years ahead) for coal units
- during 2011 (1 year ahead) for gas units

Key principles

Entire capacity/volume in liquid timeframe transferred to EET (except for gas plants)
Capacity is priced at time of transfer
Prices based on bid-prices

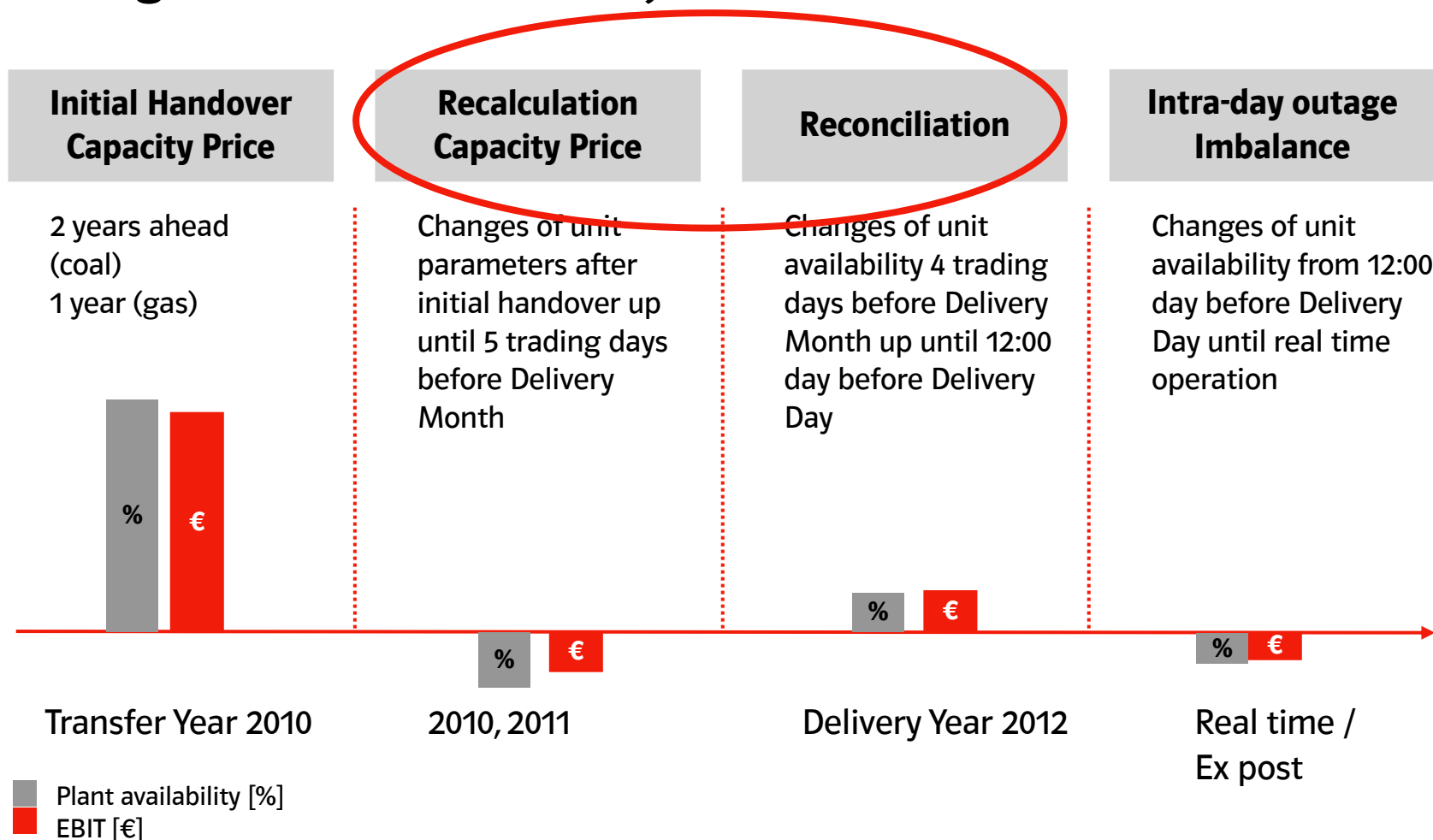
Advantages EET

EET oversees and manages complete commodity position in liquid time frame
Commodity price risks of whole group centralized in one place (EET)

Advantages GenCo

Almost no market price risk with GenCo in MTP period
GenCo result depends only on factors GenCo can influence (mainly availability and efficiency)

