

Building an Electricity-focused Economic Input-output LCA Tool to Analyze Future Power Generation Scenarios

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The electricity industry is extremely important to both our economy and our environment, and we would like to be able to examine the economic, environmental and policy implications of various future power generation scenarios. However, the tools which currently exist to analyze the potential outcomes are either too complex or too aggregated to be useful.

In this work, we build upon the framework of an existing aggregate model – the Economic Input-output Life-cycle Assessment (EIO-LCA) tool – by adding data about the electricity industry. We add information to the Power Generation & Supply sector of a 500-sector model of the US economy by splitting up, or disaggregating, this single sector into at least 24 additional sectors, each representing a specific construction or operation portion of the electricity industry.

For each of these disaggregated sectors we create a supply chain – what the sector purchased from the other 500 sectors in the economy in order to produce its output – and a set of emission factors which allow calculation of the environmental impact of the sector's output.

When all the new sectors are inserted into an existing economic input-output framework, we can build future generation scenarios – each with a specific mix of generation types and investment in future technologies – and we can look at the economic and environmental results which include not only the top-level emissions, but the impacts from the entire supply chain.