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Competing principles driving energy futures: Fossil fuel decarbonization vs. manufacturing learning curves

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Highlights

- Critique of view that energy system is driven by decarbonization.
- Critique of view that there are successive waves of energy sources following an automatic trend of logistic substitution.
- Critique of the view that energy evolution is driven by increasing levels of power density.
- Critique of Ausubel and IIASA scholars as leading exponents of these views.
- Restatement of the advantages of conventional renewables – hydro, wind and solar.
- Reassertion of role of costs (via learning curve) as principal driver of energy change.

Abstract

Energy futures continue to attract heated debate. There is a well-established tradition associated with centralized giga-scale nuclear systems and continental super grids, which may be contrasted with future trajectories based on decentralized “conventional” renewables such as hydro, wind and solar power. The traditional centralized view emphasizes a seemingly ineluctable direction of evolution based on claimed fossil fuel decarbonization which leads, via nuclear power, to the hydrogen economy. But China and to some extent India are emerging as the principal practitioners of an alternative vision of energy growth, underpinning their vast industrialization efforts, based on conventional renewables that are the products of manufacturing, and whose industrial dynamics are driven by cost reduction achieved by learning curves. In this paper, a critique is offered of the traditional view of a centralized energy future, and a restatement of the real drivers of alternative energy pathways actually being pursued by countries like China and India is offered.

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