Energy Trading

ENERGY TRADING

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- Introduction of EDF Luminus
- European Energy Market
- Price Drivers
- Portfolio Management
- Remit
- Specific cases







Introduction of EDF Luminus

European Energy Market

Price Drivers

Portfolio Management

Remit



Power markets: where to trade?



Gas markets: where to trade?





Capacity mix Europe





luminus



European power markets – installed capacity (2018)

Installed Capacity [MW] (2018)



Source :: https://transparency.entsoe.eu

FIGURE 1: THE EUROPEAN POWER MIX BY INSTALLED CAPACITY 2000-2014



Source: EWEA. (2015). Wind in Power: 2014 European Statistics



FIGURE 7: GLOBAL ASSET FINANCE ON NEW INVESTMENTS BY SECTOR⁵⁶

The role of interconnections



German effects

- Gas and Coal pulling Germany to the cheap (exporter side)
- Wind and sun: growing effect, up to negative prices
- Stop of German Nukes ench offects
- French effects • Temperature sensitive (on
 - power) in southern area
 - Spiky merit order with cheap base
- Benelux
 - New CCGT's and Coal PP in The Netherlands

UK

UK price as f(gas,coal)

Decoupling of Prices

Only when capacities are saturated

Market description – Type of gas

Gas network is divided in 2 types of gas networks

H-Cal : high calorific value (MWh/m³ delivered) – the orange network
L-Cal : low calorific value (MWh/m³ delivered) – the blue network

- H-Cal sourcing is coming from all around the world (LNG, North sea, baltic countries and Russia)
- L-Cal sourcing is only coming from the Groningen gas field in the Netherlands

Production of Groningen gas field will decrease due to earthquakes risks





Introduction of EDF Luminus

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Power Price Drivers





Drivers of natural gas prices





Source: RWE



Introduction of EDF Luminus European Energy Market Price Drivers Portfolio Management Portfolio Concept & Definitions

Hedging Short Term Market Imbalance Market

Remit

Specific cases



TRADING TERMINOLOGY PHYSICAL/FINANCIAL POSITION



Optimisation versus Trading

Asset Optimiser

Manages a portfolio of assets (power plants, contracts, retail portfolio,...) Objective is to control physical and financial risks and maximising margins

= hedging

Trader

- Creates a position
- Objective is to make money from this position when market conditions change

= speculation

Both actors sell and buy in the wholesale markets to achieve their objectives, thus creating a liquid market



TRADING TERMINOLOGY HEDGING VERSUS SPECULATION

Hedging =

- Hedging aims at reducing the riskiness of a portfolio; match an existing exposure with an opposite exposure
- ⇔ Speculation =
- taking risky positions in a market with the intention of exploiting market price movements



Source: KYOS Energy Consulting

TRADING TERMINOLOGY MARK TO MARKET

Mark to market

- Value of the position according to the current market prices.
- MtM of the portfolio assumes that the portfolio could be liquidated instantly, to realise the value, without moving the market.
- Process of reconciling asset values or obligations with a set of market prices

Example of MTM:

buy 5 MW for March 2016 & April 2016 @ 41,9 EUR/MWh

	Volume (MWh)	Market value (EUR)	Contract value (EUR)	MTM (EUR)	Market price (EUR/MWh)	Contract price (EUR/MWh)	MTM (EUR/MWh)
01/03/2016	3715	186.664	-155.659	31.005	50,25	-41,9	+8,35
01/04/2016	3600	147.208	-150.840	-3.632	40,89	-41,9	-1,01

MARKET PLACES



OTC markets and power exchanges

- Continuous Market
- Bilateral contact between counterparties
- Deal not public for the Market
- Credit Line and Authorization to trade different from counterparty



• Ex: EBL, EDF Trading, EON, RWE, Danske Commodities...

