



## **SEMINAR**

# ***Strategic Sector Coupling? Market Power in Heat and Power Markets***

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Decarbonisation of the power sector envisages vast uptake of variable renewable energy (VRE) technologies. Coupling between heat and power sectors via combined heat and power (CHP) plants provides flexibility to mitigate the intermittency of VRE output. However, firms with CHP plants could use the link between the two energy sectors to manipulate electricity prices. We use a bi-level model to investigate the incentives for such strategic behaviour. At the upper level, a firm with both heat-only and CHP plants acts as a Stackelberg leader to determine its heat output and is constrained by power-market operations at the lower level. Such a strategic firm produces more (less) heat from its CHP (heat-only) plant vis-à-vis the social optimum in order to constrain its maximum power output. Thus, it uses its leverage to manufacture scarcity in the power market to boost the electricity price. Additional market power at the lower level from power-only generation induces the strategic heat producer to ease off on distortions to its operations as long as the electricity market is relatively large. In order to mitigate welfare losses from such strategic behaviour, we devise a regulatory mechanism consisting of a subsidy or a tax on CHP heat output. Numerical examples illustrate the properties of our main analytical results, which can inform future negotiations over CHP cost allocations between regulators and producers.