



Transição Energética

Tiago Jacques
Assessor Técnico – SSM/ANP





- Baixo carbono:
 - Atributos desejáveis
 - Retorno esperado



Alice: Você pode me ajudar?

Gato: Sim, pois não.

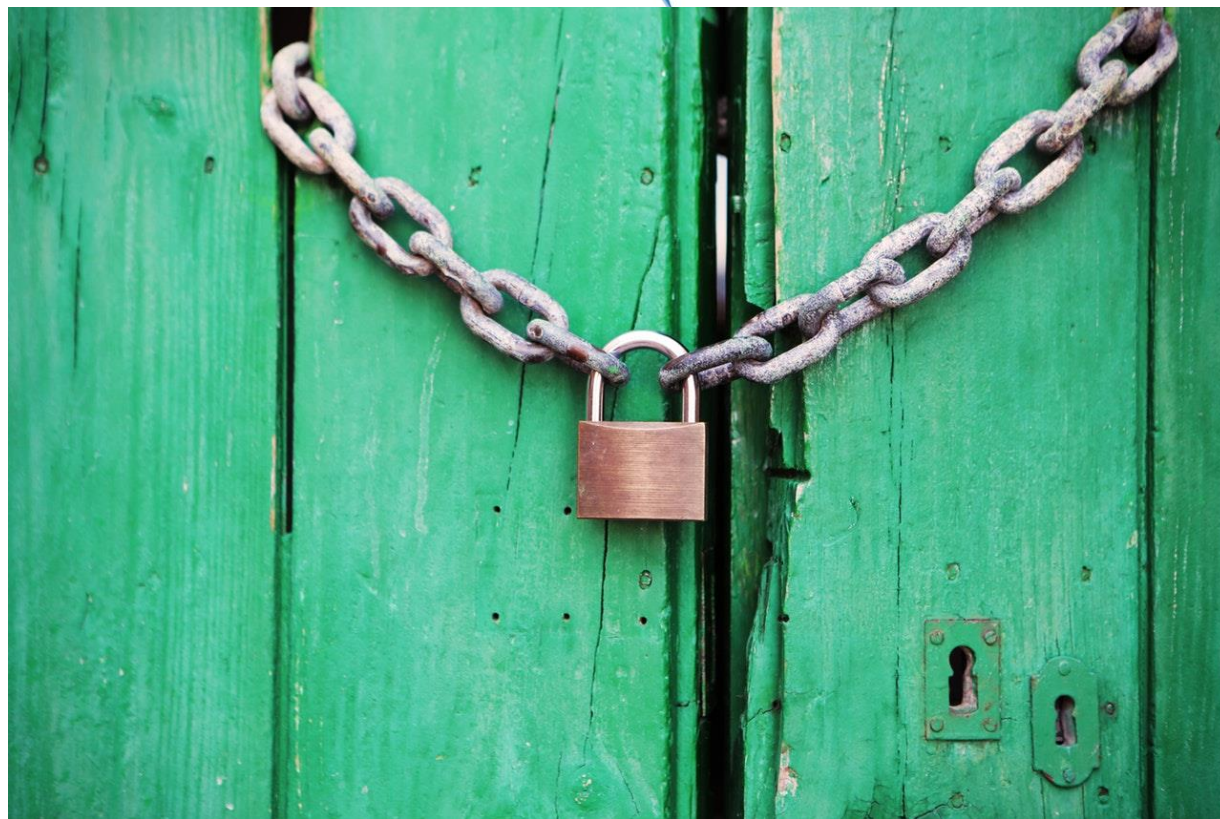
Alice: Para onde vai esta estrada?

