

PAL

determining a fair and credible carbon price

Fact sheet

Carbon Pricing

A unique carbon pricing system that is future-proofed and science-based, transforming the way carbon prices are set for now and for the future.

Reinsurance Event Attributed Carbon Tax

In 2015 Predict Ability Ltd (PAL) introduced the Reinsurance Event Attributed Carbon Tax (REACT) system, which was originally designed to put a price on the financial loss and damage arising from carbon emissions.

REACT measures the expected losses that will occur for each tonne of carbon dioxide emitted. Further, it determines the allocation of the costs of those losses to each energy supplier based upon the proportion of carbon emitted and the carbon intensity of the fuel type used. The total revenue paid by all suppliers equals the total loss and damage caused by their emissions.

Carbon Intensity Weighting

The REACT system uses a scientifically-determined algorithm to calculate carbon prices in real-time across more than 140 countries. Rather than issuing a fixed price, our mechanism sets an individual and dynamic carbon rating for each emitter, which is directly proportionate to the damage that they cause. To put this into context, even renewables have an associated carbon rating, as the manufacturing of clean technologies often uses electricity from fossil-fuel power stations. This process is called Carbon Intensity Weighting (CIW).

UK Electricity Sector Snapshot Fuel Usage	Carbon Intensity e tCO ₂ /MWh	Energy E MW	Emissions C=eE tCO ₂ /h	Carbon Price yi=e.f.y.z \$/tCO ₂	Revenue Ri=yi.C \$/h
UK Biomass	0.983	1,439	1,415	\$ 25.87	\$ 36,598
UK Coal	0.979	2,606	2,551	\$ 25.77	\$ 65,739
UK Oil	0.800	0	0	\$ 21.06	\$ -
UK OCGT (Gas)	0.462	0	0	\$ 12.16	\$ -
UK CCGT (Gas)	0.359	19,663	7,059	\$ 9.45	\$ 66,700
UK Solar	0.053	2,380	126	\$ 1.39	\$ 176
UK Nuclear	0.013	7,756	101	\$ 0.34	\$ 34
UK Wind	0.012	2,668	32	\$ 0.32	\$ 10
Totals		36,512	11,284		\$ 169,257
PAL Carbon Loss Index (CLIX)		15.00	\$/tCO ₂		
Carbon intensity weighting factor f		3.236	MWh/tCO ₂		
Revenue weighting factor z		0.542			
Carbon Intensity 1/f		0.309	tCO ₂ /MWh		

Table 1 - UK Electricity Sector CIW carbon prices and revenue where CLIX is \$15

AIMS Allocation

REACT revenue is fairly distributed with four realistic AIMS, whereby allocations are directed to **Adaptation** (e.g. flood protection), **Insurance** (ensuring viability), **Mitigation** (e.g. solar panels, wind turbines and carbon capture), and to **Social** dividend (tax impact offsets).

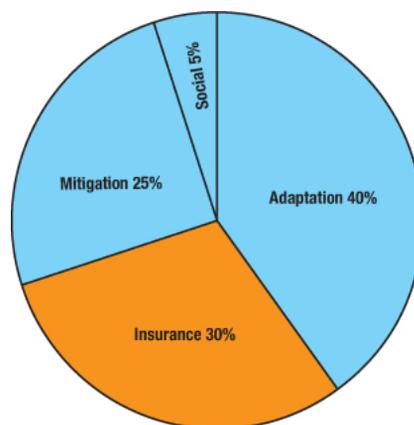


Figure 2 – Carbon revenue allocation with AIMS: Adaptation, Insurance, Mitigation & Social

The REACT Revenue Calculation

The generalized formula used in the REACT revenue calculation is:

$$R_i = E_i \cdot e_i \cdot y_i \cdot N_i \quad (1)$$

where

- R_i revenue for fuel/energy type i
- E_i amount of fuel type i used globally (GWh)
- e_i emission factor for fuel type i (tonne CO_2/GWh)
- y_i carbon price for a given fuel type i (\$/tonne CO_2)
- N_i supplier's proportion of market for fuel/energy type i

The carbon price y for fuel/energy type i is given by:

$$y_i = e_i \cdot z \cdot y \cdot f \quad (2)$$

The carbon intensity weighting factor f is defined as:

$$f = \sum E_i / \sum (E_i \cdot e_i) \quad (3)$$

The revenue weighting factor z is defined as the weighting to ensure that the total premium from individual fuel prices y_i is consistent with premium using a global carbon price y . Thus, both $R = \sum R_i$ and $R = y \cdot \sum (E_i \cdot e_i)$ are satisfied and

$$z = \frac{(\sum (E_i \cdot e_i))^2}{\sum E_i \cdot \sum (E_i \cdot e_i^2)} \quad (4)$$



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