

The Carbon-Gas-Electricity Price Triangle in the Spot Market

This summer's big energy story was the fall of oil prices from \$141 per barrel in July to below \$90 in September. When the tide turned, carbon, gas, electricity and to some extent even coal prices followed. Financial factors and a change in sentiment had energy speculators indiscriminately heading for the door. In the space of a few weeks, gas prices fell by 25%, carbon prices by 27%, electricity prices (base-load) by 34% and coal by 18%.

But by the end of the first week of August, prices for carbon, gas, electricity and (a week later) coal firmed, while oil prices continued their downward path. The carbon-gas-electricity triangle, whose fundamentals are indeed different from those of oil, thus gained autonomy. While gas prices remain a key driver for both electricity and carbon prices in the medium run, in the short run it is electricity spot prices that drive both carbon and gas prices, and to a lesser extent coal prices. Econometric causality tests for the first eight months of 2008 confirm this story. Are both carbon allowances and gas not inputs into the production of electricity? Should the price of inputs, which is determined by larger forces of supply and demand, not set the price of the output? Yes, of course, if one talks about the setting of long-run equilibrium prices in forward markets.

In the short run, however, spot markets reflect the sudden adjustments power producers need to make to short-run demand changes. If electricity demand unexpectedly rises, this causes higher prices and the additional use of carbon-intensive peak-load technologies such as gas- or oil-fired combustion turbines. As a result, operators find themselves short on carbon permits, and they need to cover themselves on the spot market. They also need to buy more gas (and oil) than expected. Higher electricity spot prices thus imply higher carbon and gas prices: electricity rules in the short run.

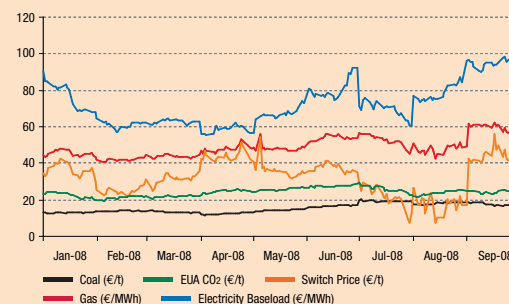
There exists a second, indirect link between electricity, carbon and gas prices. When electricity prices drive up carbon prices, it becomes more profitable for operators to switch from coal-fired to less carbon-intensive gas-fired power stations. Higher carbon prices would thus imply higher gas prices. There are, however, two caveats to this story. First, switching, which cannot happen during peak demand when all capacity is used, would require operators to use both coal and gas in base-load power production. This is the case only in specific countries such as the United Kingdom. Second, the price of the EUA was only high enough to overcome the cost differential between coal- and gas-fired power production during July-August 2008. The econometric tests show only a weak causality link running from carbon to gas prices; with the rise of gas prices in September, the potential for switching has again become very limited.

This notwithstanding, the second biggest energy story of this summer might well be that the carbon-gas-electricity triangle began to display an autonomous and economically coherent behavior. In other words, the carbon market is becoming a mature market in its own right.

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Graph of the month: Carbon, Gas, Coal and Electricity in 2008

Source: BlueNext, Mission Climat – Caisse des Dépôts



Monthly volumes:

Trading was brisk, with 277 million tons of CO₂ changing hands in September.

Source: PointCarbon



Carbon prices:

EUA and CER prices fluctuated and ended at nearly two-month lows.

Source: ECX, Reuters



EUA – CER price spreads :

After having declined since July, the spread increased slightly in September.