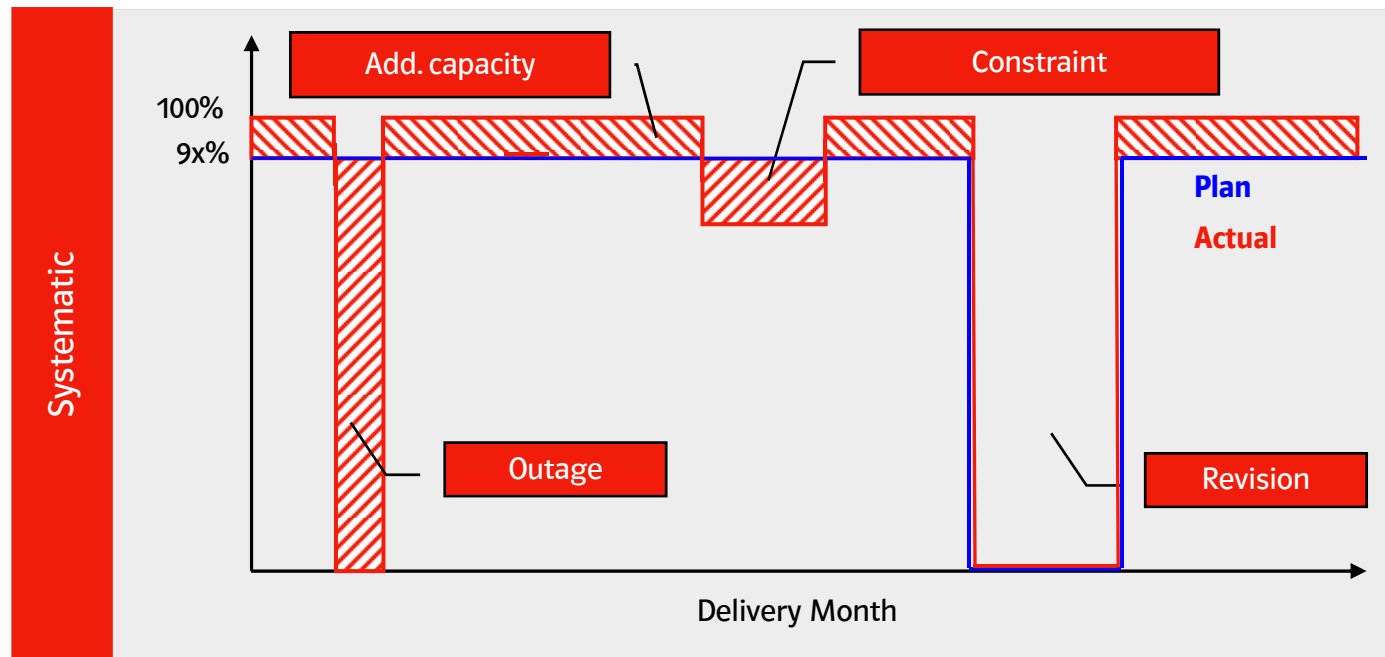
Change of Parameter – Adjustment of Remuneration



Capacity Price Recalculation versus Reconciliation

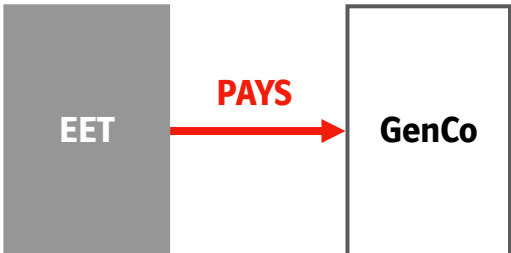
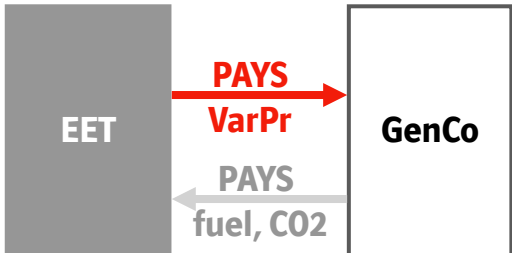
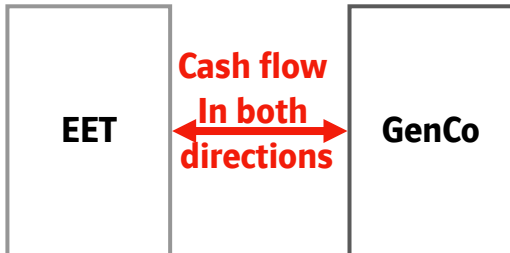
	Recalculation	Reconciliation
Parameter changes	Before 4 th -last trading day in month before Delivery Month	After 4 th -last trading day in month before Delivery Month
Prices	Forwards	Spot prices
Adjustment	Ex ante adjustment of Cap. Price	Ex post financial compensation
Calculation	Genco buys back original option at current market price (FWD) Option is re-calculated (new parameter, actual market prices) New option is sold back to EET at current market price (FWD)	Genco pays to EET spot-spread for negative deviations Genco gets spot-spread from EET for positive deviations
Remarks	Switch from Reconciliation to Recalculation possible If availability decreases by 10MW, only 10 MW of the total capacity are affected by revaluation/reconciliation GenCo bears market price chance/risk „for the changed part“	

