



# SAINTS PERSPECTIVES

*Things about Climate Change*

## What would it cost to kill coal?

The price of shutting down coal power, and what would be gained

[The Economist, Nov 15th 2024](#)

In 1882, at 57 Holborn Viaduct in London, the Edison Electric Light Company started using a coal-fired steam engine to generate electricity for the first time. Its 125-horsepower (93-kilowatt) generator, known as Jumbo, provided power to around 1,000 streetlights. Unfortunately for its investors, it did not do so as cheaply as gas could, and closed four years later. But a precedent had been set.

Today the world has 27m times as much coal-fired electricity-generating capacity: 2,470 gigawatts (GW) parcelled out between 7,120 plants. Cumulative emissions from coal since 1882 amount to 800bn tonnes, the single biggest factor driving the warming that makes today's world about 1.2°C warmer than that of 1882. Most of that coal has been burned to produce electricity. Today's plants are producing about 12bn tonnes a year.

These plants exist because they do what the Holborn Viaduct plant failed to do: **make money for investors**. So we have calculated how much it might cost to give the investors their return directly, thus compensating them for the loss of the plants.

To do this we took each plant's location, the number of years of life it was assumed to have ahead of it, its generation capacity, the fraction of that capacity typically used by plants in that country today, and the emissions expected if operating at that capacity. From this we assigned a value to the plant and calculated the emissions that it might be expected to produce over its lifetime.

The world's current fleet of coal plants can produce 2,096GW of power, and account for 35% of total production. New capacity coming online by 2024 would add 244 GW more capacity.

To reimburse investors for the capital involved would cost \$5.7trn (equivalent to about three years' worth of global clean energy investment). The later you start, the less you have to pay. But the earlier you start to shut down the plants, the more cumulative carbon-dioxide emissions you avoid.

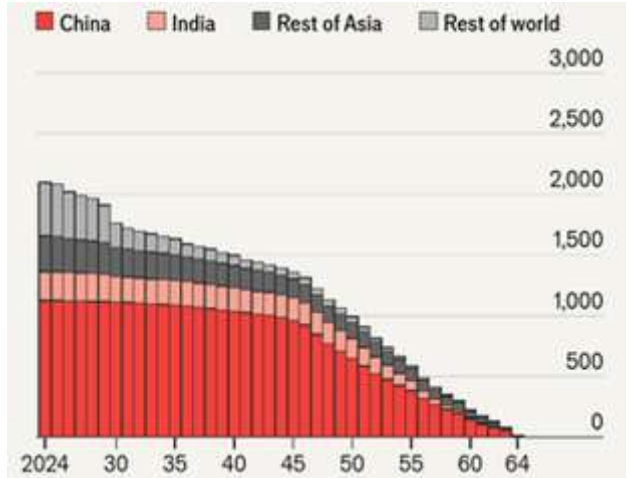


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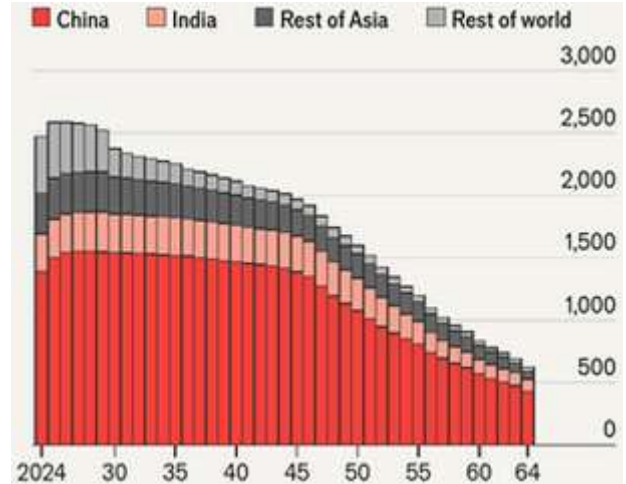
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### Capacity