OTC Market



- Auction or continuous market
- Anonymity of the traders
- Deal public for the Market
- Credit line with the platform



• Ex: Belpex (Belgium), EPEXSpot (France & Germany), APX (The Netherlands)

Power Exchange



guantity

OTC MARKET GV8 SPOT & FORWARD POWER MARKET

	В	elgium l	Baseloa	France Baseload									
	Qty	Bid	Ask	Qty	Qty	Bid	Ask	Qty					
Wed 20/05/15													
Thu 21/05/15	25	37,50	38,50	25	25	34,35	35,50	25					
Fri 22/05/15					25	32,50	33,00	25					
Sat 23/05/15													
Sun 24/05/15													
Mon 25/05/15					25	15,00	18,00	25					
Tue 26/05/15													
Wkend 23/05-24/	25	29,00	31,00	25	25	19,25	19,75	25					
Wkend 30/05-31/					25	17,70	18,25	25					
Wkend 06/06-07/													
Wkend 13/06-14/													
Wk22-15	25	34,00	34,50	25	25	25,55	25,75	25					
Wk23-15			38,00	25	25	26,75	27,00	25					
Wk24-15					25	27,25	28,50	25					
Wk25-15					25	27,25	28,95	25					

		Belg	jium Bas	eload		France Baseload										
	Qty	Bid	Ask	Qty	Last	Qty	Bid	Ask	Qty	Last						
	5	35,85	36,10	5	36,15	10	28,60	28,70	10	28,60						
Jun 2015	5	35,85	36,40	5		10	28,55	28,70	10							
	5	35,50	36,70	5		5	28,55	28,75	10							
Jul 2015						10	27,60	28,00	10	27,70						
Aug 2015						5	25,15	25,25	10	25,20						
	5	37,75	38,10	5	38,00	5	29,65	29,80	10	29,75						
2015 Q3	5	37,50	38,30	5		10	29,55	29,85	5							
	5	37,00	38,35	5		5	29,55	29,90	10							
2015 Q4	1	51,15	51,90	5		5	44,90	45,10	10	45,00						
2016 Q1	5	52,00	53,00	5		5	47,10	47,45	5							
2016 Q2	5	38,00	39,00	5		10	31,50	32,00	5							
	5	44,10	44,50	1		5	38,70	38,75	5	38,75						
2016	5	44,00	44,75	5		5	38,65	38,79	5							
	5	43,75	45,00	5		5	38,65	38,83	5							
2017	5	40,30	41,10	5		5	38,50	38,60	5	38,55						
2018	5	40,20	40,95	5		5	38,65	38,75	10	38,75						
2019						5	38,60	39,10	5							

- EDFL active on Belgian and French markets (Baseload and Peak products)
- Spot market → Day ahead (DA) and intraday (ID)
- Forward market → Beyond DA & ID
- Bid

- → Buyers side (price at which you are prepared to buy)
- Ask (or offer)
- Both markets
- → Sellers side (price at which you are prepared to sell)
- → traded in €/MW