Reconciliation (2/2)



- Assessment**
- GenCo optimally incentivized through usage of actual market prices
 - Reconciliation spread-based → no effect when plant is out of the money
 - Potentially high costs for GenCo in times of correlated outages (e.g. cooling water restrictions) and resulting spikes

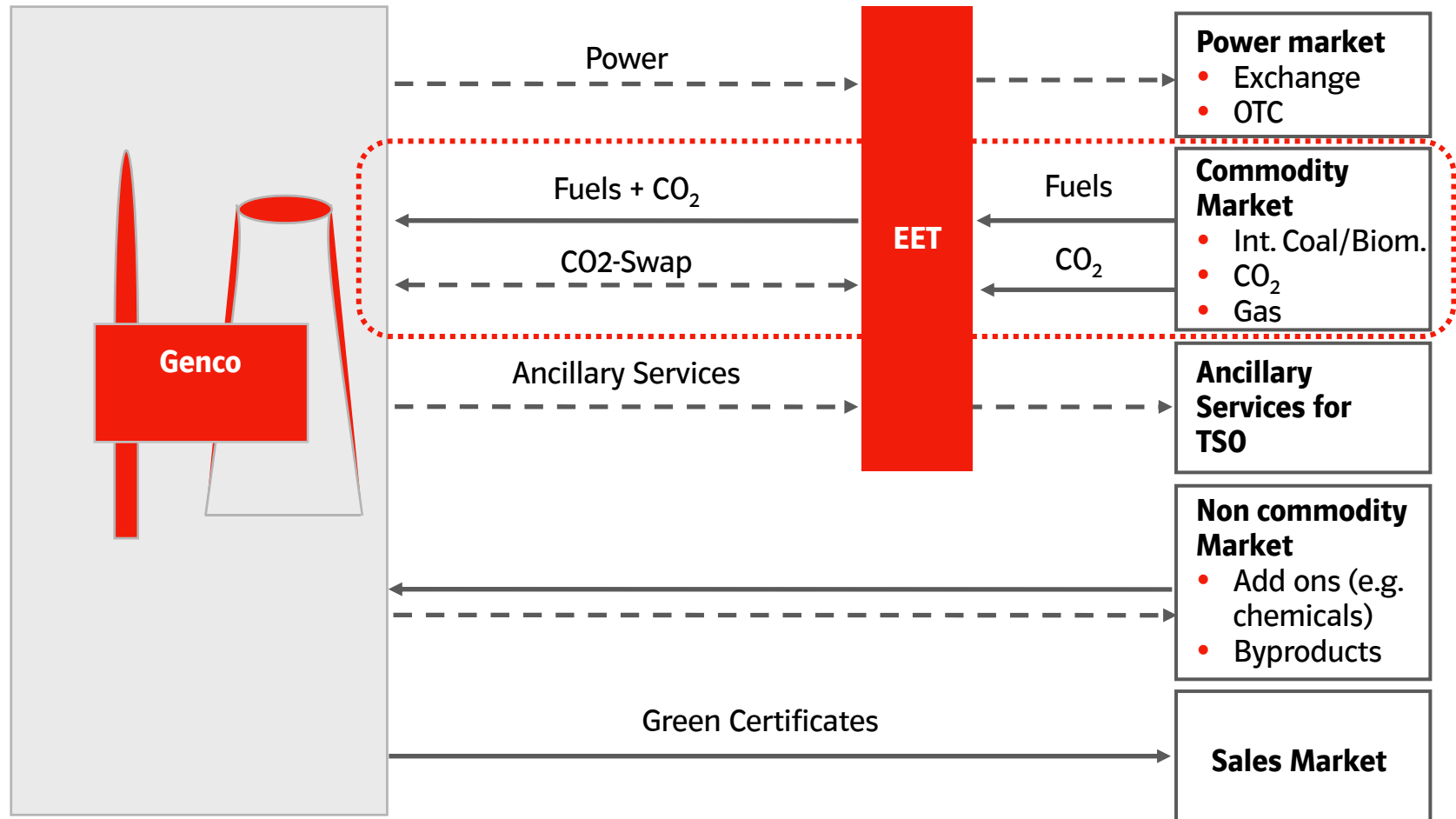
Summary: Main Remuneration Elements

Capacity Fee	Variable Price	Reconciliation
• in general a real option premium • [€/MW] • Based on forward prices and planned unit data	• marginal costs (fuel, CO2) incurred by GenCo • [€/MWh] • Based on spot market prices (power, fuel, CO2) and actual production	• reflect the under- or over-performance • compare forecasted and actual outputs • based on spot market prices of power, fuel and CO2 allowances
 <pre> graph LR EET[EET] -- PAYS --> GenCo[GenCo] </pre>	 <pre> graph LR EET[EET] -- "PAYS VarPr" --> GenCo[GenCo] GenCo -- "PAYS fuel, CO2" --> EET </pre>	 <pre> graph LR EET[EET] <--> "Cash flow In both directions" GenCo[GenCo] </pre>