Source: ECX, Reuters

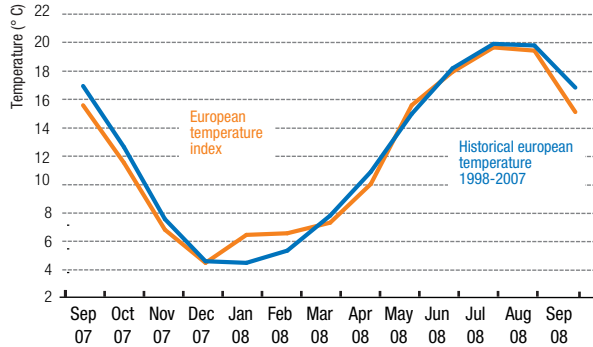


Temperatures (°C)

- Average of BlueNext Weather indices* – France, Germany, UK and Spain – weighted by the allowances allocated to each country.

	August 2008	Sept 2008
Monthly average (°C) - 2008	19.2	15.0
Monthly average (°C) - 1998-2007	19.6	16.6
Monthly minimum (°C) - 2008	16.3	12.3
Monthly maximum (°C) - 2008	22.4	19.6

Source: Mission Climat - Caisse des Dépôts



Europe experienced a colder September (1.6°C below its ten-year-average): the UK, France and Germany continued to enjoy below average temperatures (1.6 °C, 1.6°C and 1.3°C below their ten-year-average) while Spain had a slightly cooler month (0.6°C below its ten-year average). Precipitation was particularly heavy in Turin, Lyon and Madrid (211.5 mm, 87.8 mm and 68.8 mm above their ten-year averages respectively). Turin experienced the wettest month since our records began in January 1996. Despite having had the wettest month since our records began in January 2006, the hydroelectric reservoir levels in Madrid still were below their ten-year averages (by 1.3%). Drier weather in the Nordic countries may have contributed to low reservoir levels, which fell below their ten-year average for the first time since March 2007.

* The BlueNext Weather indexes are defined on the basis of average temperatures, weighted by the population of the representative regions making up each country.

Precipitation (mm)

- Average of precipitation indices for Lyon, Oslo, Turin, Vienna and Madrid, weighted by the hydroelectric share in each country's electric power mix.

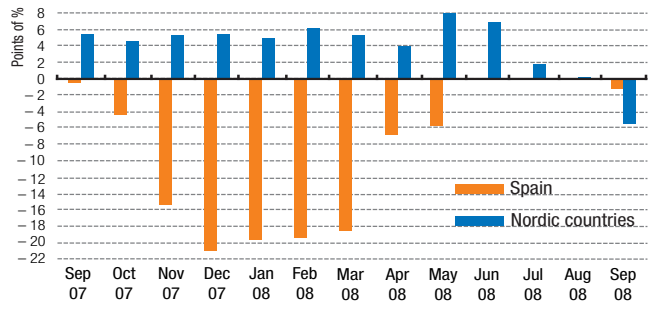
	August 2008	Sept 2008
Monthly precipitation - 2008	79.6	123.2
Monthly precipitation - 1998-2007	72.1	74.1
Cumulative over 12 months	805.6	852.1
Cumulative over 12 months - 1998-2007	754.1	756.4

Source: Météo-France

Reservoir Content for Electrical Production

- Spread between the monthly rate of reservoir levels (%) and the ten-year average rate (%).

Note: The monthly rate of Spanish reservoirs levels was not available for August, 2008.



Production Indices

EU27 (base year 2000)	July 2008	Monthly variation (%)	Variation/12 months (%)
Indust. prod. (excl. construction)	111.4	-0.4%	-1.2%
EU ETS sectors production*	106.6	-0.5%	-1.4%
Power, gas and heat	107.0	-0.3%	-0.7%
Cement	103.0	1.5%	-7.4%
Iron and steel	109.3	-1.9%	1.3%
Refineries	104.4	-3.7%	-2.9%
Paper and pulp	110.4	0.2%	-2.2%
Coke ovens	122.3	-2.0%	9.5%
Glass	102.6	0.4%	-6.0%
Ceramics	83.1	-1.2%	-8.5%
Metal ore	116.8	-0.8%	-0.8%