OTC MARKET GV8 SPOT & FORWARD GAS MARKET

	Zeebrugge					TTF (Hi Cal)							PEG NORD H						Zeebrugge					TTF (Hi Cal)				PEG NORD H			
	Qty	Bid	Ask	Qty	###	####	Qty	Bid	Ask	Qty	####	####	Qty	Bid	Ask	Qty	####	WD	100	42,600	43,350	100	60	20,375	20,525	120	250	20,70	20,75	250	
Jun 2015	150*	42,900	43,100	25		GRIF	30	20,250	20,290	15	ICE		240	20.45	20,55	240	PNXT		100	42,300			115	20,350	20,550	120	1000	20,70	20,775	1000	
Jul 2015	25	41,650	42,200	25	1	GRIF	10	20,150	20,190	5		PRBN	240	20,40	20,50	240		DA	100	43,200	43,400	100	120	20,400	20,425	120	750	#####	20,75	1000	
Aug 2015							10	20,225	20,290	5		PNXT	720	20,25	20,65	720	PNXT		100	43,100	43,500	100	110	20,400	20,425	120	####	20,70	20,775	1000	
Sep 2015						ICE	30	20,275	20,365	15				1				BOW	25	42,650			120	20,250	20,700	120					
Oct 2015					<u> </u>	ICE	45	20,650	20,775	60	ICE								<u> </u>												
2015 Q3	25	42,150	42.625	25		ICE	30	20.250	20,300	5	PNXT	PNXT	720	20.275	20.675	720	PNXT	W/END	100	41,900	42,650	100	120	20,200	20,400	30					
2015 Q4						PNXT	5	21,450	21,475	10	ICE	PNXT	720	21,625	22,125	720	PNXT		<u> </u>				120	20,100	20,500	120					
2016 Q1	25	47.575		1		ICE	5	22.200	22,250	10	TFUK	PNXT	720	22.35	22,875	720	PNXT	WK/DY NW	100	42,250	42,950	100	30	20,350	20,500	30					
2016 Q2						ICE	20	20.850	21,150	10				1					100	42,100			60	20,350	20,600	120					
Win 15	25	46 650	46 850	25		TELIK	10*	21,800	21.850	10	####	PNXT	720	22.00	22.35	720	PNXT	FW/END	<u> </u>												
Win 16	25	48,350	49,100	25			15	22,425	22,500	10		GFI2	240	22.85	23.00	720	PNXT		<u> </u>												
Win 17	25	49,100				####	30	22,500	22,600	30	####							FWK/DY NW	<u> </u>												
Sum 16	25	44 000	44 450	25		ICE	15	20.725	20,750	10	####	PNXT	720	20 775	21 175	720	PNXT	POM	60	42.050	42.000	50	20	20.250	20,400	20	1440	20.50		<u> </u>	
Sum 17				1		ICE	5	20.875	20.925	30	####							BOM	50	42,000	43,000	50	30	20,350	20,400	50	1440	20,50			
Sum 18						ICE	10	21,000	21,475	30		<u> </u>							50	42,000			50	20,330	20,400	00					
Sum 19				1																											
2016					-	GRIF	10	21.425	21.475	5	TFUK	PNXT	240	21.60	21,975	240	PNXT														
2017						CAPI	10	21,650	21,675	15	ICE																				
2018			i			GRIF	5	21,900	21,950	10																					
2019							5	22.075	22,150	10	ICE																				
Gas Yr 15						<u> </u>						<u> </u>																			

- EDFL active on Belgian, French & Dutch markets (Baseload products)
- **Spot & Forward** market → same definition as POWER
- Bid & Ask (or offer) → same definition as POWER
- In Belgium
- In France and the Netherlands \rightarrow Traded in \in /MWh
- → Traded in Pence/therms (1MWh = 34,1214 therms)

TYPE OF PRODUCTS



TSO: Transmission System Operator

Timeline of activities of an asset optimiser

From 3 years to 1 month ahead of implementation date [D]

- Forecast of the medium-term supply/demand balance
- Scheduling of power plant maintenance
- Sale/purchase operations on the forward markets

1 Month ahead of implemenation date [D]

> Refine the supply/demand balance to more accurate weather forecasts and availability of power plants Sale/purchase operations on the forward markets

Day Ahead [D-1]

- Create operating schedule for the power plants
- Balancing supply and demand on the Day-Ahead market (DAM)
 Send nominations to TSO



Intraday & Balancing Market [D]

- Respond to latest unanticipated changes in the portfolio
- Send renominations to TSO
- Sale/purchase operations on the intraday and balancing markets



THE SPOT MARKET REFLECTS THE PHYSICAL **BALANCE OF THE MARKET**

MCV (MWh)

- The Belpex Day-Ahead Market (DAM) provides hourly products to sell and purchase electricity to be delivered for each hour of the next day on the Belgian grid
- Retailers and generators can buy and sell on Belpex before handing in a balanced portfolio to the grid operator Elia

