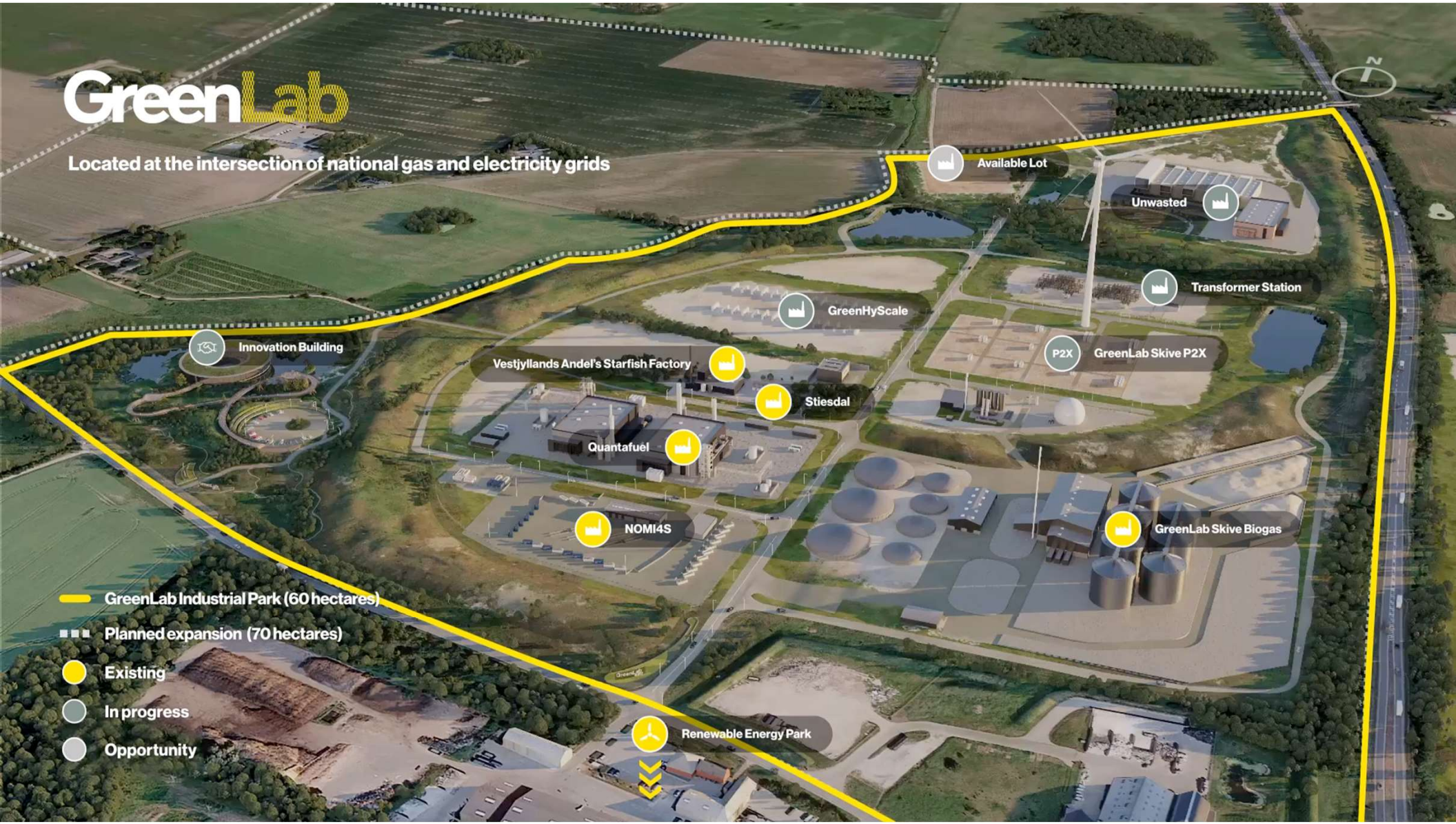

GreenLab

SUPER P2G

The Danish Case - GreenLab

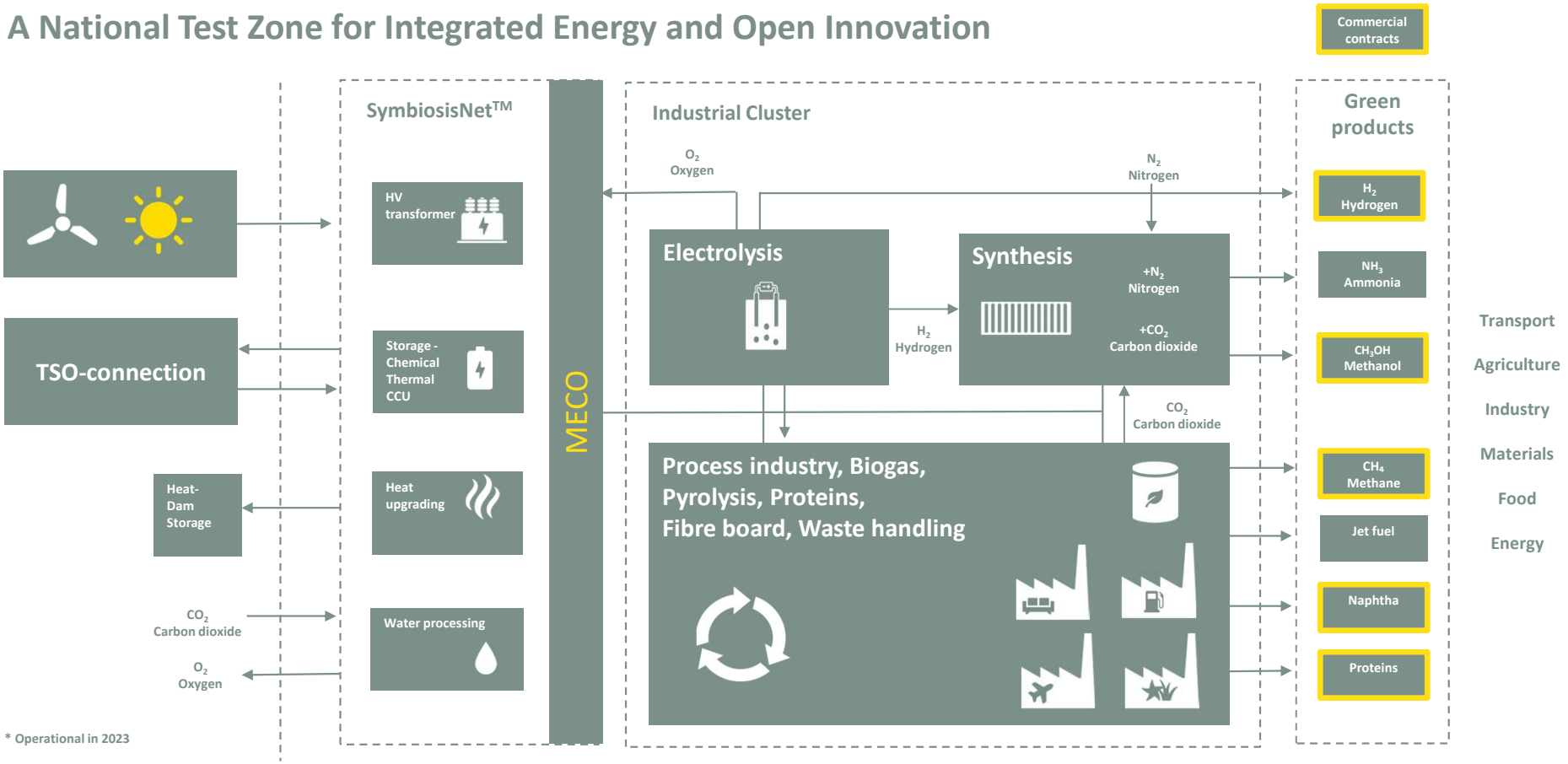
GreenLab


GreenLab
Located at the intersection of national gas and electricity grids
Available Lot
Unwasted
Transformer Station
GreenHyScale
Innovation Building
Vestjyllands Andel's Starfish Factory
Stiesdal
P2X
GreenLab Skive P2X
Quantafuel
NOMI4S
GreenLab Skive Biogas
Renewable Energy Park
GreenLab Industrial Park (60 hectares)
Planned expansion (70 hectares)
Existing
In progress
Opportunity


