

# Process-Informed design of tailor-made Sorbent Materials for energy efficient carbon capture (PrISMa)

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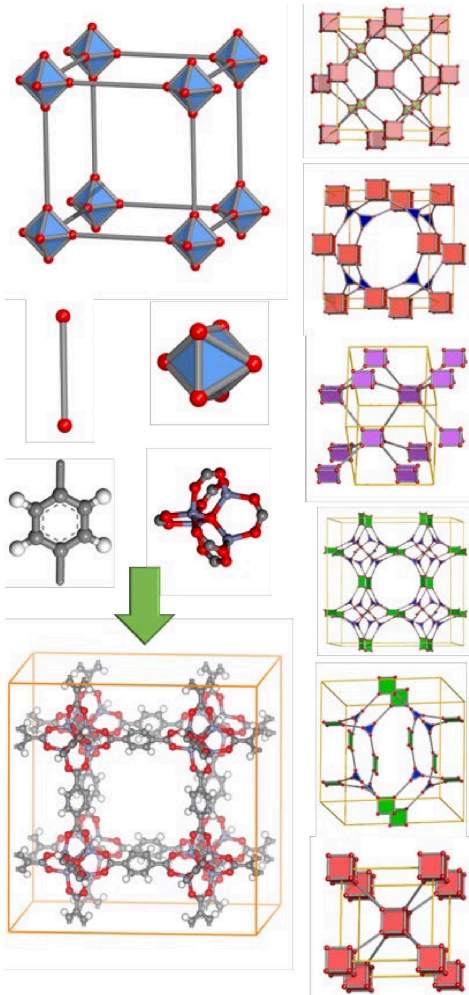


SINTEF



4<sup>th</sup> ACT Knowledge Sharing Workshop  
Divani Palace Acropolis Hotel  
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# Carbon capture with solid sorbent materials



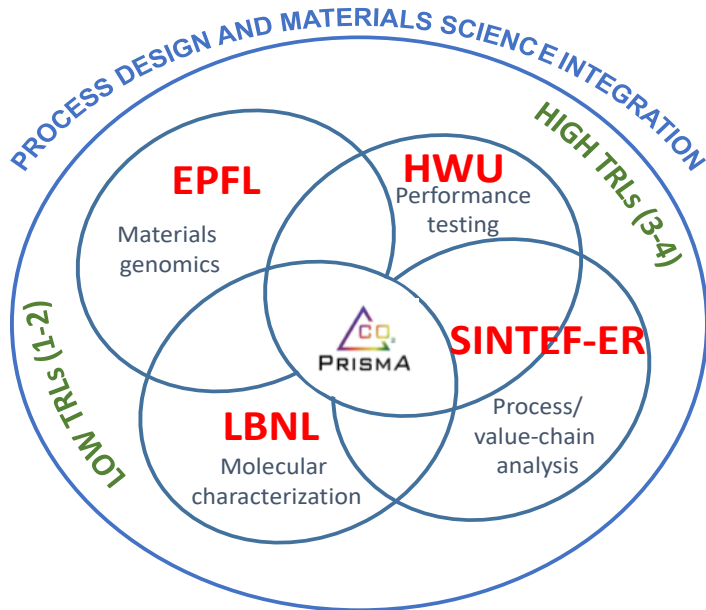
## The Challenge:

*“There is currently no ability to quickly identify what processes and process conditions are optimal for a particular adsorbent to achieve the required specifications for a capture application”*  
(Mission Innovation report)

- For maximum impact of breakthrough materials, ***processes and materials must be developed hand-in-hand*** for any particular application.
- The ***integration between molecular science and process engineering*** is a significant gap of knowledge which hinders the realization of many novel promising materials beyond lab scale testing.

