

Oil Indexation in Gas and LNG Sales Agreements

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Jonathan Stern and
Anthony Way



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Persistence of Oil Price Indexation

What are the aims of the Buyer and the Seller?

Seller

- Reflect market value of the gas
- Provide basis for investment in the field, pipeline and facilities

Buyer

- Reflect cost of competing fuels
- Enable Buyer's business to operate at a reasonable profit
- Provide a basis for any investment in Buyer's facilities

Price indexation

- Historically, the long term of most contracts for the sale of pipeline gas required that the price was linked to an appropriate commodity or index.
- Price indexation is performed through a regular price recalculation under an agreed formula; sometimes an annual recalculation, frequently quarterly, but may be shorter intervals.
- In markets where gas is a freely-traded commodity itself, such linkage has become redundant.
- Outside the USA and most of Europe, pipeline gas sales remain price linked to oil or oil-based products.

Multiplicative Gas Price Formula

- Most frequent used
- Recalculates the gas price P from the originally agreed price P_0 according to the relative movement in prices of other commodities or indicators

$$P = P_0 \left[0.25 \frac{GO}{GO_0} + 0.30 \frac{FO}{FO_0} + 0.35 \frac{CPI}{CPI_0} + 0.10 \frac{\ddot{O}}{\ddot{O}_0} \right]$$

Multiplicative Formula -Incremental

- Multiplicative formula may be expressed as an incremental recalculation, where the price is recalculated periodically based upon the previous price rather than the Base Price.
- Recalculation produces a very similar result to a Base Period multiplicative formula.

$$P_n = P_{n-1} \left[0.29 \frac{LSFO_n}{LSFO_{n-1}} + 0.71 \frac{CPI_n}{CPI_{n-1}} \right]$$

Additive Gas Price Formula

- Additive formula. Recalculates the gas price P from the originally agreed price P₀ according to the absolute movement in prices of other commodities or indicators

$$P = P_0 + \frac{\text{€}}{\text{€}} 0.5 \cdot F_1 \cdot (GO - GO_0) \frac{\text{€}}{\text{€}} + \frac{\text{€}}{\text{€}} 0.5 \cdot F_2 \cdot (LSFO - LSFO_0) \frac{\text{€}}{\text{€}}$$

- Typical formula for gas supplies to Germany

$$\begin{aligned} AP = AP_0 &+ 0.60 \cdot 0.85 \cdot F_1 \cdot (GO - GO_0) \\ &+ 0.25 \cdot 0.90 \cdot F_2 \cdot (HFO - HFO_0) \\ &+ 0.15 \cdot 0.90 \cdot F_2 \cdot (HFOK - HFOK_0) \end{aligned}$$