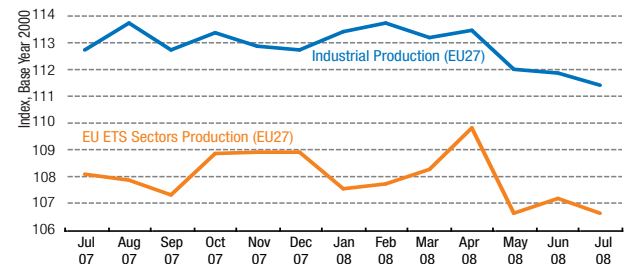
* Index weighted by EU ETS sectors' weight in average total allocation over 2005-2007
Source: Eurostat

Opinion of Business Leaders

EU 27	July 2008	August 2008	Sept 2008
Industrial Confidence Indicator	-7	-10	-13

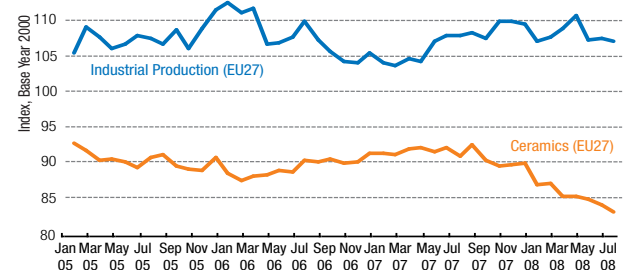
Source: EC

Total Production and Production by EU ETS Sectors



Note: Production indexes reflect downward adjustments made by the UK in September 2008

Sectoral Focus: Ceramics (since January 2005)



Source: Eurostat

In July 2008, the industrial production index declined (-0.4%) for the third month in a row. The ETS production index followed the same trend (-0.5%), mainly due to declines in the energy (-0.3%), iron and steel (-1.9%) and refining (-3.7%) sectors. Following the expectations of slowed economic growth in Europe due to the global financial crisis, the opinion of business leaders is the lowest since the first *Tendances Carbone* bulletin was published 2005.

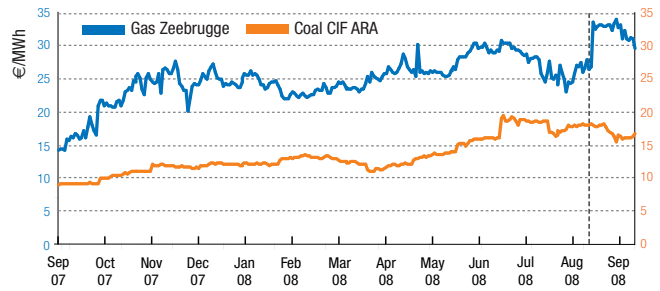
This month's focus is on the ceramic sector, which is comprised of around 1,200 installations, mostly very small entities with average annual emissions of 20Mt (1% of EU ETS emissions). Although the the sector's production was below 2000 levels over the period, it grew by an average of 3% per year from January 06 to August 2007, when difficulties in the housing and construction sectors combined with increases in energy and fuel costs pushed production down to a historical low, more than 15 points below 2000 volumes.

Energy Prices

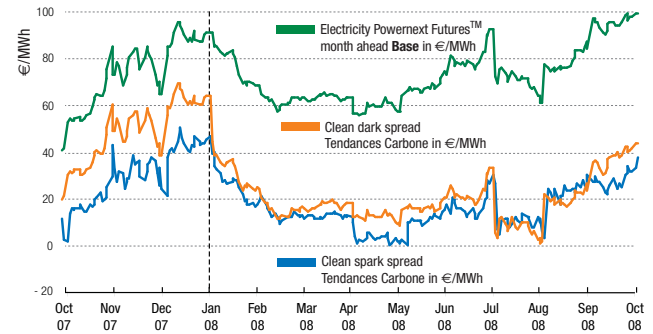
	August 2008	September 2008	
Average closing price			
Brent, in \$/barrel	114.96 \$/B	100.84 \$/B	
Natural gas Zeebrugge month ahead	7.58 €/MMBTU	9.45 €/MMBTU	
Amsterdam coal CIF ARA month ahead	126.26 €/t	122.99 €/t	
Powernext Futures™ month ahead	Base	78.04 €/MWh	94.41 €/MWh
	Peak	102.84 €/MWh	123.09 €/MWh
BlueNext spot price	23.29 €/t	23.73 €/t	
Clean spark spread	21.53 €/MWh	26.72 €/MWh	
Clean dark spread	19.21 €/MWh	36.53 €/MWh	
CO2 switch price coal/gas	16.26 €/t	42.18 €/t	

