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Having the End in Mind - The Pre-Pilot-Plant at DTU Biosustain

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The Novo Nordisk Foundation (NNF) Center for Biosustainability (CFB) develops engineering workflows enabling the rapid, inexpensive construction of cell factories for a broad range of chemical and pharmaceutical products. While a cell factory alone has limited commercial value, combining the cell factory with a validated prototyped bioprocess creates a strong commercial value proposition, increasing the technology value by 3- to 10-fold by reducing the time and risk to market. Bio manufacturing plays a significant role in Danish industries and its economy by representing about 40% of the manufacturing output of the country. Thus, adding bioprocess development capabilities to the CFB would notably enhance its translational potential and socio-economic impact. A mid-term review carried out in the spring of 2015 resulted in a highly favorable report and a series of recommendations, including: 'the expert panel feels the ability to pursue top hosts at a pre-pilot/pilot-scale facility (PPP) will be an important step towards verification and subsequent potential commercialization of the assets developed at the CFB.'

NNF granted a substantial amount of money to establish such facility. The PPP is expected to be fully implemented by 2019 and the facilities are located on CFBs premises (Building 220). Operations start up by late of 2017, with a ramp up to full operation by end of 2018. Scientists, engineers and technicians will staff the facilities capable of developing two bioprocesses simultaneously while the first projects will commence in mid-2018 and equipment purchases and installation will be completed during 2017-19.

In order to productively invest PPP resources in accordance with CFB's mission (to promote a more sustainable bio based chemical industry), it is essential to rigorously evaluate technologies prior to entering the pre-piloting stage. Filter out those that are not commercially viable and/or are inconsistent with CFB's mission, give constructive guidance to those with commercial potential but not technically ready for pre-piloting. Prioritize those that are clearly ready for pre-piloting and have the most commercial potential and the greatest potential to fulfill CFB's mission. To characterize key process scale parameters the PPP has to operate at near, or at, planned operational system level to demonstrate at a small processing scale. Testing of industrial feeds (rather than research grade media), prototyping of product separation strategies, examination of impurities in the purified product, estimation of large-scale capital and operating costs, generation of kilogram quantity product samples is required to produce technology information packages for productive, fully-valued technology transfer into desired commercialization tracks (e.g. spin outs or licenses). Additionally the Center's facilities will provide process demonstrations, training, and troubleshooting support for internal and external stakeholders.