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A Global Map of Electricity and Gas Distribution Network Companies

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Electricity and gas distribution system operators (DSOs) – the entities managing networks – will play a significant role in advancing the energy system towards net zero. Whether through increased electrification, digitalization, decentralization or the integration of low-carbon gases, DSOs will need to perform new or enhanced tasks, while responding to the same operational efficiency imperatives.

This paper aims to create a global map of DSOs in electricity and gas, one for each of the 194 surveyed countries, looking mainly at their organization, size, structure, ownership and performance. These characteristics are relevant in the context of the enhanced and different role that DSOs are expected to play in the energy transition. For example, in leading jurisdictions (such as the UK, California, Australia, etc.), we see DSOs engaging in innovation projects to facilitate the connection of distributed generation, electric vehicles and heat pumps. In many countries there remain issues around the optimal organisation of the sector for the challenges of deep decarbonisation. These include the separation of gas and electricity, size and public/private ownership. In addition, in some jurisdictions – particularly across Europe – there are strict unbundling rules that reduce incentives for network investments with spillover benefits for generation or retail segments, effectively preventing battery investment by network companies. This raises questions about

the extent to which the current operation, regulation or ownership structures of assets facilitate or hinder the energy transition.

Such challenges exist all over the world in an industry where the fundamental physics is the same and therefore much can be learned from the experience of others. In particular local hotspots have appeared in places where distribution networks struggle with large exports of distributed generation (e.g. from solar in Australia) or large new sources of demand for power (e.g. data centres in Virginia), for transport (e.g. EVs in Norway) or for heat pumps (e.g. in Germany). These experiences provide lessons for other companies contemplating or struggling to respond to rapid growth on the supply and demand side.

Our global mapping of electricity and gas DSOs shows that they indeed vary widely in terms of ownership, structure, integration, size and performance.

The vast majority of DSOs in the world are in public ownership and part of vertically integrated utility companies. Fewer than a quarter of DSOs are unbundled, and most of them are in Europe. In most developing countries, DSOs are in public ownership. In terms of performance, looking beyond the OECD and the more advanced emerging markets, challenges tend to be significant. There are countries where DSOs have to deal with lengthy and frequent interruptions or large losses both technical and commercial (e.g. in Guyana, Niger, Paraguay or Zimbabwe). In many countries, particularly in Sub-Saharan Africa, energy access rates (via electricity networks) are low, and many connection points are not metered. In these circumstances, utilities tend to be financially weak, with revenues below costs, which limits their ability to invest in improved performance. Their priorities tend to be restoring financial health, having cost-reflective tariffs, reducing operational costs, connecting new customers and finding ways to prevent the erosion of their revenue base as a result of the booming captive commercial and industrial (C&I) segment.

On the gas side, only around 40% of counties have a gas DSO active in the capital. Very few (15) DSOs are integrated between gas and electricity. In countries where gas distribution utilities exist, they are significantly smaller than their electricity peers and relevant, comparable data is scarcer, which may illustrate the insufficient attention given to the role of gas networks in the energy transition.

Europe constitutes an exception by most indicators. The impact of the European Union adopting the UK model of unbundling is seen even beyond its borders, with accession candidates adopting similar strategies. Also, in Europe, gas networks are more extensive and relatively bigger. Finally, by examining corporate reports including sustainability reports where available, we were able to determine that innovation has significantly different goals in different regions. In many countries innovation extends beyond decarbonization, including improved metering, reduced losses, and resilience to weather events.

Data availability tends to be a problem for both electricity and gas. Not only is basic data difficult to get, but it also has significant comparability issues which makes it hard to evaluate the state of DSOs and the challenges they face. This also makes it difficult for DSOs to learn from each other. Poor data has implications for the likely

quality of energy network regulation, such that poor reporting indicates weak regulation.