Source: Reuters, BlueNext, PowerNext, Mission Climat - Caisse des Dépôts

Primary energy prices



Price of electricity and price difference between electricity and primary energy prices

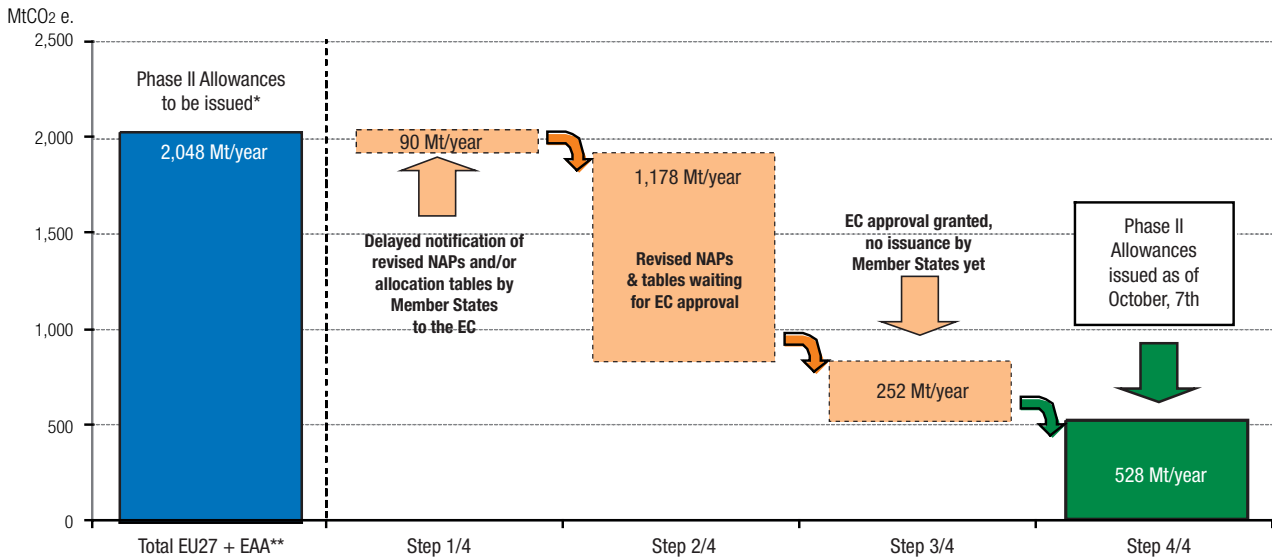


September confirmed the de-coupling of European electricity and gas markets from global coal and oil markets. The oil prices continued their downward path driven by slowing global demand due to a worsening financial crisis and a looming recession, and by potential production cutbacks by Saudi Arabia and the uncertain impact on production and refinery capacities in the Gulf of Mexico following two recent hurricanes.

Coal prices moved less, falling from \$194 per tonne to \$171, reflecting slowing demand for steel and lowering freight rates. Gas rose during September from €7.87 to €8.70 per MMBTU with an intra-month high of €9.97. The gas price was pulled along by a strengthening electricity price, which began the month at €83.50 per MWh and ended at €98.38 (base-load). This was the highest base-load price ever recorded for September, and mainly reflects electricity generation capacity constraints facing a sharp increase in power demand. Lower-than-usual temperatures also had some influence.

