

Renewable Energy System Integration Costs

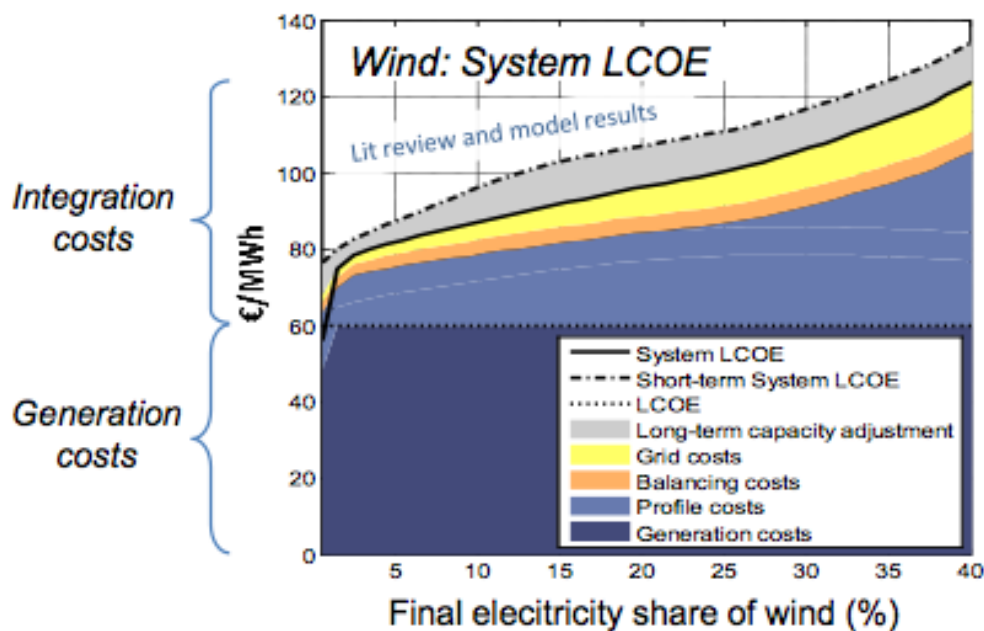
The “Tragedy of the Commons” is an economic theory first authored by Garrett Hardin. It states that individuals acting independently and rationally according to their own self-interest, behave contrary to the best interests of the group as a whole, by depleting some common resource

We normally think of the “Commons” in conjunction with Climate Change in general or depletion of the ocean’s fish stocks, but the “Commons” in the case of Variable Resource Energy (VRE), such as wind and solar, is the grid that provides essential integration support necessary to their success.

John Thompson, at the time, Director of the Fossil Energy Transition Project for Clean Air Task Force, made a presentation at the Pittsburgh Carbon Capture & Sequestration Conference in April 2014. The topic was System Integration as related to renewables.

The original work was authored and presented Ueckerdt, Falko and Hirth, Lion and Luderer, Gunnar and Edenhofer, Ottmar, System LCOE: What are the Costs of Variable Renewables? (January 14, 2013). Available at SSRN: <http://ssrn.com/abstract=2200572> or <http://dx.doi.org/10.2139/ssrn.2200572>

The following graphic from that paper illustrates the key take-away and integration cost components:



Highlights as published in the paper:

- A proposed new metric, *System LCOE*, that includes both generation and integration costs be used to determine the economic comparative costs of wind and solar power
- Integration costs of wind power can be in the same range as generation costs at moderate shares (~20%).
- Integration costs can become an economic barrier to deploying Variable Renewable Resources (VRE) at high shares.
- A significant driver of integration costs is the reduced utilization of capital-intensive, conventional plants.
- An economic evaluation of wind and solar power must not neglect integration costs.

At the moment, integration costs are an afterthought and borne by the utility infrastructure. As with any “Commons”, there will come a day when the resource can no longer be sustained.

These effects are both complicated and amplified by the various state level Renewable Portfolio Standards (RPS) and the Production Tax Credits (PTC) currently in force or pending.