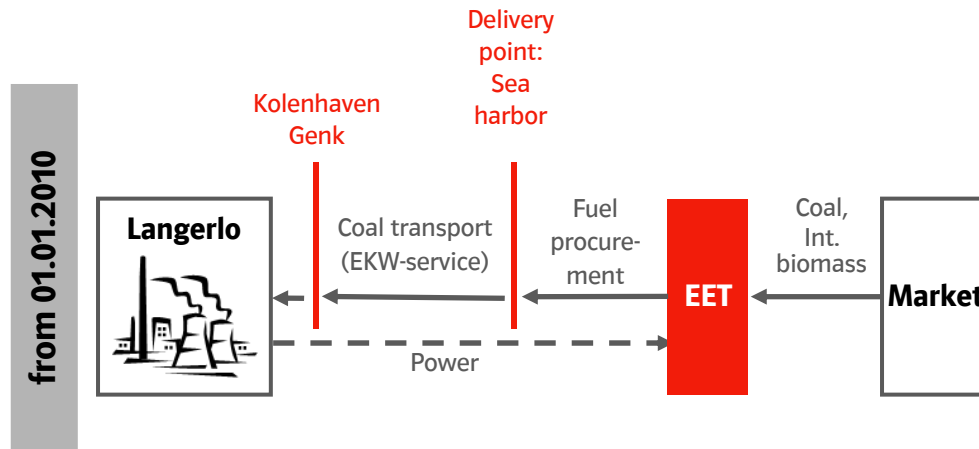
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Interfaces between Genco and EET



Supply of coal and biomass to Langerlo



Further GenCo responsibilities

- Provide information to EET on stocks
- Record fuel delivered and burnt weekly
- Decide on type, qualities of coal and odd fuel, blends

Further EET responsibilities:

- International logistics up to delivery point
- Organise quality measurement
- Management of stock pile at delivery point
- Inform GenCo about fuel deliveries (latest 4 weeks before arrival of vessels)
- Hold necessary licenses

Overview process:

Coal and international biomass

EET procure coal/biomass

EET sell coal to GenCo at sea harbour fob barge (delivery point)

Quality measurement: first barge of week of same stockpile in Antwerp weight according to Barge B/L at delivery point

EKW is service provider for transport to plant

EBX/GenCo is responsible for logistic at Kolenhaven Genk and handling within the site

National biomass

EBX as service provider procures national biomass
Delivery at station

Coal quality bandwidth and Suitability List

Back up

Specification Hard coal

KW Langerlo

updated 31.08.2009

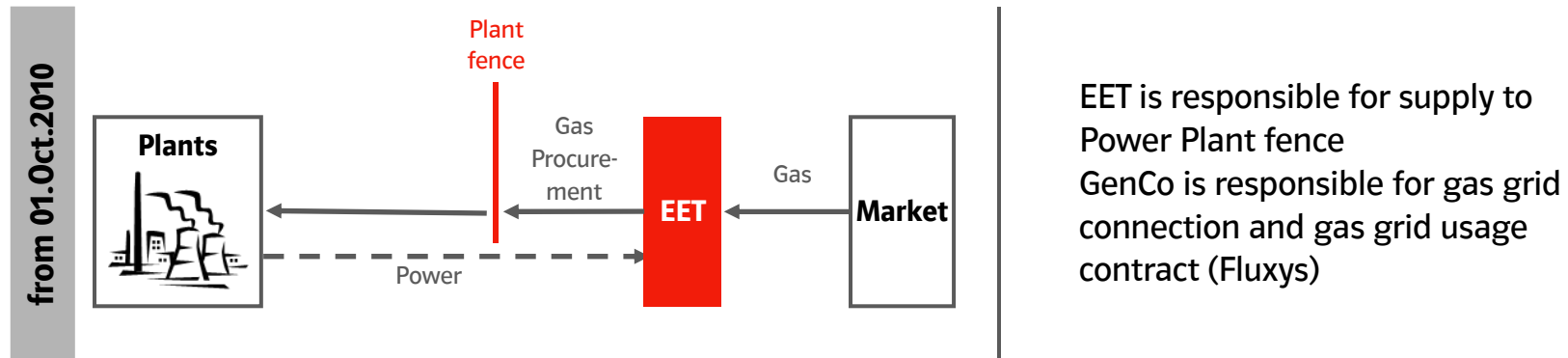
Approximate analysis (ar)		min.2)	min. 1)	max.1)	max.2)
Total moisture	%	5	5	10	12
Inherent moisture	%				
Volatile matters	%	20	22	35	40
Ash	%	5	7	15	18
Sulfur	%	0,3	0,4	1,4	2,5
Net calorific value	MJ/kg	23,5	25	30	
Grindability	*H	45	50	55	60
Size-range	mm	0	0	30	50
FSI					
Ash analysis (dry)					
Si/Al					
SiO2	%	45	45	60	75
Al2O3	%		20	35	
Fe2O3	%		1	10	20
CaO	%		1	6	10
MgO	%		0,5	1,5	2
Na2O	%		0,5	2	4
K2O	%		0,5	2	4
TiO2	%		1	2	2
SO3	%		0,5	4	
P2O5	%		0	1,5	2
Mn3O4	%				
Ultimate analysis (daf)					
Carbon	%		65	80	
Hydrogen	%		4	6	
Nitrogen	%		0	1,7	2
Oxygen	%		4	7	10
Chlorine	ppm		0	500	1000
Fluorine	ppm			200	250
Phosphorus	ppm				
Arsenic (in coal)	ppm				
Ash fusion temperature		red. atm	oxid atm		
Deformation point	*C	1250			
Hemisphere point	*C	1300			
Flow point	*C				
Size-fraction					
0 - 1 mm	%			2,5	13
1 - 2 mm	%			6	10
2 - 5 mm	%			7	20
5 - 10 mm	%				21
10 - 20 mm	%				24
20 - 50 mm	%				22
> 50	%				2

