

# Modelling a future fuelled by sustainable energy

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Credit: University of Adelaide

University of Adelaide economists have modelled the transition from a world powered by fossil fuels to one in which sustainable sources supply all our energy needs.

Dr. Raul Barreto, Senior Lecturer from the University's School of Economics, has examined the short and long-term consequences of the relative productivity differential between fossil [fuel](#) and renewable energy.

"The transition from [fossil fuels](#) to [alternative energy](#) is dependent on their relative productivity. Sustainable energy will increasingly replace fossil fuels as the former becomes a less productive, more expensive

source and the latter becomes more productive and less expensive," says Dr. Barreto.

The research, published in the journal *Economic Modelling*, shows that fuel productivity determines whether [renewable energy](#) is a viable source and how economies will transition from today's world in which [sustainable energy](#) complements fossil fuels, to one solely powered by sustainable sources.

"Fossil fuels have the advantage of being a relatively inexpensive and stable source of energy, but stocks are finite," says Dr. Barreto.

"Sustainable energy sources such as solar and wind power are potentially limitless, but supply is inconsistent, and they require large amounts of capital investment to make them a viable source," he says.

Despite the world having passed 'peak oil', where abundant supply was enjoyed, it is still difficult to predict when fossil fuels will run out. Some estimates suggest that in 50 – 100 years from now depleting reserves will become an issue.

"Hypothetical scenarios predict that finite stocks of fossil fuels will be depleted and economies that are solely dependent on those sources of energy will collapse causing severe welfare problems," says Dr. Barreto.

"These predictions assume that the supply of fossil fuel cannot be influenced by productivity increases, economies of scale or substitution.

"However, alternative energy substitution can alleviate the negative implications on growth and welfare of an ever-depleting fuel source on an energy dependent dynamic economy."

The further that alternative energy must improve to catch up to oil, the

larger the relative decrease in consumption will be. If alternative energy remains less productive than oil, we will suffer falling growth, possibly for a prolonged period, as we are forced to switch to the less efficient alternative.

"If society can improve the [productivity](#) of alternative energy in the long run to a level comparable to oil, then the future will be at least as bright as it was at the peak of the economy's oil dependence. If instead, alternative [energy](#) always remains oil's weaker cousin, then the eventual result is a world that is at best nostalgic of the heydays of cheap oil," says Dr. Barreto.

**More information:** Raul A. Barreto. Fossil fuels, alternative energy and economic growth, *Economic Modelling* (2018). [DOI: 10.1016/j.econmod.2018.06.019](#)

Provided by University of Adelaide

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