Hourly Details for the BE Hub

3.000

2.000

1.000

-1.000

-2.000

-3.000



-20

-40

-60

-80

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BUT SPOT PRICES CAN BE VERY VOLATILE



FORWARD MARKETS PROVIDE A HEDGE AGAINST SPOT VOLATILITY

- Forward markets allow two parties to enter into a contract for future delivery of power at a price agreed upon today
- Forward prices are today's expectations of future spot prices (thus making it a derivative instrument)
- Traded over-the-counter (OTC) or via a futures exchange (Endex)
- Allows retailers and generators to protect themselves from the volatility of the spot markets by entering into hedging contracts



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Forward and spot prices





FORWARD AND SPOT PRICES (GAS)

YEAR AHEAD GAS PRICE EVOLUTION (FROM 2011 TILL TODAY-



Gas prices have been falling sharply

- Following bearish coal
- Following bearish oil (supply glut)
- Less power generation demand
- Less energy intensive industries
- Less domestic demand
- Slowing Asian growth
- Fukushima crisis over
- Global growing LNG capacities
- Since mid 2016, slow economical regain



Types of customers in a portfolio

B2C

- High value customers with standard load profiles (SLP), strong seasonal and temperature sensitivity (value strongly decreased)
- Increased churn varies from active clients or due to "group buying"
- Pricing (fix prices or market index)

B2B

- From <1GWh to manufactury or hospital or multisited supermarkets</p>
- Varying profiles
- Higher risk on volume from year to year
- Varying customer awareness and purchasing strategies (fixed prices, click-options, autoproducers...)
- Most often locked in sales for 1 to 3 years

Industrial (large B2B)

- High volumes and low margin
- Varying profile and high risk on volume
- Add-hoc pricing

Autoproducer

- Utility can be on the buying or the selling side or both (spark spread)
- Multi-sites and industrials or specific profiles: railway companies, incinerators
- Optimizes porfolio vs wholesale market



Portfolio Management : Definition/Concept

Forward Market vs Spot Market

spot market is also known as "cash market" where the commodities are sell on the current price or the spot rate and deliver immediately where as in case of **forward market**, market dealing with commodities for future delivery at prices agreed upon today (date of making the contract).

Hedging vs Trading

Hedging is the practice of taking a position in one market to offset and balance against the <u>risk</u> adopted by assuming a position in a contrary or opposing market.

Trading is the fact to buy or sell a product on the market.

Stochastic vs Deterministic view

A **deterministic model** is one in which every set of variable states is uniquely determined by parameters in the model and by sets of previous states of these variables. Therefore, deterministic models perform the same way for a given set of initial conditions. Conversely, in a **stochastic** model, randomness is present, and variable states are not described by unique values, but rather by probability distributions.



Portfolio Management : Definition/Concept

Trader : A trader is person or entity, who buys and sells financial instruments such as stocks, bonds, commodities and derivatives, in the capacity of agent, hedger, arbitrageur, or speculator.

Asset Optimiser : asset managers/optimisers are responsible for portfolios. They are supposed to ensure the financial profitability of the assets and are not supposed to speculate.

Broker : A broker is an individual or party (brokerage firm) that arranges transactions between a buyer and a seller, and gets a commission when the deal is executed

Market Maker : A market maker is a company, or an individual, that quotes both a buy and a sell price in a financial instrument or commodity, hoping to make a profit on the bid-offer spread, or turn.



Portfolio Management : Definition/Concept

Retailer : A retailer purchases goods or products in large quantities from producers or through a wholesale, and then sells smaller quantities to the consumer for a profit.

- Producer : A producer is a company that owns and operated production assets.
- Integrated Company : an integrated company is a company that is composed by a producing division and retail division.

Retailers are mostly making high profit in long market, **Producers** in short market. An **Integrated Company** should realize confortable profit in all market conditions.





Introduction of EDF Luminus European Energy Market Price Drivers Portfolio Management

Portfolio Concept & Definitions Hedging Short Term Market Imbalance Market

Remit

Specific cases

What is a hedge?