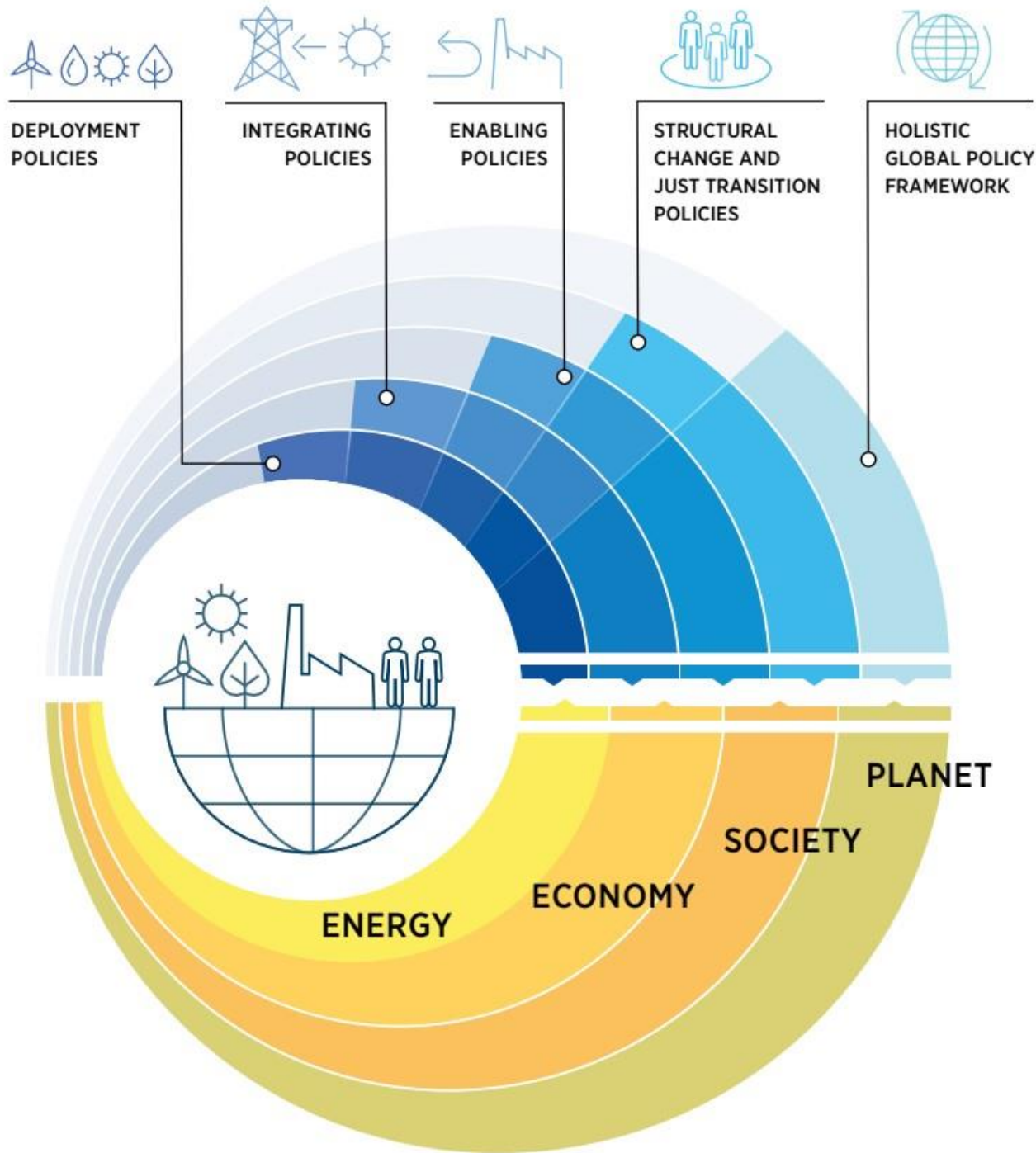
Gato: Para onde você quer ir?

Alice: Eu não sei, estou perdida.

Gato: Para quem não sabe para onde vai, qualquer caminho serve.

- Visão de longo prazo
- Abertura econômica
- Diversidade de agentes, características locais/sociais.





Fonte: IRENA

Petróleo



SSM/ANP



Regulação

Oportunidade de aprimoramento de:

- Contratos;
- Planos de Avaliação de Descoberta, Plano de Desenvolvimento e fase de produção;
- CCS e de Hidrogênio.



Relação com a sociedade

Painéis dinâmicos de sustentabilidade da indústria do E&P.



Meio Ambiente

Gestão de emissão de Metano;
Projetos integrados de energia de baixo carbono contendo gás natural, CCS e hidrogênio

Projeto Sustentabilidade

Transparência quanto ao desempenho em sustentabilidade da indústria e redução de emissões de gases de efeito estufa no segmento de E&P