Gas Price Formula - Variants

- Direct Formula – fuel parity

$$P = 0.5 \cdot (0.0232 \cdot GO) + 0.5 \cdot (0.02463 \cdot FO)$$

- Direct Formula – 80% of fuel parity

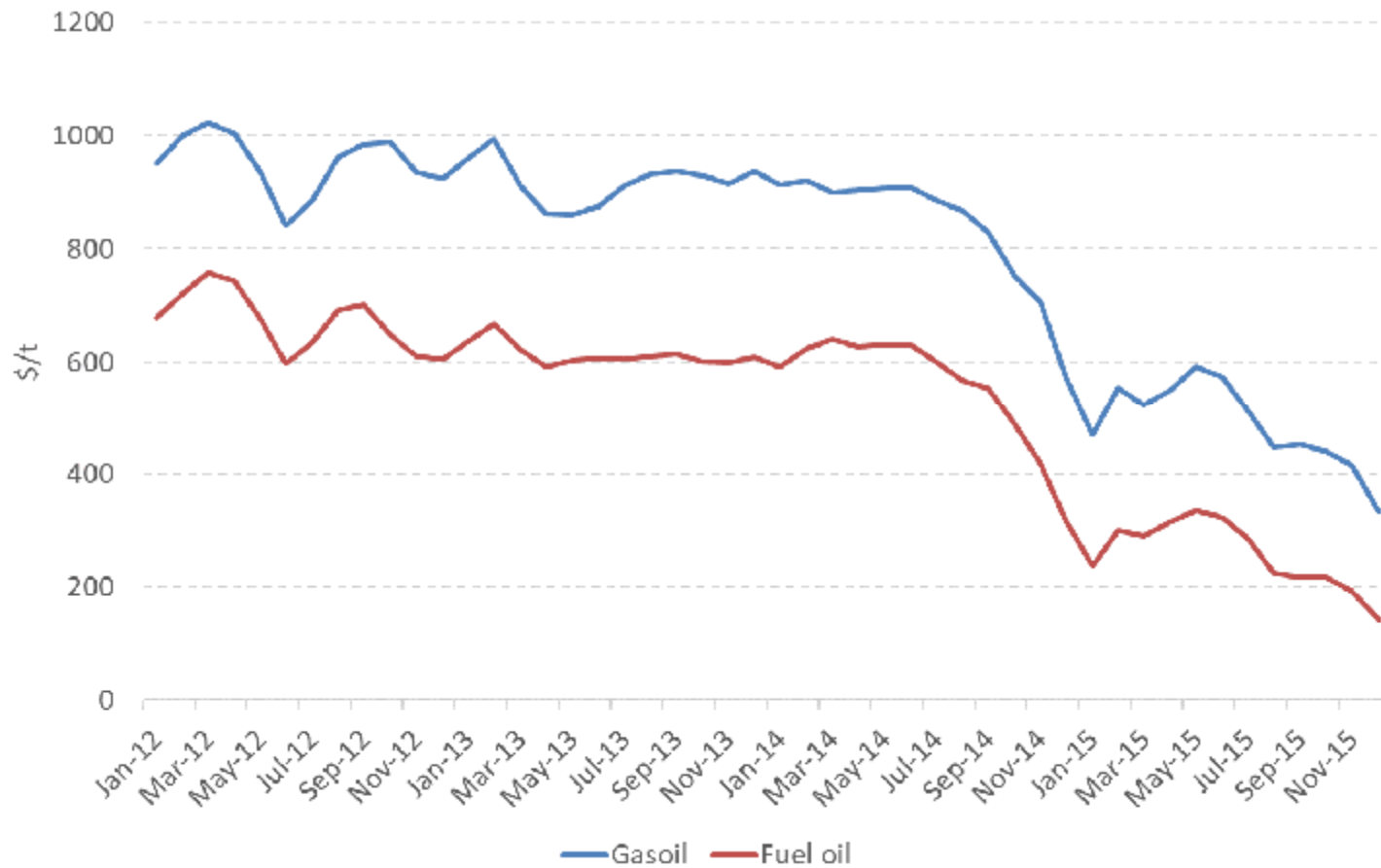
$$P = 0.5 \cdot (0.01856 \cdot GO) + 0.5 \cdot (0.0197 \cdot FO)$$

Multiplicative Formula - Example

$P_0 = \$2.50/\text{MMBtu}$	
$GO = \$502.7/\text{tonne}$	$FO = \$254.2/\text{tonne}$
$GO_0 = \$195.4/\text{tonne}$	$FO_0 = \$90.8/\text{tonne}$

$$\begin{aligned}
 P &= P_0 \left[0.2 \frac{GO}{GO_0} + 0.3 \frac{FO}{FO_0} + 0.5 \right] \\
 &= \$2.50 \left[0.2 \frac{502.7}{195.4} + 0.3 \frac{254.2}{90.8} + 0.5 \right] \\
 &= \$2.50 \times 1.8544 \\
 &= \$4.6361/\text{MMBtu}
 \end{aligned}$$