## Our Aim:

*To accelerate the transition of energy and industrial sectors to a low-carbon economy by developing a technology platform to tailor-make cost-efficient carbon capture solutions for a range of different CO<sub>2</sub> sources and CO<sub>2</sub> use/destinations.*



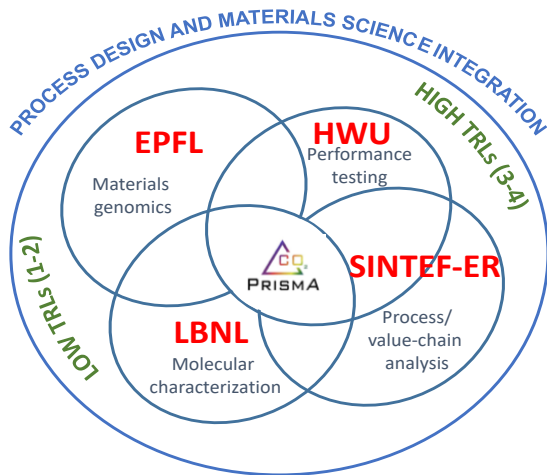
## Research Objectives

1. To **establish a methodology**, based on an effective carbon price (ECP) metric, that allows translation of specific carbon abatement requirements for industrial and CO<sub>2</sub> delivery sites into key performance indicators (KPIs) of capture processes for screening and synthesis of novel materials (**WP1**).
2. To **effectively design new and advanced materials** at the molecular level with the optimum process-informed properties and guided by process-derived KPIs (**WP2**).
3. **Efficient high-throughput synthesis and characterization** of promising novel sorbent materials that have been molecularly found to be optimal for a given separation (**WP3**).
4. To **standardize** and evaluate rapidly and efficiently the **dynamic performance** of novel sorbent materials under relevant process conditions (**WP4**).
5. To **evaluate** the **competitiveness** of advanced sorbent-based capture technologies in terms of cost, environmental impact, scale and reliability (**WP5**).
6. To **outreach, communicate and exemplify** novel breakthrough materials and CCUS technologies to society (**WP6**).

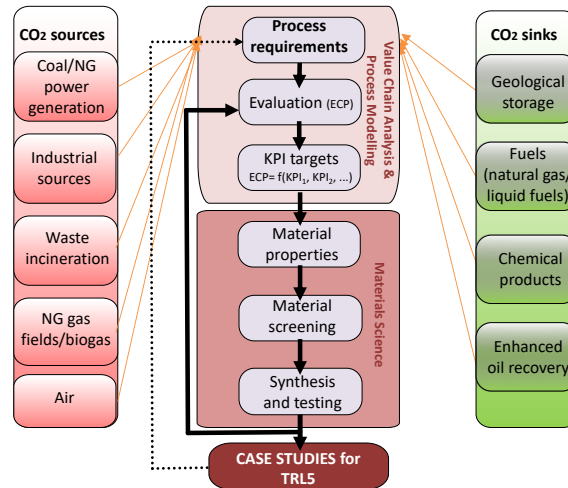
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### Who will do it?



### Illustration of PrISMa platform

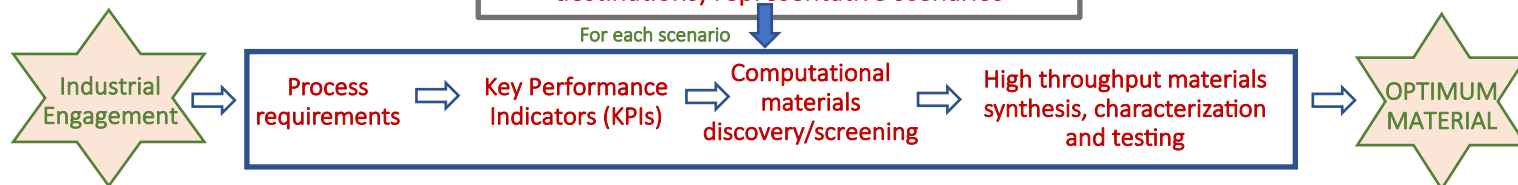


### Key Technical Outputs

- ✓ A **technology platform** that allows us to identify for a given source and target of CO<sub>2</sub> the optimal capture technology. This platform is based on a **methodology for systematic knowledge exchange between material science and process engineering**.
- ✓ A **set of case studies**, inspired by the interest of the national funding agencies and our industrial advisory board, **to bring the technology/material to the TRIL5 level**.