Hedging aims at reducing the riskiness of a portfolio; match an existing exposure with an opposite exposure

Earnings depend on fluctuating commodity prices

- Hedging = act (buy/sell commodities) to reduce the variability of earnings
- Hedging does not impact expected earnings (except for transaction costs)
- Energy portfolio is complex, and hedging involves buying/selling different commodities (including FX)



What is the right time/price to hedge?

- A hedge is a transaction on the forward market: agree now to buy/sell in the future at agreed fixed price
- Prices can be very volatile \rightarrow timing is crucial



Key elements for hedging

- Liquidity is key for hedging
- Bid-Ask cost
- ♦ Lot size → slippage risk
- Types of products → forces to proxy hedges or tailor made products (costly)
- Hedge through portfolio \rightarrow indexes, origination
- But still: Many areas of basis risk: power indexation, time spreads, Hub/ZIG,...



TRADING TERMINOLOGY HEDGING EXAMPLE

Position	Volume (MWh)	Market value	Contract price	МТМ	
LONG ASSET	1000	60	0	60 000	
SHORT HEDGE	-1000 MWh	-60	59	-1000	
PORTFOLIO				59 000	

Position	Volume (MWh)	Market value	Contract price	МТМ
LONG ASSET	1000	55	0	55 000
SHORT HEDGE	-1000 MWh	-55	59	+4000
PORTFOLIO				59 000

Position	Volume (MWh)	Market value	Contract price	МТМ
LONG ASSET	1000	65	0	65 000
SHORT HEDGE	-1000 MWh	-65	59	-6000
PORTFOLIO				59 000

DIFFERENT EXPOSURES → DIFFERENT STRATEGIES



Each exposure being different, hedging strategy will be different



FIXED EXPOSURES





• Floating to Fix

Directly hedged as exposure arises to lock margin











FLOATING EXPOSURES













FLOATING EXPOSURES – EXEMPLE POWER

		Prix variable	
•	 Floating sales are structural and arise from: B2C : Products like Essential/Optimal SME 	Essential Electricité et gaz	Optimal Electricité et gaz
	Floating B2C formula is 1/3*(12-12-12)+1/3*(12-0-12)*1/3*(3-0-3)	Variable	Variable

- Meaning price for delivery during Q1 2016 is the average of
 - 12-12-12 : Average of closing prices of product Cal16 during year 2014
 - 12-0-12 : Average of closing prices of product Cal16 during year 2015
 - 3-0-3 : Average of closing prices of product Q1-2016 during Q4-2015

To hedge this exposure, we have to buy every day the volume that was fixed that day

Example:

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- In Q2-16, we have to deliver 600GWh to our variable customers
- In 2014, markets will be open 250 days
- In 2015, markets will be open 250 days
- In Q1-16, markets will be open 66 days
- \rightarrow Every day of 2014, we have to buy 1/3*600GWh/250 = 0,80GWh of Q2-16
- → Every day of 2015, we have to buy 1/3*600GWh/250 = 0.80GWh of Q2-16
- \rightarrow Every day of Q1-16, we have to buy 1/3*600GWh/66 = 3,03GWh of Q2-16





Types of Hedging Strategies



No hedging

 Naked strategy/ "Do nothing": After taking a position, no activities with respect to hedging are pursued

Static hedging

- Covered strategy with perfect hedge: Trading the underlying asset to completely hedge away the risk
- Covered strategy with proxy hedge: Trading an asset that is highly correlated to the underlying to hedge away the risk as well as possible
- Stop-loss strategy: Closing position when a given threshold is exceeded

Dynamic hedging

Delta hedging strategy:

 Dynamically rebalancing a portfolio to make it deltaneutral, i.e., a change in the underlying asset price has no impact on overall portfolio value



Iminus

Fundamentals of Delta Hedging

Using the forward market to increase value of power plant by taking positions varying with the delta of the option





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Day Ahead power price formation



- Merit order principles for bid & ask curves
- Algorithm to calculate match price (on full CWE region and beyond)
- Includes block (conditional) bids & offers
- Settles the price at 1 pm:
 - If bid price > settlement price, power purchased @ settlement price
 - If offer price < settlement price, power sold @ settlement price



Power

Applying date:01-03-2011 Hour:01 MCV:1829.2 MWh MCP: 47.44 Euro





HOW IS THE POWER PRICE FIXED?