GreenLab
Located at the intersection of national gas and electricity grids
Existing
In progress
Opportunity
GreenLab supply
Power
Water
Heat/Steam
Instrumental Air
Nitrogen
Shared energy/ressources
Methanol
CO_2
Hydrogen
Surplus PtX heat for District heating
Heat
Expansion (70 hectares)
Available Lot
Unwasted Ltd.
Utilities Building
Transformer Station
GreenHyScale 100MW PtX
P2X
Innovation Building
Vestjyllands Andel's Starfish Factory
Stiesdal SkyClean
P2X
GreenLab Skive P2X
Quantafuel
NOMI4S
GreenLab Skive Biogas

GreenLab Skive Energy Park – SymbiosisNet™*

A National Test Zone for Integrated Energy and Open Innovation



* Operational in 2023


GreenLab Skive P2X
GreenLab
e·on
Everfuel
DGC
Dansk Gasteknisk Center a/s
ENERGINET
NORLYS
REintegrate
Danish Energy Agency
Ea Energianalyse
GREEN HYDROGEN SYSTEMS
DTU
EUROWIND ENERGY A/S

Methanol Synthesis plant

- Main objective: To kickstart the green methanol economy
- This year the first electrolysers will land connected to this project
- The project has a 10 MW methanol synthesis plant and a 12 MW electrolyser plant (that is 12 MW equivalent out not electricity in)
- The energy will be provided by the connected 80 MW green energy plant run by Eurowind, the breakdown of the energy being 56 MW wind, 24 MW solar
- The needed CO_2 will be provided primarily from the biogas plant on site

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THIS PROJECT HAS RECEIVED FUNDING FROM THE EUROPEAN UNION'S HORIZON 2020 RESEARCH AND INNOVATION PROGRAMME UNDER GRANT AGREEMENT NO 101036935

The GreenHyScale project

The world's largest electrolyser system qualified as a TSO balancing service provider

- Main objective: Pave the way for large-scale development of electrolysis onshore and offshore
- Create new multi-MW-range alkaline electrolyser platform
- Create a 6MW module that will fit into a 40-foot container
- Generate green hydrogen for two years via 80MW directly connected renewables and certified electricity from a TSO grid connection
- GreenLab distributes the electricity through the SymbiosisNet (Operational in 2023)

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BMS
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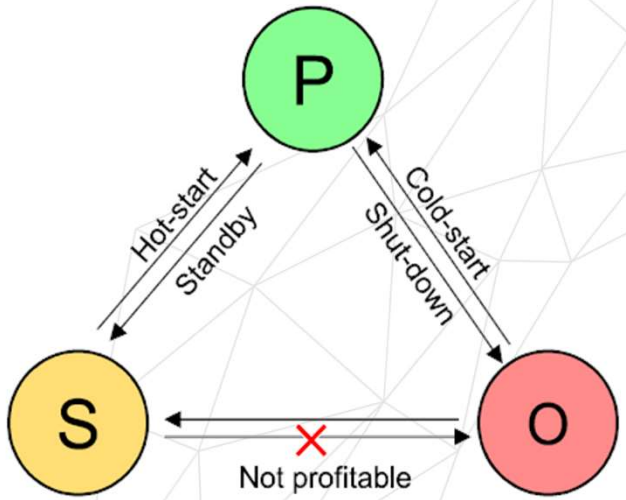
OPERATIONAL STRAGEGIES & IMPLEMENTATION