Trend of Gasoil and Fuel Oil Prices

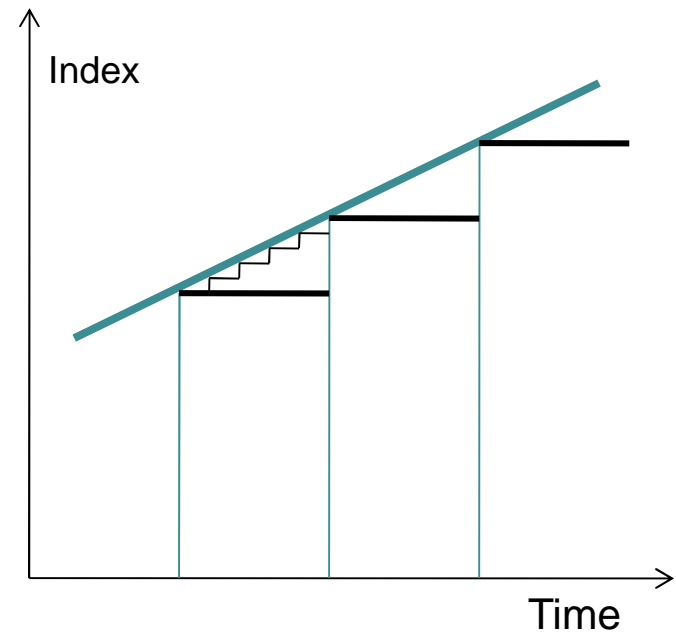


Mechanics of Gas Price Indexation

- There are three important factors to consider in a price indexation formula:
 1. Price adjustment frequency
 2. Base period
 3. Review period

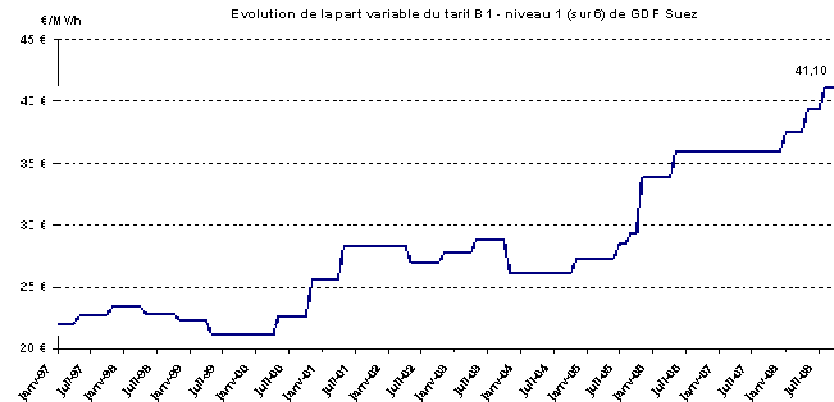
Price Adjustment Frequency

- Frequent Adjustment:
 - Price close to market level
- Infrequent Adjustment:
 - In a rising market:
good for Buyer; bad for Seller.
 - And the reverse is also true.
 - Price stability is useful for some Buyers.

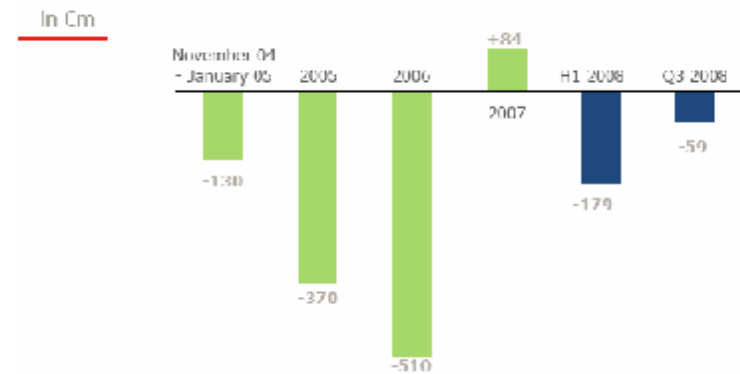


Price Adjustment Frequency – Gaz de France

- GdF claimed that the regulated period and frequency of price adjustment was causing them to lose money on supplying the French residential market during the rapid rise in oil prices 2005-8.
- The French Government reviewed their case and agreed to allow higher tariffs in compensation.
- However the Regulator in Q3 2010 required that Hub Traded prices be reflected in the residential tariff.