Coal suitability matrix Langerlo

as of 31.08.2009

Origin	Coal	percentage in blend
AUS	Ensham	50
	Newlands	50
	Blair Athol	50
	Clarence	50
	South-Blackwater	50
	Ulan	?
	Drayton	?
	Metropolitan	50

Gas supply – example Power Plant Vilvoorde



EET is responsible for supply to Power Plant fence
GenCo is responsible for gas grid connection and gas grid usage contract (Fluxys)

Main commercial terms and conditions:

GenCo pays to EET and EET remunerates GenCo via Variable Price (run through for GenCo):
Gas Commodity Charge for each unit of Gas: NG_ZEEBRUGGE.GBP – indexed
variable transportation costs, if applicable

GenCo pays to EET (affects P&L of GenCo directly):

Flexibility Charge for the flexibility required to supply the Unit

Standing Charge for the transportation from trading point (ZH) to the Unit

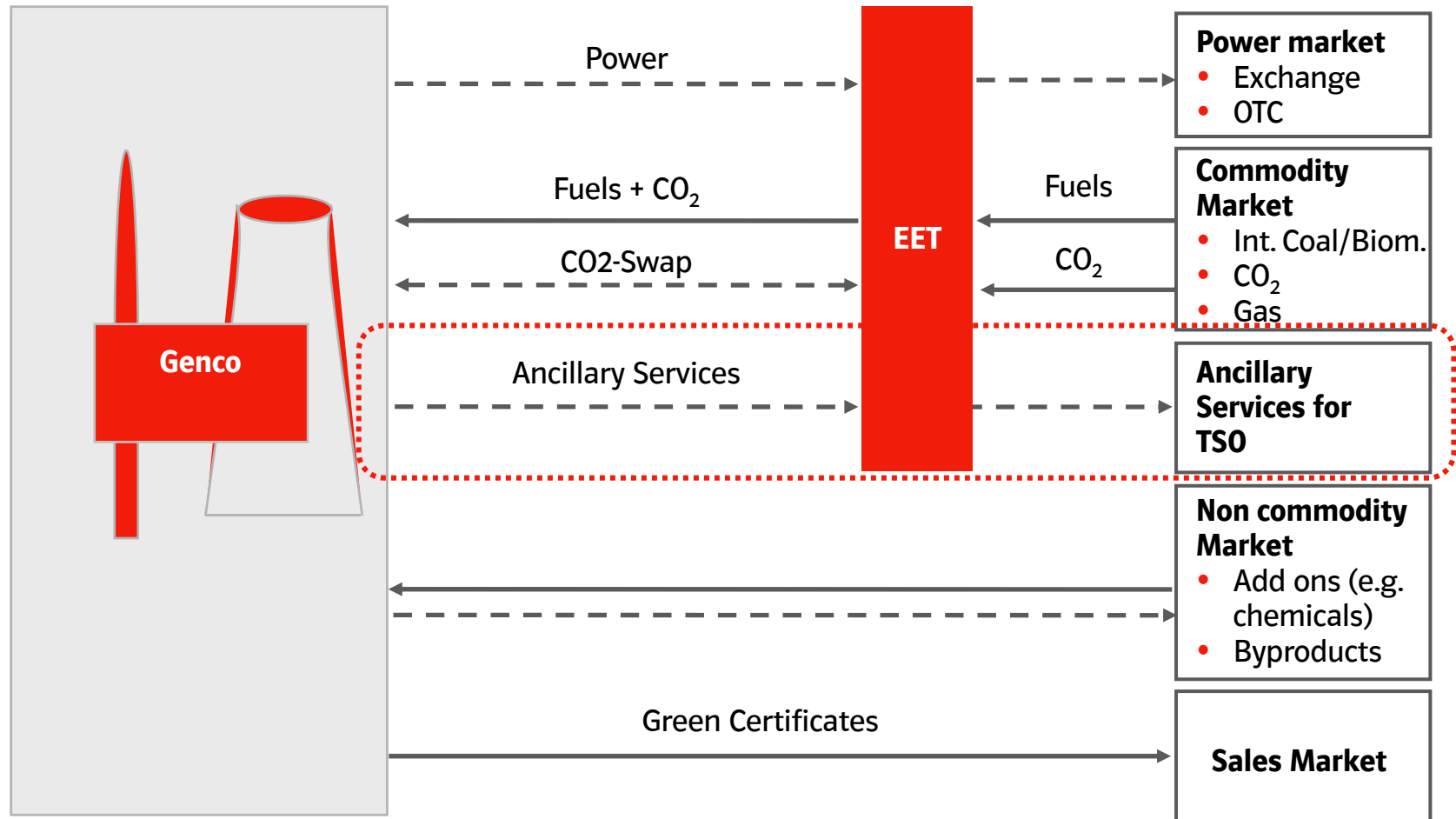
imbalance costs compensation for any damage caused to EET by failure of GenCo to off-take gas
according to the instructions of the EET

