

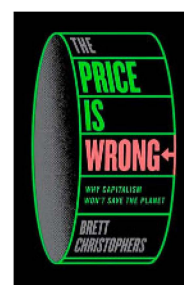
Brett Christophers · 2024

## The Price is Wrong: Why Capitalism Won't Save the Planet.

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Due to power price upheavals and the centrality of electrification for decarbonizing economies, electricity markets have been subject to ever closer scrutiny by policymakers and the broader public in recent years. In (mostly Western) countries, where markets are liberalized, there have been fierce debates about whether the predominant model is still fit for purpose. However, given the technical and economic complexity of electricity markets, understanding what is at stake is anything but straight-

forward. Against this backdrop, Brett Christophers' timely new book offers a uniquely accessible tour-de-force through the world of electricity markets, focusing on their (in-)ability to bring about the renewable energy installations necessary to reach net zero. In view of the widespread narrative – which anyone only remotely engaging with climate policy news will have encountered – that renewable electricity production costs have fallen below those of fossil fuel-based power thanks to technology cost improvements, Christophers' book asks why government support for renewable energy is (or is at least seen to be) still indispensable for the deployment of wind and solar power. While many commentators and public discussions currently focus on bureaucratic obstacles to renewable energy, Christophers problematizes the *economics* of renewable energy investments under the private finance-led energy transition paradigm.

The book makes two basic arguments on the matter. The first takes the second-order observation that those who assume markets to be able to bring about sufficient clean energy installations are following a misguided understanding of the economics of renewables investments. Prevalent in the public and political debate is a focus on price, but the relevant parameter is in fact profitability. The second argument holds that renewable energy is not profitable enough on the market to yield investments at the scale needed. It consists of two parts: on the one hand, profits are too volatile and uncertain; on the other, their total volume is not large enough.

As the author duly acknowledges, the first part of his lack-of-profitability argument – renewable energy's profit volatility – has long been understood by policymakers and market experts. In a merit order pricing system, which most

liberalized electricity markets have, the marginal cost of the most expensive unit feeding electricity into the grid sets the market price received by all active participants in any given bidding period (usually one hour). When many low marginal cost renewable energy assets enter the market, this may cause very low power prices during periods of high renewable energy production – a phenomenon referred to as “price cannibalization” – and relatively high prices during periods of low renewable power production. Christophers argues that, as banks perceive this price volatility as risky, it increases the capital costs at which projects active in these markets can lend. Given the high capital intensity of renewable energy projects, such a risk premium on capital costs can quickly render them unprofitable. Governments around the world have responded to this issue by stabilizing the revenue of renewable power with various support schemes, as Christophers explains (chapters 8 and 9).

The second component of Christophers' lack-of-profitability thesis is more controversial. He argues that the downward pressure that renewable energy installations exert on power prices not only leads to increased profit volatility but also reduces the total return on investments in renewable energy projects. Christophers provides little data evidence to back this argument, since it is very hard to prove. This is not only because revenues, and therefore profitability, vary greatly across locations, but also because his argument that renewables cannot be profitable on a pure market basis relies on a counterfactual: there simply are not so many subsidy-free renewable energy projects and the few that do exist will hardly be representative of the population of potential investments. Nevertheless, given that, according to Christophers,

renewables investments compete with fossil fuel-based investments that are also subsidized, the fact that reported returns on investments in renewable power are a multiple higher than returns on fossil fuel investments (IEA 2021) seems to contradict his line of argumentation.

To avoid such numerical comparisons Christophers argues that it is the *expected* profitability that counts for whether a project will materialize or not. If, however, it really is the bankers – as Christophers claims – on whose expectations about a project's profitability it depends whether it will come to fruition or not, one may wonder why total profits are deemed so important in his account. After all, bankers can be assumed to be satisfied with any positive return on investment if it is steady enough for the project owners to be able to adhere to their scheduled repayments. But, as Christophers shows, this is an important *if*: prices in electricity markets with a high and quick penetration of renewables will become more volatile almost unavoidably. This demonstrates that the profit uncertainty component is much more important to Christophers' story than the profit volume component. What he basically points to is the gap between short-run marginal prices and long-run marginal cost. Because spot market prices are determined by scarcity, they may undermine the positive effect of long-run marginal cost improvements on investment profitability.

This relates to his other key argument, that the focus on price is misleading if one is to assess the attractiveness of renewable energy investments (chapters 4 and 5). More precisely, Christophers – often using the terms price and cost interchangeably – takes issue with the public debate's focus on the *levelized cost of electricity* (LCOE), which expresses the discounted electricity

production costs of a generation asset averaged over its entire lifetime, as a measure of comparison. His argument here is as simple as it is powerful: LCOEs do not provide for a balanced comparison as they are “rendered in temporal as well as spatial abstraction” (p. 155). Both factors, time and place of production, are highly consequential for the revenues earned by renewable power plants, which is why another measure, so-called system cost (Ueckerdt et al. 2023) is more frequently used as a metric, e.g., for policy design purposes. Because of the “price cannibalization” dynamic, the revenue actually received by intermittent renewable generation assets for each dispatched unit of electricity (the “capture price”, to put it in energy policy terms) will on average be lower than that of “dispatchable” fossil fuel-based power plants, which can react to price signals at will. It makes intuitive sense, then, that renewable energy investments are not becoming more profitable as long as their cost improvements vis-à-vis fossil fuel-based power is overcompensated by higher volatility and lower total revenue. As such, Christophers’ argument implies that we should, indeed, look at price – the prices captured on the market by each renewable energy investment – and set it in relation to cost, in order to assess renewable energy profitability, which is the key metric driving investment decisions.