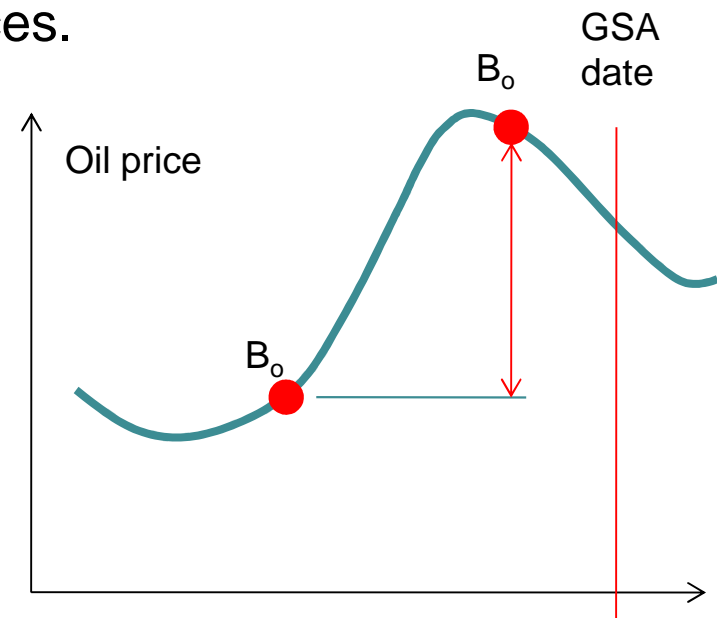
An aggregate shortfall of €1,165m as of September 30, 2008



• Current tariffs notably do not take into account spikes in oil prices

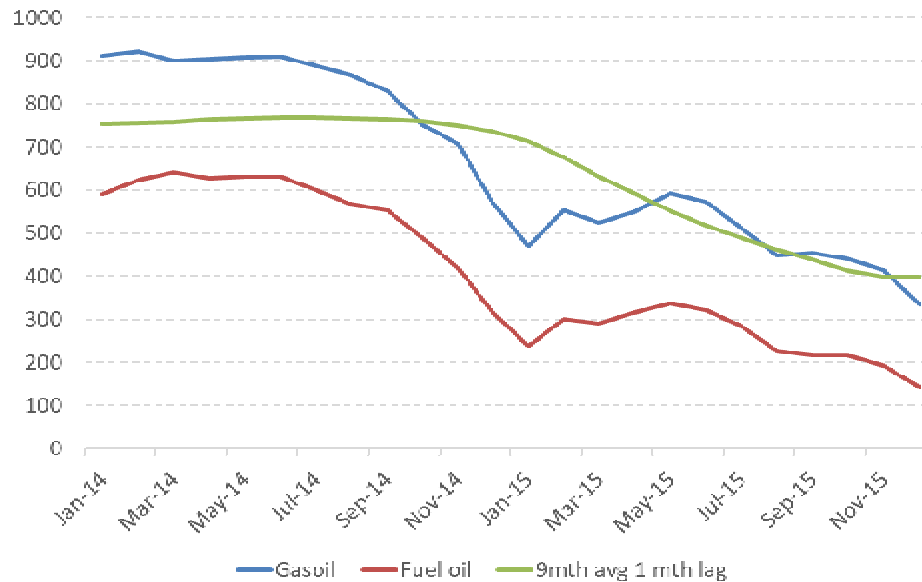
Price Indexation – Base period

- Base Period is the period, prior to date of contract signature, that is the reference period for the price.
- The value of an index during the Base Period must use published, reliable data.
- Base Period values affect all future prices.



Price Indexation – Review Period

- Review Period for an Index is a period before the date of each price recalculation in which the published data for the Index is sampled.
- Review period will contain a lag in the indexation.
- Review period lag may distort effort to reflect market values.



Price indicators 1

Indicator	Buyer's view	Seller's view
Crude oil	Not market related for any segment; accepted for LNG	Very familiar; acceptable for LNG.
Oil Products Internationally Traded		
Gas Oil	Good for Household segment; not ideal for Power Generation or Industrial.	Very good, free market.
LS Fuel Oil	Reasonable for Power Generation and Heavy Industrial.	Very good, free market.

Price Indicators 2

Indicator	Buyer's view	Seller's view
Oil Products Inland		
Gas Oil	Ideal for Household segment but not for Power Generation or Industrial.	Not ideal, market distortion, maybe government price controls.
Fuel Oil	Ideal alternative for Power Generation and Heavy Industrial.	Not ideal, market distortion, maybe government price controls.

Price Indicators 3

Indicator	Buyer's view	Seller's view
Inflation	Generally acceptable as felt to be low.	Good hedge; less risky than oil. Generally unacceptable as felt to be low.
Coal	Excellent for Power Generation	Poor; no internationally traded prices.
Electricity	Excellent for Power Generation.	Unacceptable; uncertain market.
Fixed element	Good; low and predictable future prices.	Poor; low but predictable future prices.