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The bioeconomy, the challenge of the century for policy makers

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Dedication

This paper is dedicated to the memory of Peter Schintlmeister, a true champion of the bioeconomy, who died far too young in 2017.

Highlights

- This work finds policy gaps and contradictions.
- Supply and demand side issues need policy attention.
- Important finding regarding R&D subsidy for biotechnology and synthetic biology are described.
- Blurring the boundaries between the scientific method and the engineering design cycle is needed.
- This has important implications for skills, training and education.

Abstract

During the Industrial Revolution, it became clear that wood was unsuited as an energy source for industrial production, especially iron smelting. However, the transition to coal was the effort of decades. Similarly, the transition from coal to oil was neither a smooth nor rapid process. The transition to an energy and materials production regime based on renewable resources can similarly be expected to be fraught with many setbacks and obstacles, technically and politically. Those earlier transitions, however, were not complicated by the so-called grand challenges faced today. Above energy security and food and water security lurks climate change. Some events of 2015 have politically legitimised climate change and its mitigation, and 2016 has seen the world finally sworn to action. The bioeconomy holds some of the answers to the economic challenges thrown up by mitigating climate change while maintaining growth and societal wellbeing. For bioeconomy policy makers, the future is complex and multi-faceted. The issues start in regions and extend to global reach. It is hard to quantify what is going to be the most difficult of challenges. However, one of the the visions for the bioeconomy, that of distributed manufacturing in small- and medium-scale integrated biorefineries flies in the face of the current reality of massive fossil fuel and petrochemical economies of scale, married to gargantuan fossil fuel consumption subsidies.

Introduction

Bennett and Pearson¹ argue that the transition to petrochemical feedstocks in the UK chemicals industry occurred between 1921 and 1967. The transformation was hastened by mass production of cars in the US in the 1920s. More-or-less by the end of WWII, a large supply of olefins was available in the US for the transformation to petrochemicals. Diffusion east took time, but by the late 1960s the UK organic chemical production industry was totally transformed to petrochemistry.

There is at least one lesson for bioeconomy policy makers to take from this: the transformation to a bioeconomy is going to take time. The world human population is continuing to rise whilst stagnating or falling in most of the OECD countries. Most importantly, the global middle class could increase to 4.9 billion by 2030, with most growth coming from Asia².

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