Transparência

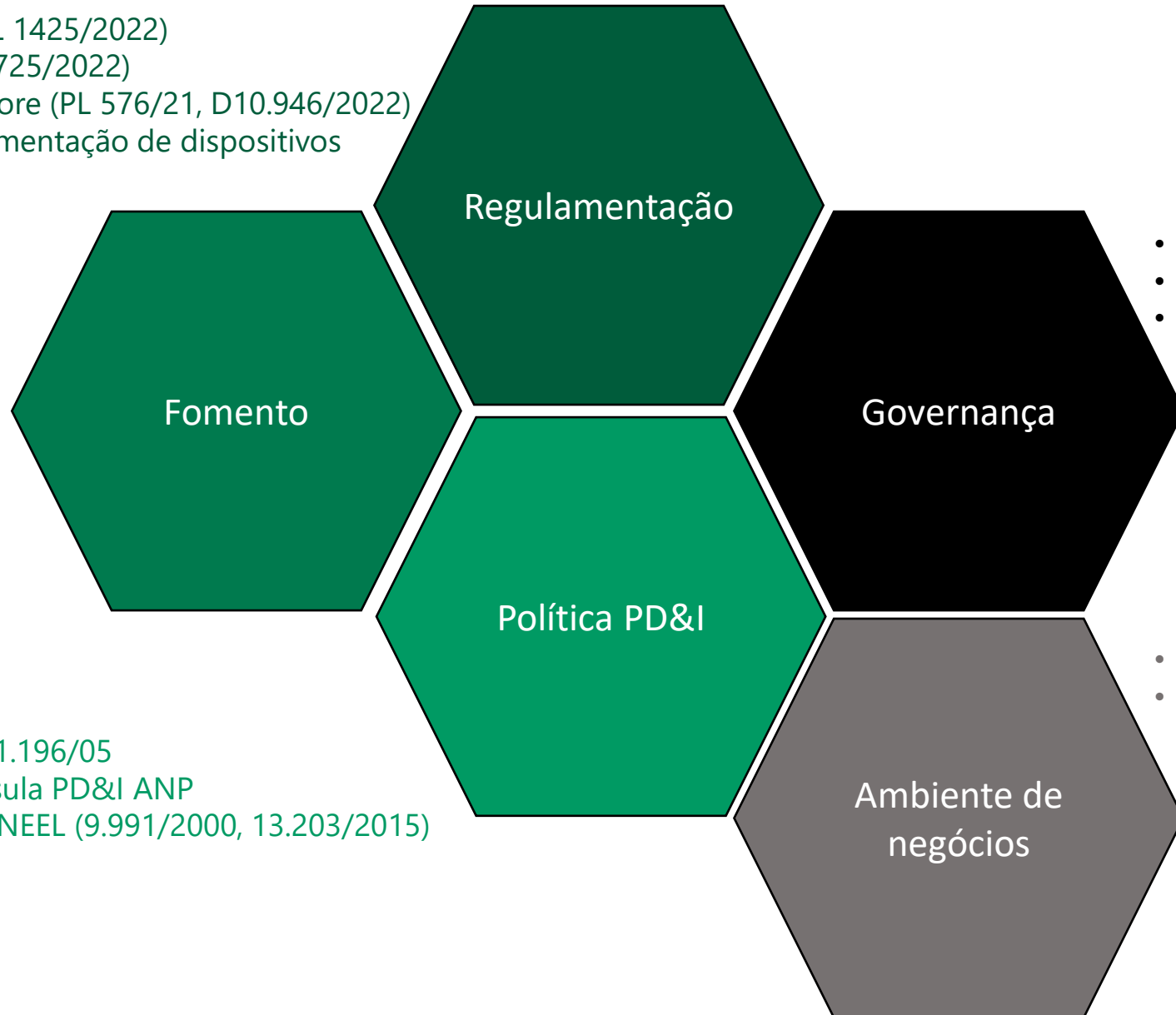
Mitigação

Transição

Abordagem

- CCS (PL 1425/2022)
- H₂ (PL 725/2022)
- E.Offshore (PL 576/21, D10.946/2022)
- Regulamentação de dispositivos

- Estudos /Benchmark
- Mitigar riscos de *first movers disadvantage*.