The Parties will specify the main commercial conditions of the gas supply in an Annual Term Sheet

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- 7 EET carve out project

Interfaces between Genco and EET



TSO Purchased Services (TPS)

TSO-Purchased Services offered by GenCo	
Those That Significantly Affect Scheduling	Others
Primary Reserve	Reactive Power
Secondary Reserve	Black Start

TPS affecting scheduling: revenues are an add-on to Capacity Price

Other TPS: revenues are passed through to GenCo

Imbalances

Unit feeds into balancing group of EET. EET thus bears imbalance costs of ELIA.

Imbalance reason: Unplanned („unexpected”) (part)-outages, deviation of actual production from scheduled

Imbalance time period in case of outage:

Outage after gate closure of Spot Exchange at the day before Delivery until the end of the day before production can be replaced by procurement at Spot Exchange.

E.g. Unit trips at 16:00 on 25th Nov 2009

Imbalance time period from 16:00 on 25th Nov 2009 until 24:00 26th Nov 2009

Imbalance Fee to be paid by GenCo to EET is calculated as follows:

2010: Fee = (Imbalance Energy Buy Price ELIA - Avg. Spot Price Belpex) x Imbalance Energy

2011: lump sum, based on real imbalance in previous year(s)

Other remuneration elements

Auxiliary power:

Auxiliary Power delivered to the Unit by EET is priced at the hourly Spot Market Prices in the day-ahead market.

Must run

GenCo declares Units as "must run" (e.g. due to test program) despite EET would not deploy the Unit
difference between the Spot Market Price of electricity and Strike Price is negative ("out of money")
GenCo will pay to EET this difference for each hour

CO2 interface

EET is responsible:

- supplying GenCo with all information needed for the fulfilment of its monitoring obligations under any applicable EU and/or national guidelines
- forecasting actual CO2 Emission Certificates needed for electricity production
- Buy additionally needed EUA

GenCo is responsible:

- compliance with requirements in respect of monitoring CO2 emissions (including certification of actual emissions)
- timely complete submission of CO2 Emission Certificates to the relevant national authority
- providing EET with monthly actual CO2 statistics on the basis of already monitored emissions and actual production figures for all Units used and electricity production

Summary: Split of responsibilities between Genco and EET

	Genco	EET
Functions performed	- Technical plant optimization - On site fuel management and blending - Plant operations - Management of additives and residuals - Holds generation licence - Environmental and safety compliance - Volume + price risk (illiquid time frame)	- Managing volume and price risks (in liquid time frame) - International fuel procurement - Carbon rights purchasing - Plant portfolio optimization, scheduling and dispatch
Transaction flow	Sells power generated from coal, gas (nuclear, wind if applicable)	Buys power generated from coal, gas (nuclear, wind if applicable)
Risks allocated	- Technical failure - Plant inefficiencies - Long-term price (investment) risk - Legal risk (e.g. concession)	- Short- and medium-term price risks - Operational risks (e.g. faulty dispatch) - Default risks of OTC-partners - Currency risks