Operation States & Dynamics

- Defined functions for electrolyser state
- Allows for models to account for loses while transitioning from state to state

  An electroylser is not a lightbulb
- A defined standby state or minimum operation
- Dynamic modelling of temperature of the electroylers as it transitions from state to state



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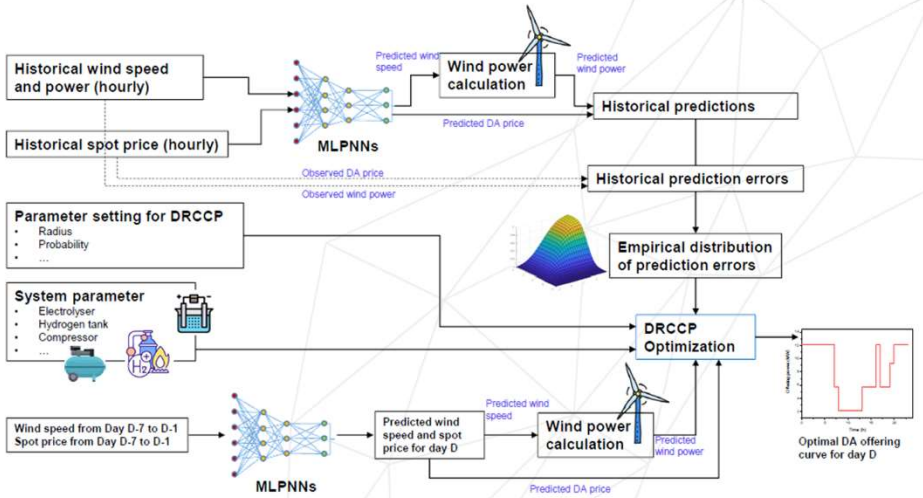
Data-Driven Robust Chance Constrained Programming (DRCCP)

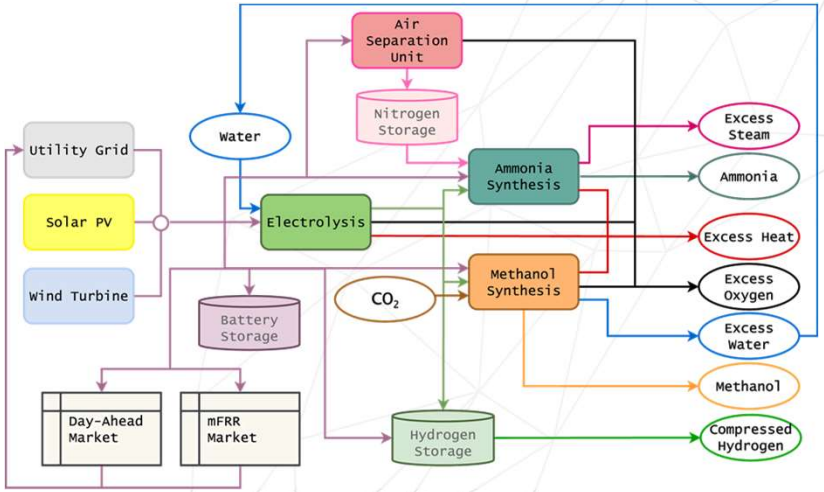
- Impressive forecasting using nueral networks
- The correction using DRCPP to minimise expensive errors
- Could provide the basis for how we do forecasting at GreenLab
- We can see the improvements bringing it closer to being ready for implementation, and we could work together to feed it more data from the methanol synthesis plant when operational.

  We look forward to seeing the results when it has been fed intra-day and real-time market data



EnerHub2X

- The predictions in methanol synthesis and operating conditions including state transition strategies
- Optimisation to costumer profit
- Addressing the need for added premium on green methanol
- Ultilising the grid and our available renewable energy
- Assessing the energy bidding markets our costumers could bid into in grid balancing




LET'S CREATE
A POWER SHIFT
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