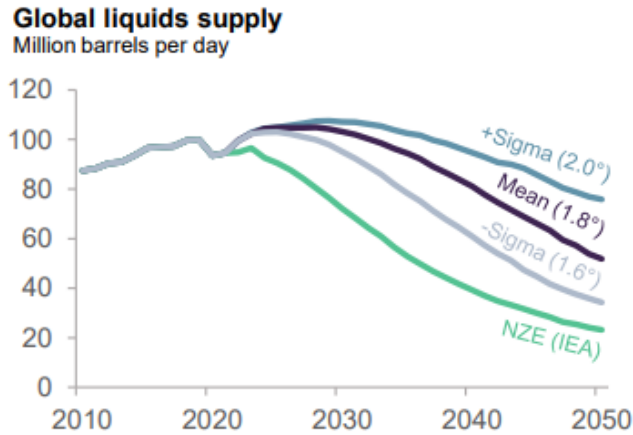
- ISO 15663/2021
- ISO 31001
- TCFD (Carbon Risk)

- Lei 11.196/05
- Cláusula PD&I ANP
- Lei ANEEL (9.991/2000, 13.203/2015)

- Competitividade
- Ecossistema de PD&I

1 Resilient supply

Provide affordable and viable fossil fuels supply that is still essential

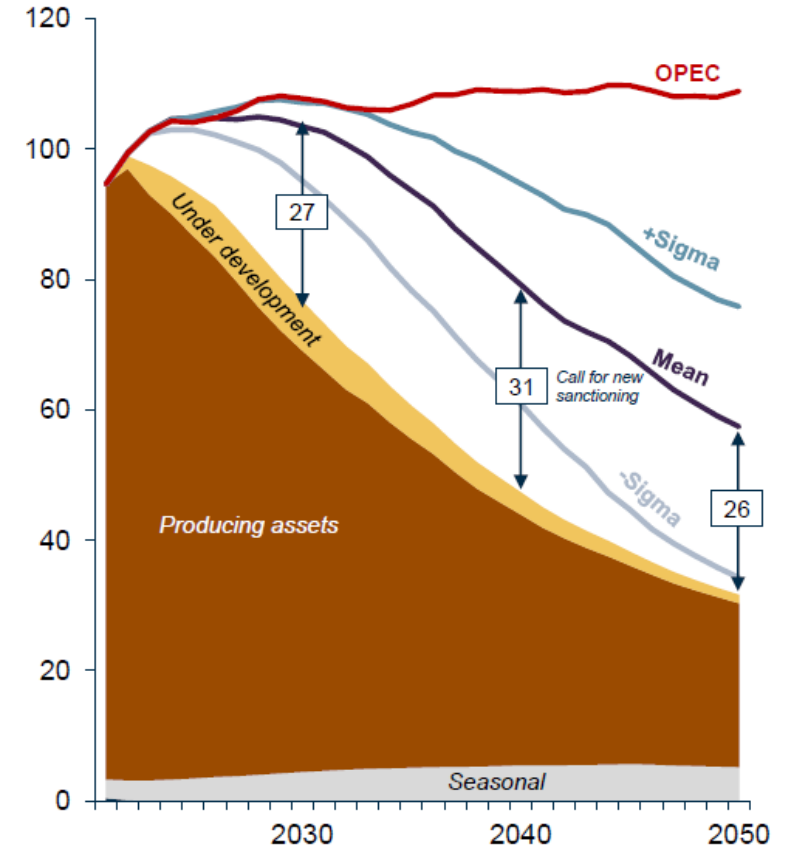


Key factors for success:

- ✓ Cost competitiveness
- ✓ Low carbon intensity
- ✓ Flexibility

Focus for today

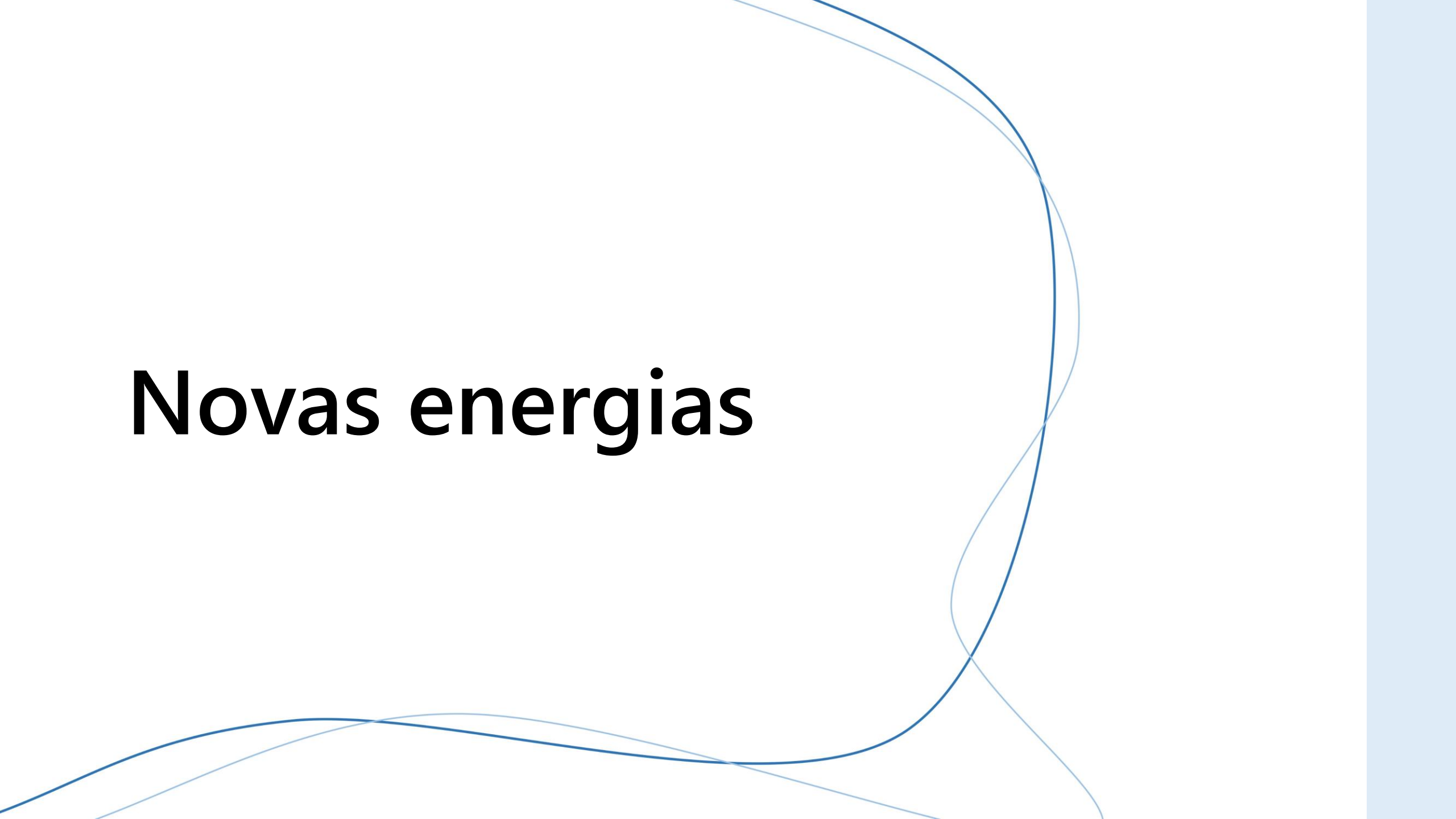
Liquids supply and call for new sanctioning
Million barrels per day (bpd)

