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**Renewables, manufacturing and green growth:
Energy strategies based on capturing increasing returns**

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Abstract

Energy futures and the case for renewables and cleantech can be framed in terms of their contribution to mitigation of climate change, as well as cleanliness and absence of carbon emissions. By contrast, energy security is generally discussed in terms of access to fossil fuels. In this paper we make a different case for renewables: we contrast the *extraction* of energy (fuels), which – in spite of technological change - takes place under diminishing returns, with the *harvesting* of nature's renewable energy, which takes place in a process utilizing manufactured devices, where manufacturing generates increasing returns and costs decline along steep learning curves. This gives a fresh perspective on both renewables and energy security. We argue that energy choices can be framed as choices in favour of increasing returns, (based on manufacturing) vs. choices in favour of diminishing returns activities, which usually involve extraction of fossil fuels. Such a framing does not entail assumptions as to whether the entire energy system can be converted to renewables, but

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