



Scale, governance and net zero: decentralisation vs centralisation in electricity

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This paper focuses on the question of what net zero implies for the size distribution of firms in the electricity sector. Our starting point is that generalisations about trends in the size of firms in an industry based on changes in some of the underlying technologies are often misleading.

The starting point for firm size is the nature of economies of scale and economies of scope, often we focus on first, when the second is more profound. This is because economies of scope do not rely only on technology but can also be driven by financial considerations. The exploitation of scale is not just about the ownership of assets it is about transaction costs in the organization of physical production. Teece (1980) points out that economies of scope can be exploited by separate firms agreeing to share assets (e.g. sheep owner and an orchard owner can negotiate to exploit economies of scope in agricultural production from the same land). However, if there are high transaction costs arising in negotiations, scale and ownership must go together. For example, Hart and Moore (1990) explain how the galley and the engine room of a luxury yacht are almost never in separate ownership, even though they could be in theory.

This paper divides into three main sections. First, we discuss how the concept of scale (and scope) applies to firm sizes in the electricity sector. Second, we discuss how governance arrangements in net zero might influence the size of firms in the electricity sector. Third, we discuss the nature of net zero and what this implies for firm sizes in the electricity sector. In each case we question the extent there will be a decentralizing trend leading to smaller electricity companies.

We conclude that it is important not to generalize about the future scale of the electricity sector. The 4 Ds – decarbonization, digitalization, decentralization and democratization - do not imply that an alien visiting a future net zero earth will not see large firms dominating the electricity industry.

Firm scales will continue to vary at the high level even as wind, solar, EVs and other distributed technologies become more significant, for the same reasons firm scale has always varied.

Large firms will continue in the electricity equipment sector and among electricity IT platform providers. Meanwhile, large scale wind and solar developers have already emerged to compete with distributed renewables. Large firms will be needed to support the benefits of high voltage transmission and wide area trading and energy security based on imports and exports.

Global governance differences means that certain jurisdictions will have scales appropriate to them and hence the nature of democracy (and autocracy) matters for scale.

Who benefits from digitalization is a big issue in net zero: will it be data companies that benefit or will it be energy consumers? A default assumption is that it will be consumers but this is not a given.

Decentralisation in energy is a trend that might be confounded by other megatrends in AI or Quantum Computing.

Finally, market opportunities exist at different scales and a key policy implication is to allow scales to be driven by market processes while maintaining appropriate regulation of competition and quality of service.

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