HOW ARE POWER PRICES IMPACTED?

Offer/demand logic to 4 common examples

- 1. Lot of wind tomorrow!
- 2. Nuclear outage
- 3. Fuel prices are falling





4. Belgian economic growth is reviewed lower



LOT OF WIND TOMORROW!





NUKE IS OUT AGAIN!





FUEL PRICES ARE DOWN



SLOWING ECONOMIC GROWTH

CWE (Nov 9th 2010) > NWE (Feb 4th 2014)

- Two separate Market Couplings (CWE & Nordic) linked by a volume coupling (ITVC organised by EMCC)
- Sequential calculation approach
- No common algorithm applied

- Full coupling with GB
- One single price coupling based on a single calculation
- One single common algorithm to allow for a sound and robust price formation

NWE (Feb 4th 2014) → NWE/SWE (May 13th 2014)

- SWE joined on May 13th 2014
- New Name : MRC (Multi Regional Coupling)
- Feb 24th 2015 : + Italy borders
- 4M Market (seperated market with the same algorithm principle) -> CZ + SL + HU + RO

Flow Based Market Coupling (2018)

- The flow-based model has been advocated as the target model for highly meshed grids (like the Central West Europe grid).
- Market coupling allocates capacity by optimising the total economic surplus of the different coupled spot markets' order books, while ensuring that the physical limits of the grid are respected. The consequence of this is price harmonisation in the CWE region when sufficient capacity is available. By using a more detailed grid description, the flow-based method increase this price convergence while ensuring a same security of supply as today.

CWE Market Results 22nd February 2018

CWE Market Results 26th February 2018 (Today)

Definition (Clean) Spark-Spread/Dark-spread

The **spark spread** is the theoretical gross margin of a <u>gas-fired</u> power plant from selling a unit of electricity, having bought the fuel required to produce this unit of electricity.

The **dark spread** is the theoretical gross margin of a <u>coal-fired</u> power plant from selling a unit of electricity, having bought the fuel required to produce this unit of electricity.

In countries that are covered by the European Union Emissions Trading Scheme, generators have to consider also the cost of carbon dioxide emission allowances.

Clean spark spread represents the net revenue a gas-fired power plant makes from selling power, having bought gas and the required number of carbon allowances

Clean dark spread represents the net revenue a coal-fired power plant makes from selling power, having bought gas and the required number of carbon allowances

Definition of Spark-Spread

Optimisation of coordinable units based on Clean Spark-Spread :

 $Spark - Spread = Pelec - \frac{1}{efficiency}(Pgaz + k CO2)$

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Cross Border Trading

Introduction of EDF Luminus European Energy Market Price Drivers Portfolio Management

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Imbalance Market

Electricity **cannot be stored** in large quantities. Generation must always be equal to consumption, at any time of the day of the year. This **physical reality** is called the 'generation/consumption balance'.

How does the TSO manage to balance the country?

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BRP Responsability = individual



Imbalance Invoice





Imbalance Volume

(Production-Consumption)

Х

Imbalance Prices

f(country position)



Imbalance Invoice

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Balancing – Main principles?

