Game Theoretic Models for Energy Production

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Abstract

We review approaches to understanding the competition between energy production from different sources, that are based on game theory. The players in such games, ranging from fossil fuel producers to renewables, are vastly heterogeneous, with differing costs, sustainability and emission levels. The past several years have seen new discoveries of fossil fuels facilitated by new technologies such as fracking, cheaper solar panels as well as uncertain demand from major markets like China, and uncertain supply from producers such as Iran. The games studied are in continuous time and may be deterministic, stochastic with controlled jumps (random discoveries), finite player or of continuum mean field type. Some results can be derived analytically, and quantitative analysis comes from small parameter approximations and numerical PDE solutions.

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