

## **Scaling the Biobased chemistry, is decentralised production the future?**

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The recommended approach for scaling biofuel and biochemical technology follows a similar stage gate process to that used in traditional Chemical Process Industry (CPI) processes. But the processing of biomass leads to some subtle differences, and unique challenges, that need to be considered. The typical scaling factors for bioenergy and biofuels processes are an order of magnitude lower, or more conservative, than is the case for an equivalent CPI process. This is as a direct result of the inherent challenges with biomass processing, and the fact that there is little published data, and a lack of experience in general, related to the scale up of advanced biofuels and biochemical processes.

One of the pitfalls of working with biomass projects is scaling up too fast. Often the step from lab-scale to pilot scale is taken with both scaling up significantly the process volume and shifting from batch to continuous processing. Pilot plants provide the first window into continuous processing and often incorporate unreacted feed or product recycles. This often leads to unforeseen challenges, in some cases even jeopardizing the projects. Scaling up from a smaller pilot to a demonstration plant, before working out the commercial scale process, is therefore the norm.

But is scaling up to the traditional world scale production a necessity? The availability of feedstock is often place specific, transport of raw materials reduces the efficiency of the overall processes. Often it is much more interesting to perform the first process steps decentralized, in small, flexible and in some cases even transportable installations. Produce there where the feedstock is! So demonstration scale can even become commercial scale.