1/4h Balancing obligation for each BRP	 Balancing = difference between production and consumption of the whole portfolio (metering)
TSO takes care of the position of the country	 Short position of BRP purchased at imbalance price - Long position of BRP sold at imbalance price +
Imbalance price is equal to marginal price activated by TSO	 High incentive for BRP to be balanced Many opportunities for BRP
Imbalance price + and – are equal most of the time	 Differences (extra incentive) only if big imbalances





Delta between DAH prices and imbalance prices



D



Delta between DAH prices and imbalance prices





Demand side management







Introduction of EDF Luminus

European Energy Market

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Market Regulation

- Prohibition of market manipulation and trading on the basis of 'insider information'
- Market monitoring by ACER





AGENDA

Introduction of EDF Luminus European Energy Market Price Drivers Portfolio Management Remit Specific cases

Winter 2017-2018

Sales Trading Platform & Decentralized Production



Winter 2016-17



AGENDA

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Winter 2016-2017

Sales Trading Platform & Decentralized Production





LE MARCHÉ DE L'ÉNERGIE HIER





LE MARCHÉ DE L'ÉNERGIE HIER ET DEMAIN





UN IMPACT PROFOND POUR NOTRE PORTEFEUILLE





LA SOLUTION?

Une collaboration "gagnant-gagnant" entre des producteurs locaux et EDF Luminus

- EDF Luminus offre les services nécessaires au producteur local afin de réduire au maximum sa facture d'énergie et d'optimiser son unité de production
- Le producteur local vend son énergie et sa flexibilité à EDF Luminus
- Possible grâce à notre Sales Trading Platform



EDF LUMINUS SALES TRADING **PLATFORM:**

LA SOLUTION IDÉALE POUR DES **PRODUCTEURS** LOCAUX



Full integrated system via Web application system with a 24h/7d access



The customer will maximize & optimize the value of his asset position thanks to Flexibility option



The customer will be in the driver seat for all his energy related services: from the **nomination** till the imbalance position



The customer will automatically have the correct information for invoicing purposes



Trading desk: the customer will manage his price BELPEX position with accurate and added value information



As full integrated solution, the dataflow will increase the operational excellence position

ELECTRICITY PRODUCTS OVERVIEW



But in a changing Market context...



Les fermetures de centrales électriques vont se multiplier en 2015

BELGA Publié le vendredi 09 janvier 2015 à 06h32 - Mis à jour le vendredi 09 janvier 2015 à 06h36



We create innovative products for flexibility from decentralised production and our customers



Sales Trading Platform: web based tool to communicate with our customers Providing a "window to the market" for our customers allowing them to capture value in the energy and flexibility markets



ENERGY OPTIMIZATION ACTS ON THE SHORTEST PERIOD





LUMINUS FLEXIBILITY PROVIDES A COMPLETE OPTIMIZATION SOLUTION





PRICING INTERACTIVITY PROGRAM PRINCIPLE





You manage your energy load daily, you know what's your capacity (to consume or to inject)



You make your nomination directly into our Customer Zone the day before or review it intraday

You manage your asset in order to fit to your new profile

			0 - [10]									
059.4	05%	Conier										
Heure Consommation (kWP		nmation (kWh)	Offre conditionelle 1					Offre conditionelle 2				
	(M	ax. 200)	Volume	(Wh) (1	100x) s	prix (GMMb)	que Volum	e (kWh) (102x) si	prix (CAA	Vħ)	
20:00 - 01:00		100										
01:00 - 02:00		100					•	100	0	30.00	×	
12:00 - 03:00	1	100										
03.00 - 04.00		100	•	100	0	100.00 ×						
04:00 - 05:00	E	100										
15:00 - 06:00		100										
06:00 - 07:00	10	100										
07:00 - 08:00		100										
00:90 - 00:80	10	100										
19:00 - 10:00	23	100										
10:00 - 11:00	10	100										
11:00 - 12:00	F 1	100					0	200	0	20.00	×	
								200	-			
12:00 - 13:00	- m	100										





ACTIVE LOAD MANAGEMENT PROGRAM PRINCIPLE







A REAL TIME ACTIVATION AS FOR THE DEMAND OR SUPPLY SIDE





FLEXIBILITY CHARACTERISTICS





THANKS TO EDF LUMINUS OPTIMIZE YOUR REVENUE ON EACH MARKET !





THANK YOU FOR YOUR ATTENTION!