Existing coal plants, GW



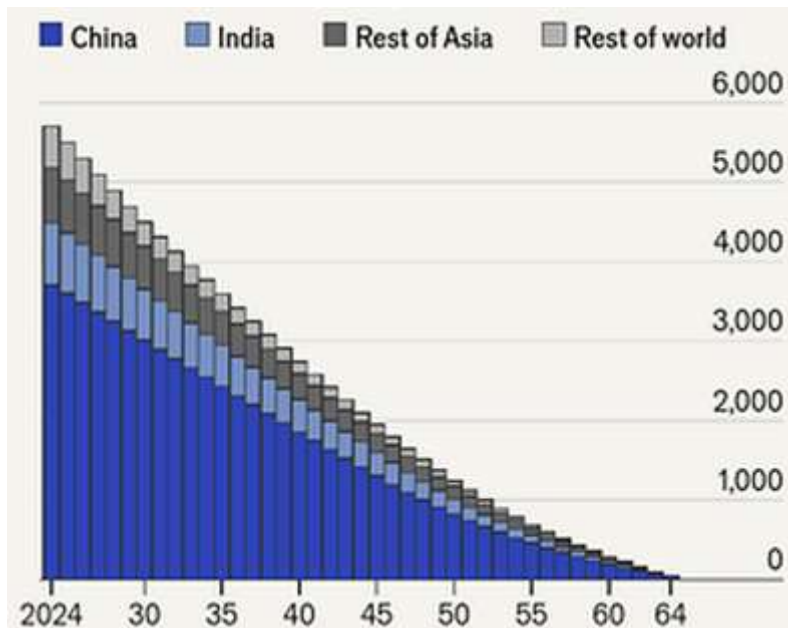
Existing & Planned coal plants, GW



Sources: Global Energy Monitor; Rystad Energy; US EIA; The Economist

Every dollar spent now is 30% more efficient—in avoided warming potential—than one spent in ten years' time.

We made some simplifying assumptions. We calculated probable capital expenditures using estimates from Rystad Energy, a consultancy, by region, of dollars spent per GW of generation capacity. We assumed that capital-holders would be compensated one-to-one: any dollar invested would be returned.



Estimated Cost of shutting down all coal plants, \$bn



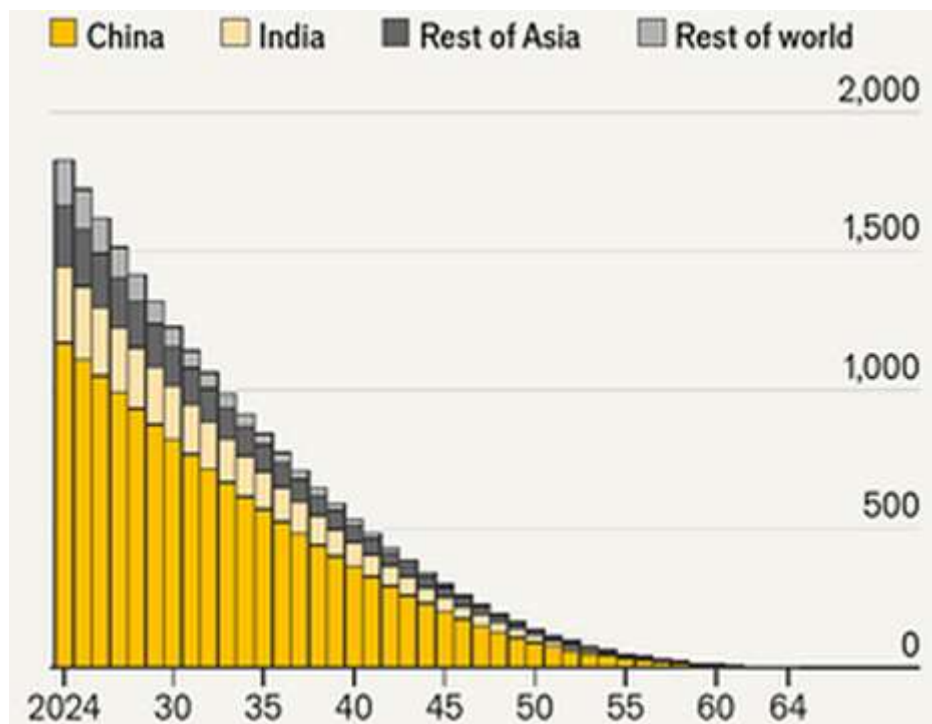
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We included the annualised remaining costs of plants already built on the basis of their expected lives.

For the amount of coal burned, and thus carbon dioxide produced, we used the “capacity factors”—the proportion of a plant's nominal capacity that is actually used—on the basis of the capacity factors reported for plants in the relevant country in 2022-23.

We included the annualised remaining costs of plants already built on the basis of their expected lives.



