

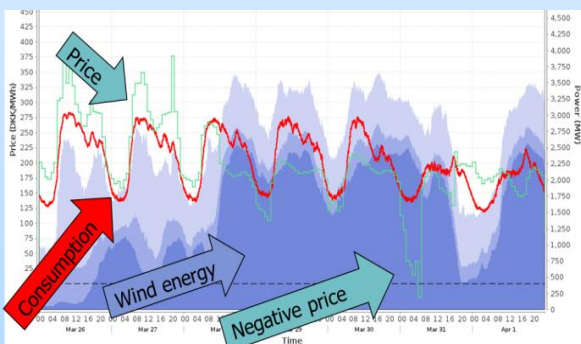
# Converting excess wind power into valuable products

Greening the Port of Rotterdam by "transshipment" of wind

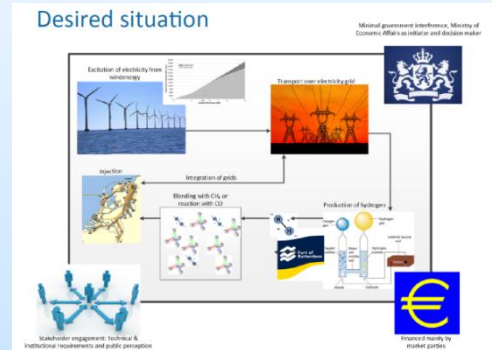
Hamilcar Knops, Anish Patil, et al

## Introduction

Wind energy is a prospective option to achieve sustainable production of electricity, as already demonstrated in Denmark and Germany. However, the unpredictability of wind energy production may result in more volatile spot prices for power, extra forced interventions by the system operator causing financial commotion and the risk of congestion of the transmission grid. To elucidate the effect of the variable supply of wind energy, the demand and supply is for West Denmark for the last week of March 2012 given below. As Denmark is frontrunner in wind energy, these data can be regarded as a picture of the future of the Dutch state of affairs.

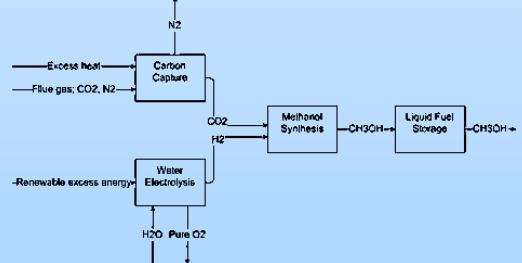


## H2 and injection in the natural gas grid



## production of methanol using CO2

### Methanol Synthesis plant



## Research goal

A group of private parties and TU Delft investigate how options for dealing with the intermittency of wind energy can be implemented in the Rotterdam Harbour, on Maasvlakte 2.

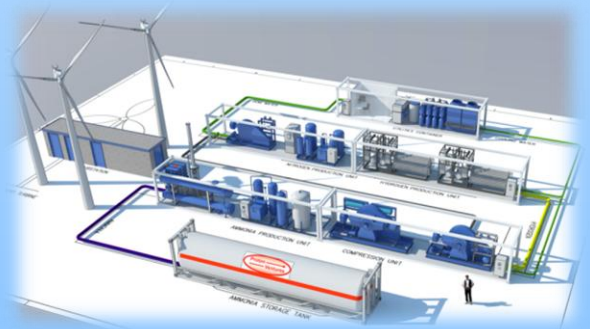


They will explore, assess, and select technical and institutional options for applying the dynamic surplus of wind energy for the production of hydrogen gas by electrolysis, including its injection into the natural gas grid, its use for the production of methanol or ammonia. Other innovative alternatives will be explored as well

The scientific challenge is to incorporate the extreme dynamic behavior of the overall system into the assessment of several clustered production processes.

During this scouting project more stakeholders are cordially invited to on-board for the next phase: a demo project!

## production of ammonia.



## Opportunities for PoR

- Reduction of the carbon footprint
- Greening of industrial processes and products within MV2
- Allowing a higher contribution of wind energy to the Dutch power production portfolio

Mr.dr. H.P.A. Knops, Delft University of Technology,  
Faculty of TPM Energy and Industry Section  
H.P.A.Knops@tudelft.nl

A. Patil, MSc, PhD TU Delft & Proton Ventures  
anish.patil@protonventures.com