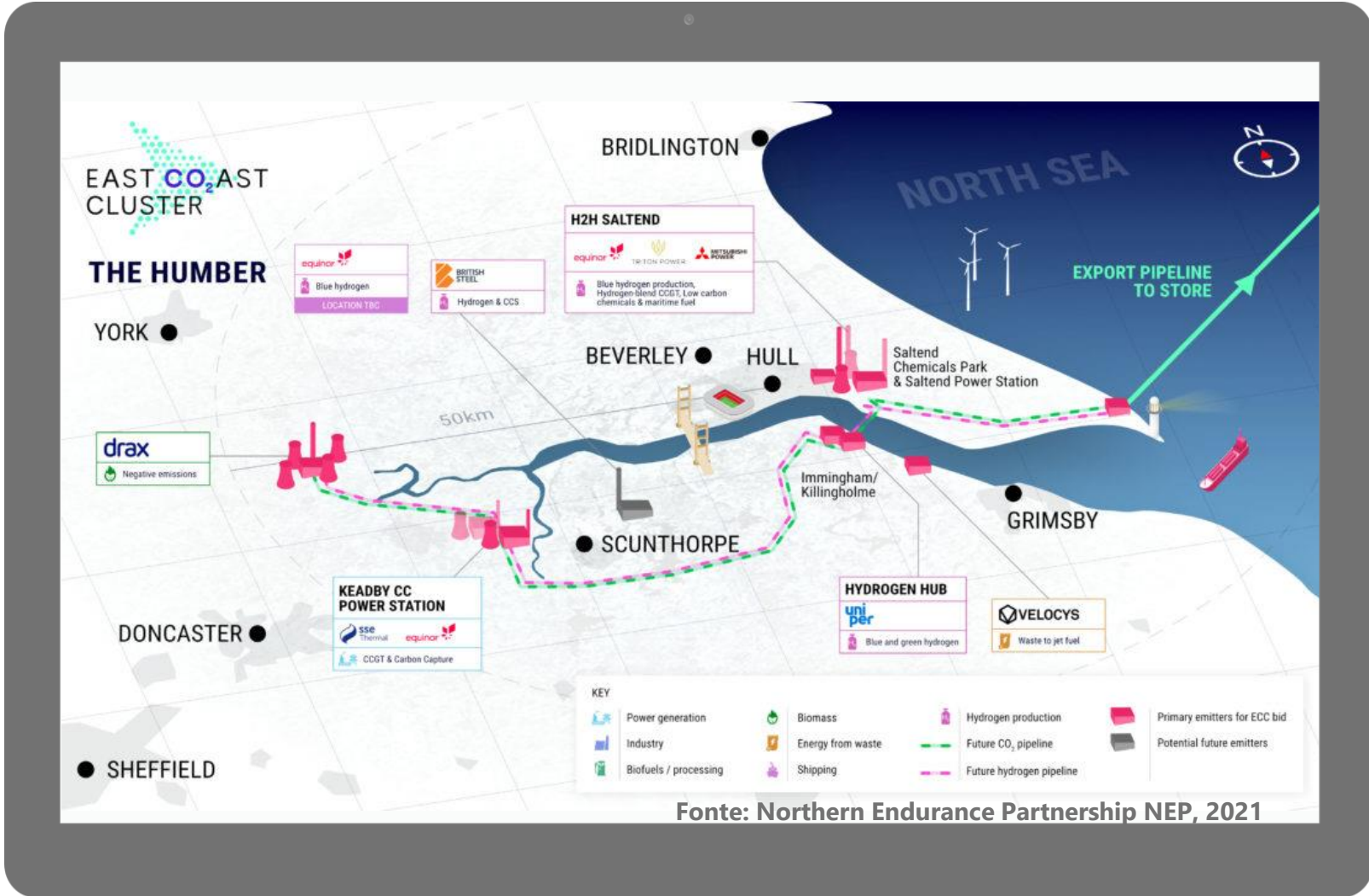


DECONSTRUCTING CHALLENGES AHEAD: UPSTREAM ENERGY TRANSITION RISK ASSESSMENT
WITH A FOCUS ON BRAZIL

OLGA SAVENKOVA, SENIOR ANALYST GLOBAL UPSTREAM RESEARCH

Novas energias





Fonte: Northern Endurance Partnership NEP, 2021

Overview of existing and planned CCUS facilities

AUSTRIA

1. Vienna Green CO₂*

BELGIUM

1. Leilac (pilot capture only)
2. Antwerp@C (Port of Antwerp)*
3. Carbon Connect Delta*
4. Flite*
5. C4U
6. North-CCU-Hub
7. Power-to-Methanol Antwerp BV
8. Kairos@C

CROATIA

1. iCORD*
2. Bio-Refinery Project*

CZECHIA

1. Onshore storage project

DENMARK

1. Greensand*
2. C4: Carbon Capture Cluster Copenhagen
3. Copenhill

FINLAND

1. SHARC

FRANCE

1. DMX Demonstration in Dunkirk*
2. Pycasso*
3. K6 Program

GERMANY

1. H2morrow*
2. Leilac 2
3. Wilhelmshaven

GREECE

1. Energean Carbon Storage

ICELAND

1. Orca
2. Hellisheidi
3. Silverstone

ITALY

1. CCS Ravenna Hub*
2. Cleankerk

THE NETHERLANDS

1. Porthos (Port of Rotterdam)*
2. Aramis (Den Helder)*
3. Magnum (Eemshaven)*
4. H-Vision*
5. Twence
6. AVR-Duiven
7. Project Everest*
8. Vissingen Cryocap FG

NORWAY

1. **Sleipner CO₂ Storage***
2. Longship (including Northern Lights)*
3. Polaris CCS*
4. Norsk e-fuel
5. Borg CO₂*
6. Fortum Oslo Varne
7. Barents Blue*
8. Norcem Brevik
9. Pilot CCS project