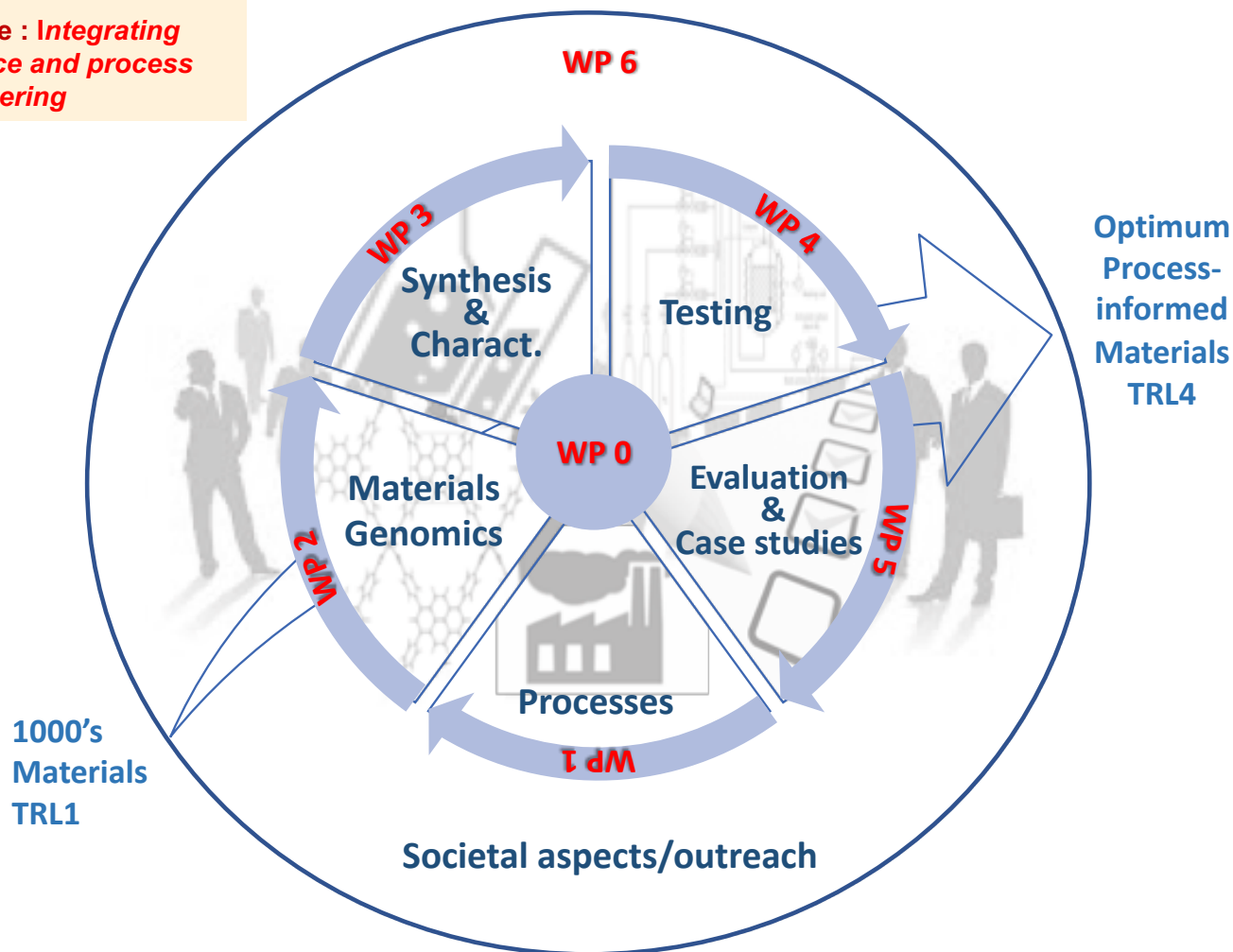
Separation Matrix of N (CO<sub>2</sub> sources) x M (CO<sub>2</sub> destinations) representative scenarios

For each scenario



# Work packages

Innovation cycle : *Integrating molecular science and process engineering*



Studio Roosegaarde

EPRI

Association of Swiss Gas  
Industries

Usine de  
Traitement des  
Ordures



Tees Valley  
Combined Authority

HUNOSA



**EPFL**

Pale Blue Dot

Equinor



Scottish Enterprise

Process Monkey



Scottish Hydrogen &  
Fuel Cell Association

Pannonia Bio

TOTAL

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<https://prisma.hw.ac.uk/>