There are various reasons behind renewable energy’s profitability problem, which Christophers elaborates to an impressive degree of detail (especially in chapters 6 and 7). At the most basic level, it comes down to two interrelated aspects: the way electricity markets are designed, on the one hand, and insufficient demand in hours of high renewable power production, on the other.

Because the intermittent generation of renewable energy is

volatile and relatively difficult to predict, electricity systems with a high penetration of clean energy are more frequently seeing an *insufficient level of demand* for the large amounts of renewable electricity produced during some periods. Christophers notes that there is in principle a range of technological solutions to this problem, but he discounts them as not sufficiently mature to aid the profitability problem of wind and solar. While he is right that storage technologies are not installed at the pace needed, market design is more likely to blame for this than technological immaturity (Qin et al. 2023). But even more importantly, another technological infrastructure Christophers barely touches upon can serve as remedy, coming at a low level of technical complexity: grid expansion (IEA 2023). Of course, there are intricate political obstacles to the expansion of grids, but transmission bottlenecks – causing large price differentials between different electricity trading zones in times of a geographically unequal distribution of power supply and demand – are primarily a result of the lack of coordination between the development of generation and transmission capacities. This problem could be alleviated with measures improving regulation, planning capacities, and the exchange of information between the production and the transport level of the electricity value chain (Cremona and Rossloe 2024).

As Christophers points out, *electricity market design* is the outcome of a series of path-dependent policy decisions to restructure the electricity industry since the neoliberal heyday of the 1990s (chapter 2). Electricity markets are therefore genuinely political constructs; prices and profits “as much a matter of external institutional intervention [...] as of supply and demand” (p. 362). The author emphasizes this in particular to highlight that

the profits of renewables generators are “un-‘natural’”, given that “they are the product of continual, ongoing and, ultimately, rather haphazard efforts by policymakers” (p. 363). Insofar as Christophers acknowledges the political malleability of electricity markets, it comes as a surprise to the reader that he only sees two alternative conclusions potentially to be drawn from his analysis: either “it is essential that governments continue to provide the same fulsome support that they historically have” or the market is “the wrong model” (p. xxxii) altogether. From the assumption that the economics of electricity are largely a function of politics, should it not follow that the rules of the market can be shaped for the better?

To assess this suggestion – paralleling the likely objection of any committed marketeer to Christophers’ argument – a deeper engagement with alternative electricity market design conceptions, such as those on the table in recent debates around electricity market design, could serve as a starting point. Long-term contracts (e.g., power purchase agreements), as Christophers shows, have proven to incentivize renewables buildout in markets without revenue stabilization policies, including the United States. He dismisses them, arguing that “there are few credible, bankable off-takers” (p. 258). However, the consensus among market experts that there is insufficient demand for PPAs seems to be less clear, if not pointing in the opposite direction (Collier 2023). In addition, solutions pooling smaller consumers demand can extend the circle of buyers beyond large corporates (e.g., EnergiDanmark 2023). If Christophers is still right (which he likely is) that demand under the current setup does not suffice to bring about the scale of investments needed, there have also been more sweeping proposals for the outright overhaul

of (European) electricity markets. Greece's proposal (Government of Greece 2022) to separate the electricity market into a renewable and a conventional segment, for example – however viable it may be – has been described by a group of energy economists as “the end of electricity markets as we know them” (Romano et al. 2022). A more thorough discussion of such proposals would have strengthened Christophers' case for more public ownership even more.

Theoretically, Christophers' bifurcated solution alternatives out of the clean energy investment malaise reflect a somewhat watered-down reading of the economic ontology of Karl Polanyi (1944), who is brought in during the last chapter and appears as an interlocutor in the background of the book's entire argument. Going beyond the scope of Christophers' already incredibly dense, empirically focused book, a consistent Polanyian perspective may hold that every separation of economics and politics amounts to an illusion, given that all economic outcomes of electricity markets are – and always will be – politically “crafted” (Vogel 2018). Seen in this light, any argument dismissing the ability of markets to bring about renewable energy investments on the basis of comparisons between the current market setup, including government support for renewables, and the shadow of a hypothetical economic reality absent these interventions, seems pointless. Not only renewable energy subsidies would have to be taken as political choices, but also the less visible mechanisms and societal conventions supporting fossil fuels that

electricity markets are embedded in. Why are efficiency losses from subsidized fossil fuel-based power production tolerated, when the curtailment of renewable power plants is sanctioned by the regulator? Is there any good argument to make electricity consumers pay for redispatch costs arising from transmission capacity shortages during periods of renewable energy overproduction, but finance large parts of the construction works necessary to build a highway out of the public budget? Most of all, why are carbon emissions not priced higher even though there is excess demand for their release?

These and the many other questions arising from Christophers' book would each deserve coverage in book length on their own. *The Price is Wrong* has sparked a debate that will deepen the level of engagement with the intersection of technological, economic, and political questions of the clean energy transition and is essential reading for anyone interested in these questions.

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