Estimated emissions avoided, gigatonnes CO<sub>2</sub>

(Gigatonnes x year in atmosphere by 2064, using Bern carbon cycle model)

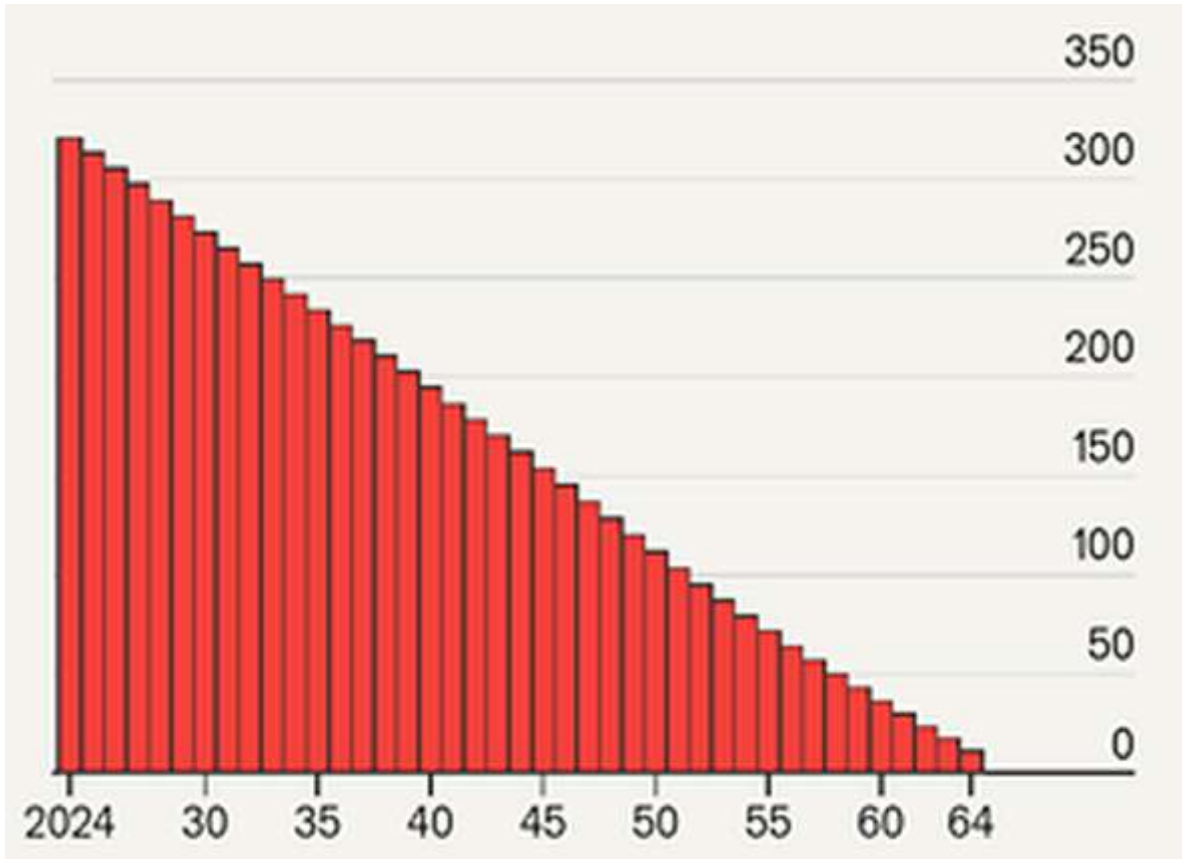
**What matters to the climate is not the rate of emissions, but their cumulative total.** This means that earlier emissions are worse than later ones. To account for this, we calculated and show emissions in terms of “warming potential”—years times megatonnes of CO<sub>2</sub> in the atmosphere by 2064—using the Bern carbon cycle model, which captures the rate at which the gas leaves the atmosphere.



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The assumption that capacity factors will remain constant is surely wrong. Though we believe that our database, supplied by Global Energy Monitor, is the best available, it may be incomplete.



Estimated megatonnes CO2 saved per \$bn  
(Megatonnes x year in atmosphere by 2064, using Bern carbon cycle model)

It is pretty certain that the investors in these plants expect to do better than simply recoup their money. If they expect to double their money, the total cost of ending coal would double too. But even then, the cost per tonne of CO2 emissions avoided is just \$34. For comparison, a typical carbon offset, such as those offered by airlines to their passengers, prices a tonne at \$85. And pulling the stuff out of the atmosphere once it is in it is more expensive still, at over \$600 per tonne.

Shutting down all coal overnight is obviously not realistic soon. The economics of it, raising some **\$5.7trn** to pay off investors, are difficult enough. The politics, which would involve transferring billions of dollars to Chinese entities



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of often unclear ownership, sometimes for plants not even built, would perhaps be even worse.

However, **the magnitude of the challenge presented by climate change requires both leaps of imagination and cold, hard thinking about the efficiency of solutions.** The benefits of shutting down coal today would compound over the next century and more, as CO2 emitted now and in the future would not enter the atmosphere or stay there, warming the planet for centuries. ■

### **Related Articles**

Why any estimate of the cost of Climate Change will be flawed.  
[The Economist, May 30<sup>th</sup>, 2024](#)