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Backup

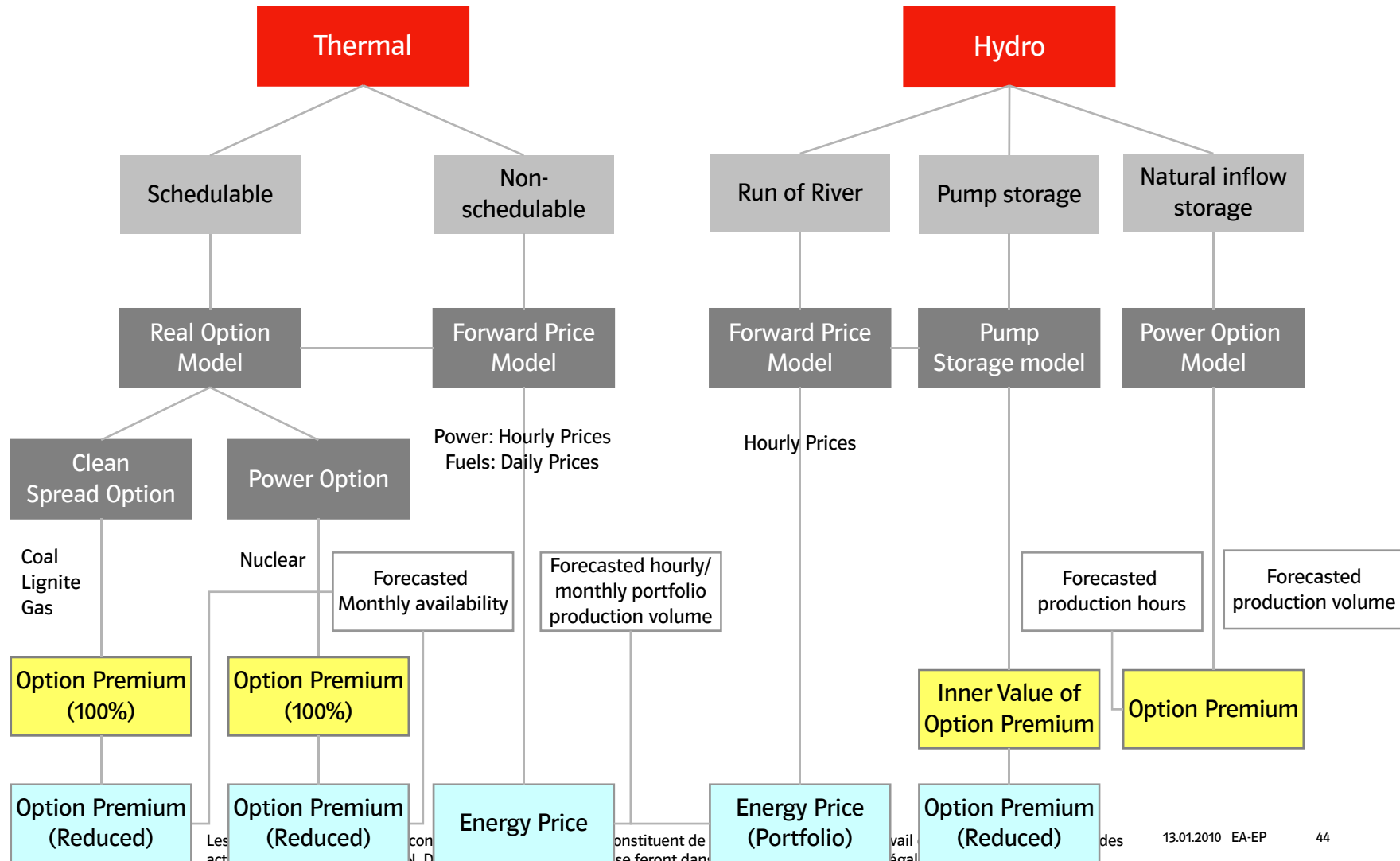
Valuation models for different plant types

