

PAL

determining a fair and credible carbon price

Fact sheet

Carbon Pricing Indices

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.

The PAL Carbon Loss Index – CLIX

In 2015 Predict Ability Ltd (PAL) introduced the PAL Carbon Loss Index (CLIX), which was specifically designed to put a price on the financial loss and damage arising from carbon emissions. CLIX uses the Reinsurance Event Attributed Carbon Tax (REACT) system and publishes intraday prices based on latest emissions, loss & damage and global surface temperature anomaly data.

Forward Prices

Perhaps the most valuable feature of the CLIX index is the existence of a forward price curve for valuation of carbon risk exposures over a ten year time horizon. This provides investors with a useful means of precisely costing the financial effects of carbon emissions in the future.

Historical Prices

The existence of 2 years of historical intraday price data provides investors with a useful perspective of how prices have behaved in response to loss and climate data. PAL has created a historical record of monthly prices dating back 35 years.

Our carbon pricing system ascertains your present and future carbon costs and identifies potential savings. We advise you on how to put a price on your assets, measuring their carbon intensity and tracking the liability of your businesses.

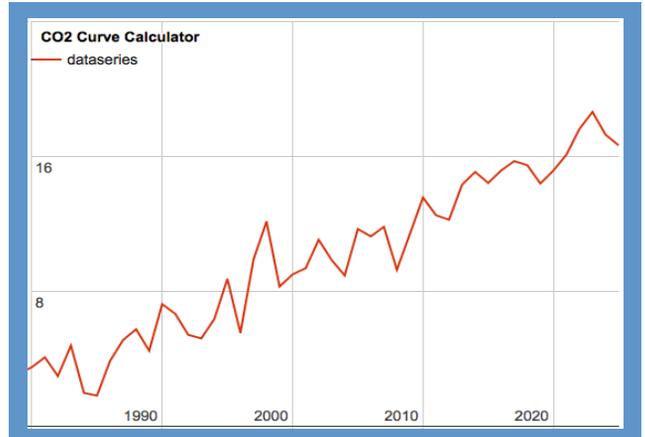


Figure 1 – CLIX carbon prices shown yearly for 1980 – 2025 (in 2015 \$'s per tonne CO2)

Beyond CLIX

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).

CLIX prices and CIW fuel prices are all available on Android, iOS and published on our website at <http://predictability.ltd.uk>

The CLIX Calculation

CLIX measures the expected losses (both insured and uninsured) that will occur for each tonne of carbon dioxide emitted and is calculated using the REACT system.

The generalized formula used in the CLIX calculation is:

$$y(t) = \sum_i (L_i \cdot x_i) / C(t)$$

where

- y(t) Carbon price for time period t (\$/tonne CO₂)
- C(t) Global carbon emissions (tonnes/year)
- L_i Financial loss attributable to weather-related event i (\$)
- x_i the per event attribution ratio (PALca)

The CLIX Index is calculated using the IPCC Historical Scenario B1 CO₂ emissions trajectory curve and Worldwide Overall Losses data (Munich Reinsurance Company, Geo Risks Research, NatCatSERVICE). Prices are adjusted to 2015 dollar amounts by using the US Consumer Price Index data (CPI-U).

Forward prices are calculated using loss estimation curves provided by our proprietary PALgamma natural catastrophe risk system.

The PALca Calculation

The PAL Claims Algorithm (PALca) measures the proportion of losses that are attributable to climate change. That figure is 20% and increasing at 0.5% per annum. It will be 25% in 2025. PALca uses the correlation of the increase in insurance claims to change in temperature recorded by HSBI&IC as a proxy.

The generalized formula used in the PALca calculation is:

$$x = \frac{\text{PALca}\{T_a + T_{pi}\}}{\text{PALca}\{T_{pi}\}} - 1$$

$$\text{PALca}\{T\} = \exp^{(T + k_a)/k_b}$$

where

- T_a temperature anomaly now
- T_{pi} pre-industrial average temperature
- k_a 2, total losses constant
- k_b 5.72, total losses constant

The PALca ratio is calculated using global temperatures anomaly data such as NOAA GHCN-M. Intraday ratios are calculated using proxy temperatures with a 60 day simple moving average applied.

The CIW Calculation

The Carbon Intensity Weighting (CIW) provides a spectrum of carbon prices based on impact (carbon intensity).

The generalized formula used in the CIW calculation is:

$$y_i = e_i \cdot z \cdot y \cdot f \quad (1)$$

where

$$f = \sum E_i / \sum (E_i \cdot e_i) \quad (2)$$

$$z = \frac{(\sum (E_i \cdot e_i))^2}{\sum E_i \cdot \sum (E_i \cdot e_i^2)} \quad (3)$$

and

- y_i carbon price for a given fuel type i (\$/tonne CO₂)
- e_i emission factor for fuel type i (tonne CO₂/GWh)
- z revenue weighting factor
- y global carbon price (\$/tonne CO₂)
- f CIW factor
- E_i amount of fuel type i used globally (GWh)



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