EU ETS: Await ITL-CITL connection

Source: Mission Climat - Caisse des Dépôts, based on European Commission and NAPs



* 2008 allowances excluding reserves and auctioning. The total has decreased since July, as the published NAPs provided for fewer allowances than expected.
 **The first three columns remain estimates pending the final EC decision. EEA data excludes Iceland.

As of October 7th, 528 million allowances, or 26% of the total, have been issued. More are expected after the ITL-CITL connection for which registries are expected to close for two weeks starting 6 October.

Regarding phase II negotiation, the European Parliament's environment committee voted on changes to the EU Energy-Climate Change Package on 7 October. The European Parliament will now negotiate with the EU Council and the Commission before the Package becomes law, on: 1/ the use of offset credits would be limited to an annual 4% of 2005 emissions if the installation used a 6.5% maximum offsets of its 2005 emissions in Phase II; 2/ industries vulnerable to international competition would get 85% of their allowances for free in 2013, decreasing to 0% in 2020; 3/ 100% auctioning for the power plants (except district heating and co-generation) from 2013; 4/ granting up to 500 million allowances to fund 10 to 12 CCS test plants; 5/ the amount of CO₂ emitted by new power plants with installed capacity greater than 300 MW is limited to 500 g/kWh from 2015 meaning no new coal-fired plant without CCS.

Dashboard

European Union Emissions Trading Scheme

		Sep-07	Oct-07	Nov-07	Dec-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08
Spot Market (BlueNext)	Phase I Average closing price in €	0.08	0.07	0.07	0.03	0.02	0.02	0.02	0.02	-	-	-	-	-
	Phase II Average closing price in €	-	-	-	-	-	20.82	21.33	24.11	25.24	27.03	25.30	23.29	23.73
	Total monthly volume in kt	551	639	1,642	1,070	619	2,167	1,711	1,491	1,590	4,153	9,437	17,062	28,435
Futures Market (ECX)	Dec. 2008 Average closing price in €	20.96	22.25	22.59	22.53	22.47	20.65	21.77	24.28	25.39	27.39	25.72	23.52	23.95
	Dec. 2012 Average closing price in €	23.63	24.59	24.89	24.97	24.54	23.34	24.76	27.36	28.39	30.82	30.39	28.02	28.17
	Total monthly volume in kt	88,561	102,008	88,930	72,592	126,593	117,493	101,865	149,305	99,932	187,413	235,349	136,898	182,974
Total European market volume in kt (PointCarbon)		127,969	139,797	128,111	90,951	180,656	168,007	149,033	203,190	150,063	239,144	297,273	181,812	276,524

Source: BlueNext, ECX, Point Carbon

International Kyoto Credit Market

		Sep-07	Oct-07	Nov-07	Dec-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08
Spot Market (BlueNext)	Average Closing Price in €												20.15	19.64
	Total monthly volume in kt												216	880
Futures Markets	Average Closing Price in €	16.56	17.19	17.73	17.15	16.52	15.21	15.83	16.04	17.08	20.05	21.00	19.75	19.69
	Total monthly volume in kt	-	-	-	11,168	13,030	16,828	27,106	26,886	28,055	42,133	72,791	45,239	52,223

Source: Reuters, LEBA, NordPool, Nymex and ECX

Weather

Temperatures (°C)		Sep-07	Oct-07	Nov-07	Dec-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08
Germany - difference monthly and decennial average		-1.3	-1.1	-0.8	0.3	2.9	1.6	-0.1	-0.9	1.3	0.8	0.3	-0.2	-1.3
Spain - difference monthly and decennial average		-0.1	-0.6	-1.2	-0.5	1.3	1.3	-0.3	0.9	-0.7	-0.7	0.1	0.3	-0.6
France - difference monthly and decennial average		-1.5	-1.3	-1.0	-0.7	1.8	1.3	-0.7	-0.8	1.3	-0.7	-0.4	-0.9	-1.6
UK - difference monthly and decennial average		-1.1	-0.8	-0.3	-0.1	1.5	-0.4	-0.8	-1.1	1.0	-1.0	-0.8	-1.1	-1.6