EET Responsibility

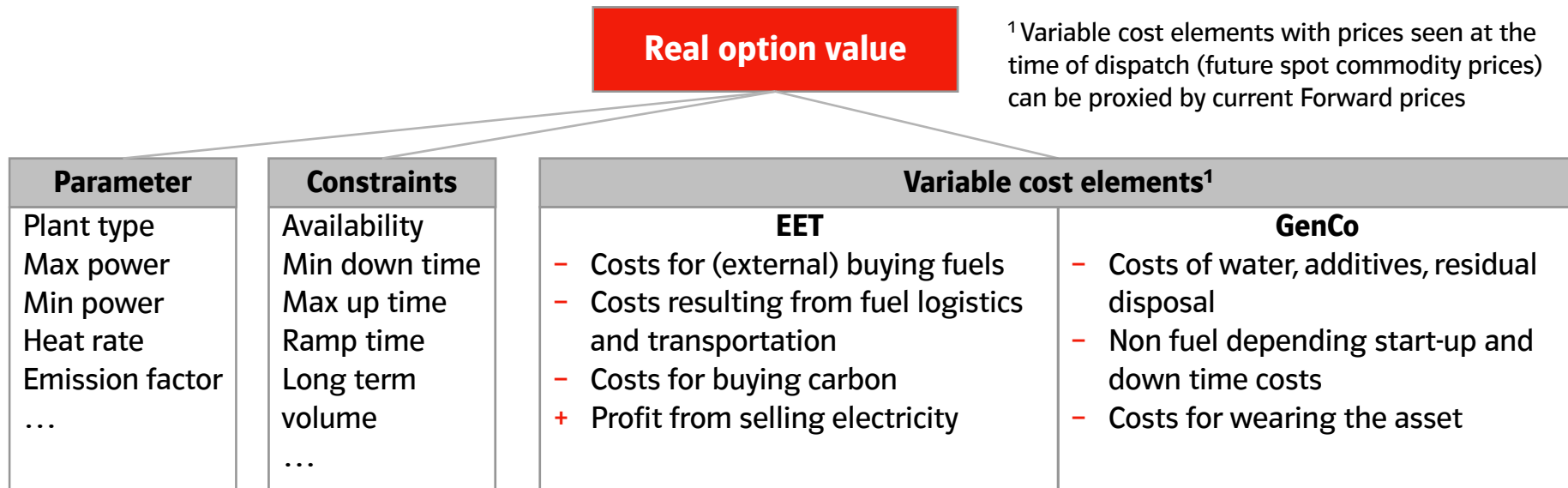
Split MPP/MPA:

MPP

MRC



Valuation of flexible thermal power plants



- Real option value depends on variable cost elements, plant parameter and technical/operational constraints.
- Variable cost elements enter into the real option valuation either by clean spread legs (= power – fuels – carbon).
- EET and GenCo will be compensated by the cost elements they actually incur (EET and GenCo see different elements of the strike price).

Allocation of market price and parameter risks

- Valuation is based on a real option approach taken into account uncertain future prices.

$$\text{OPT_VAL}_{i,M,t} = \max_{\{U_{i,j}\}} \left(\sum_j \text{FC_UNIT_CAP}_{i,j,t} \times \text{FC_AVAIL}_{i,j,t} \times \text{EV}_t \left[U_{i,j} \times (\text{CLN_SPRD}_{i,j,f,t} - \text{FC_EET_STRK_PRC}_{i,j,t} - \text{FC_GEN_STRK_PRC}_{i,j,t}) \right] \right)$$

Option value
Plant parameters
Market variables
Non fuel dependent costs

Uncertain cash flow elements¹/Risk allocation

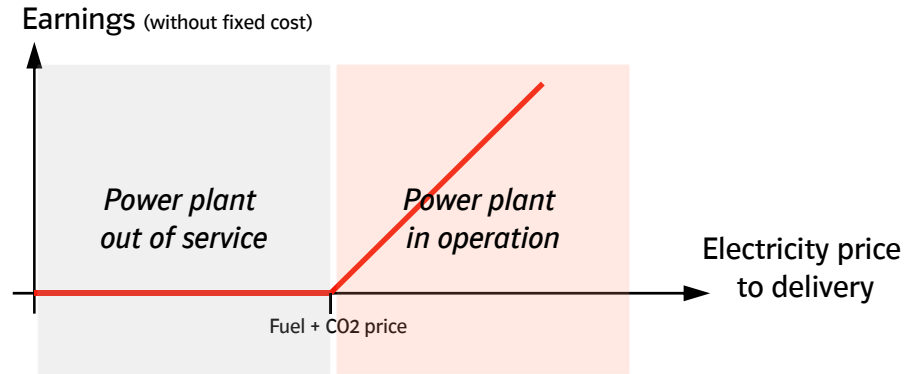
EET			GenCo		
Variable	Cash flow element	Risk	Parameter	Cash flow element	Risk
Power	Profit from selling power at uncertain future spot prices	Market price changes	Unit Availability	Cash flow proportional to forecasted availability	Parameter changes
Fuel	Fuels procurement at spot prices	Market price changes	Unit Efficiency	Fuel conversion depends on unit forecasted unit efficiency	Parameter changes
CO ₂	Additional allowances procurement at spot prices	Market price changes			
Strike	Costs for logistics etc.	Market price changes			

¹ Variable cost elements with prices seen at the time of dispatch (future uncertain spot commodity prices)

Fundamentals: Power plant as real call option

- A power plant is considered as a real call option

EET transfers option premiums to GenCo to use the flexibility its power plants. Depending on strike price, power plants are "out/at/in the money"



- Option premium consists of intrinsic and time value.

Highest time value is when power plants are nearly "at the money" because of possible opportunities

