



Sustainable Energy
Systems 2050
NORDIC ENERGY RESEARCH PROGRAMME



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Nordic Energy Research

Conversion of solar energy and CO₂ into hydrocarbon feedstock for fuel production using photobiological organisms (AquaFEED)

Nordic Energy Research SES 2050 Kick-Off

Helsinki

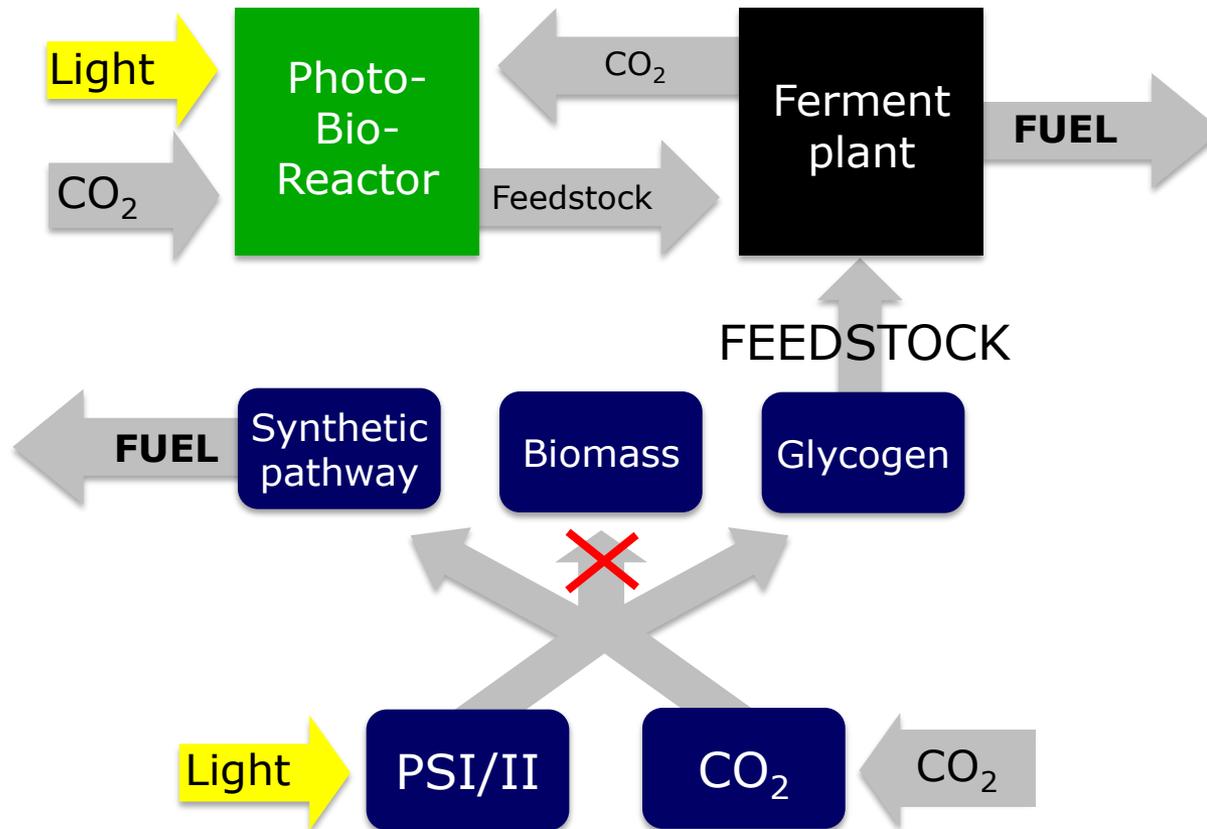
October 12, 2011

Patrik Jones, University of Turku Bioenergy group

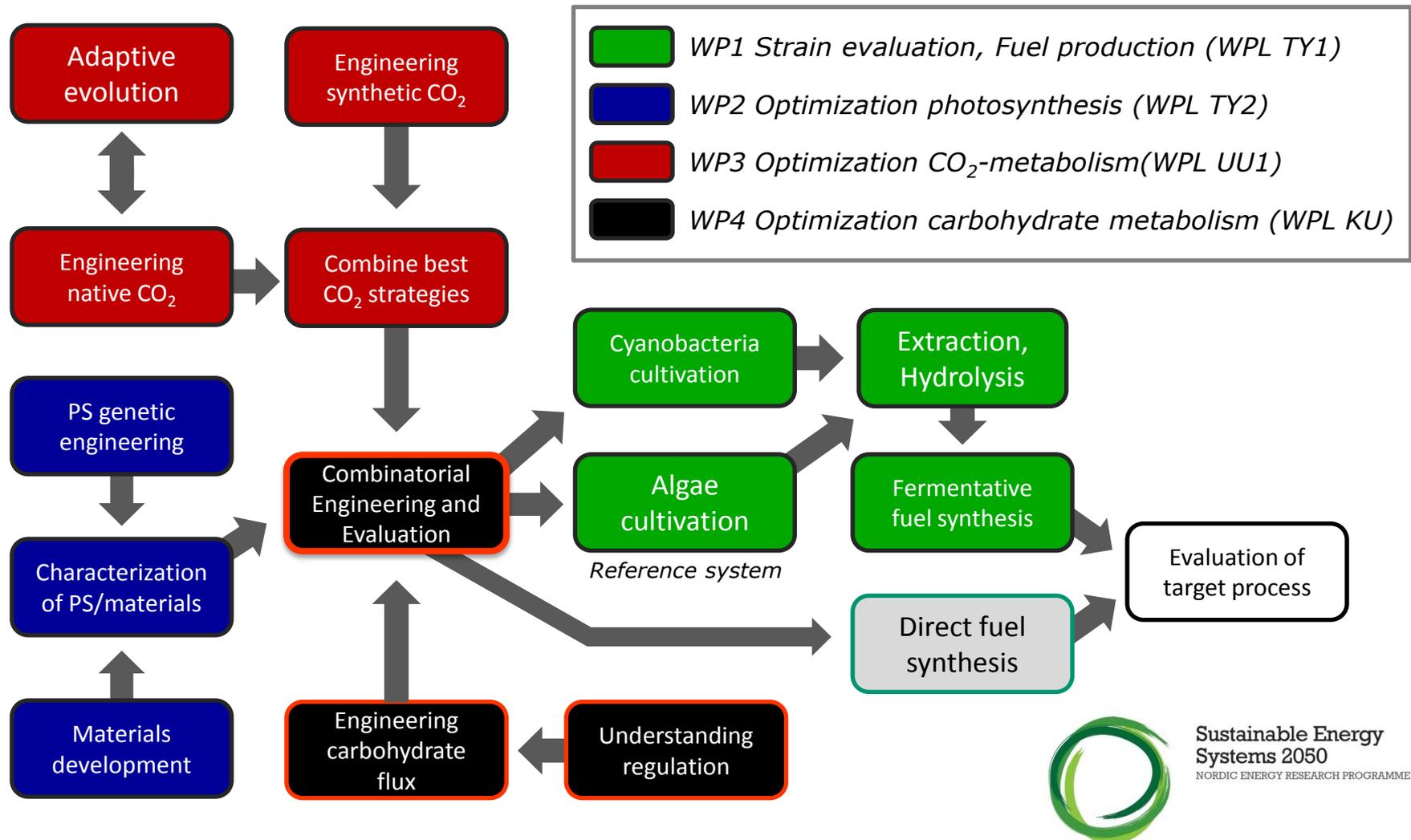
- Photobiological organisms are well-suited for conversion of solar energy into hydrocarbon feedstock
- Terrestrial biomass has limitations in terms of solar energy conversion efficiency and land use
- Aquatic photobiology has potentially greater overall conversion efficiency but remains largely untested
- Can aquatic photobiology complement terrestrial biomass for hydrocarbon fuel production?



Concept



Objectives and Goals



Challenges I

- Biology has evolved for it's own purpose, not for our (humans) purpose
- Metabolism of the entire cell and communities depend on concerted action and interaction between thousands of genes, proteins and metabolites – most of which we know nothing about
- To reengineer biological organisms for our purpose is therefore a substantial challenge
- Still, many examples exist where only minor engineering have resulted in biotechnologically useful strains



Challenges II

- The economic feasibility of utilizing photobiological systems in commercial production of low-value end-products is still to be demonstrated (as far as aware)
- This project targets improvement in the overall solar energy and carbon conversion efficiency of a solar-glycogen-fuel production-chain
- The limit in conversion efficiency, of the entire process, at which economic feasibility is reached is currently unknown. We hope to provide at least part of the solution towards such an answer within this project