Source: BlueNext

Precipitation (mm)		Sep-07	Oct-07	Nov-07	Dec-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08
Vienna - difference monthly and decennial precipitation		105.1	45.6	-7.0	18.7	-13.0	-26.9	2.9	-14.2	3.9	52.3	36.5	-11.4	-5.0
Madrid - difference monthly and decennial precipitation		-17.8	-6.5	-29.4	-20.3	-8.3	-6.2	-29.4	22.4	34.7	18.3	-5.2	-11.9	68.8
Lyon - difference monthly and decennial precipitation		-7.4	-88.1	-16.7	-24.4	13.1	-17.7	6.1	58.5	-15.7	-11.2	69.5	-2.3	87.8
Oslo - difference monthly and decennial precipitation		-2.6	-80.7	14.2	-1.0	85.6	39.6	54.6	-3.6	-29.7	-34.3	47.1	19.5	-27.8
Torino - difference monthly and decennial precipitation		-24.0	-18.9	-15.7	-30.6	29.2	-20.5	-21.5	41.9	29.1	0.7	13.3	20.9	211.5
Hydraulic Reservoirs – Spread between the monthly rate of reservoir capacity and the decennial average rate.														
Spain		-0.5	-4.3	-15.3	-20.8	-19.6	-19.4	-18.4	-6.7	-5.7	0.1	0	0	-1.3
Nordic countries		5.4	4.5	5.3	5.4	4.9	6.2	5.3	3.9	8	6.9	1.8	0.3	-5.4

Source: Météo-France, NordPool, MMA ES

Economic activity

		Sep-07	Oct-07	Nov-07	Dec-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08
Total industry production index (excluding construction and seasonally adjusted), base = 2000														
Europe 27		112.7	113.4	112.8	112.7	113.4	113.7	113.2	113.5	112.0	111.9	111.4	-	-

Source: Eurostat

Energy prices

		Sep-07	Oct-07	Nov-07	Dec-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08
Brent crude oil, 1 st maturity, in \$/baril		76.67	82.48	92.20	91.44	91.91	94.09	102.87	110.43	124.68	133.74	134.56	114.96	100.84
Natural gas Zeebrugge, 1 st maturity date, in €/BTU		4.85	6.65	7.32	7.35	7.25	6.68	6.97	7.67	7.70	8.59	8.38	7.58	9.45
Coal CIF ARA, 1 st maturity date, in €/tonne		66.58	76.99	85.42	87.06	88.51	95.62	91.94	84.77	98.18	114.39	135.56	126.26	122.99
Powernext Futures™ month ahead, in €/MWh	Base	38.07	60.05	75.70	88.35	75.84	60.41	62.18	57.82	67.00	79.32	69.22	78.04	94.41
	Peak	52.55	87.25	115.24	123.48	98.92	72.89	75.89	72.86	94.54	114.54	96.02	102.84	123.09
Difference in prices of electricity and of natural gas, corrected for the price of CO ₂ : Clean Spark spread in €/MWh		7.57	17.91	30.13	41.37	24.15	11.87	11.29	1.78	8.86	15.94	9.09	21.53	26.72
Difference in prices of electricity and of coal, corrected for the price of CO ₂ : Clean Dark spread in €/MWh		16.82	34.07	49.66	58.87	30.10	13.46	15.91	10.98	14.79	21.68	5.57	19.21	36.53
CO ₂ switch price coal/gas in €/tonne		18.24	35.35	38.77	37.38	36.11	24.26	30.64	43.01	35.57	36.26	21.48	16.26	42.18

Source: Reuters, Powernext, Mission Climat – Caisse des Dépôts

A methodological note can be downloaded: www.caisse-desdepots.fr – Publications & Documents – Carbon Finance



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