POLAND

1. Poland EU CCS Interconnector

REPUBLIC OF IRELAND

1. ERVIA

ROMANIA

1. Onshore storage project

SPAIN

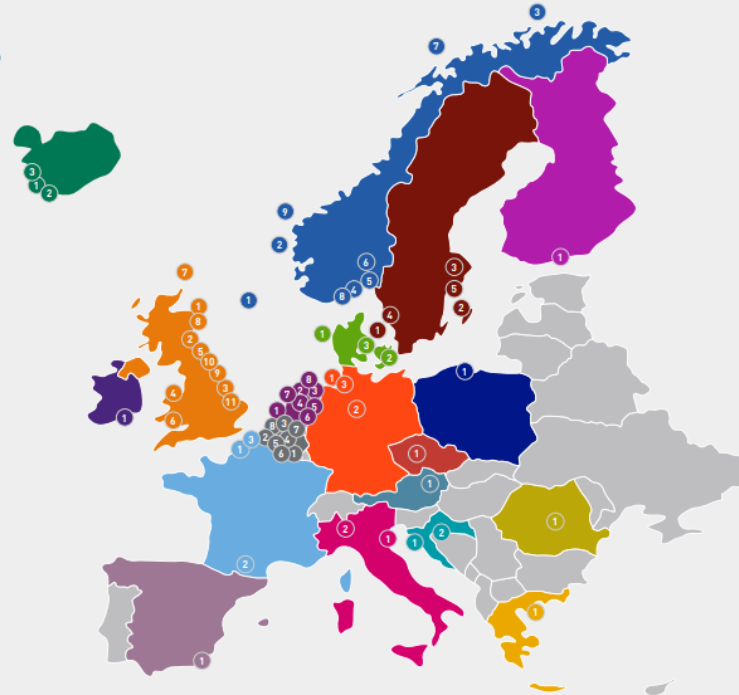
1. CCU Lighthouse Carboneras

SWEDEN

1. Preem CCS*
2. Cementa Söte Plant
3. Vattenfall Uppsala
4. CinfraCap
5. BECCS@STHLM

UK

1. Acorn*
2. Caledonia Clean Energy
3. Zero Carbon Humber*
4. HyNet*
5. Netzero Teesside*
6. South Wales Industrial Cluster
7. STEMM-CCS*
8. CO₂ Sapling Transport Infrastructure Project
9. Northern Endurance Partnership*
10. H2Teesside*
11. H2H Saltend*

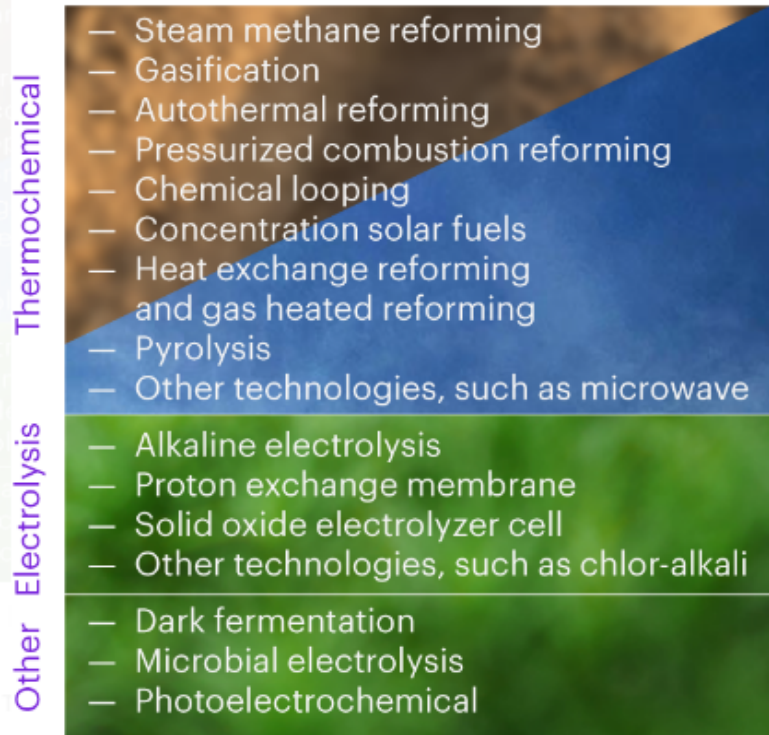


* Project where IOGP Members are involved
 † Project is cross-border with the Netherlands
 Projects listed in **bold** are in operation

Total number of projects: **65**
 Around 60 MtCO₂/yr stored by 2030

Fonte: IOGP Europa, 2022

Production technology



● Brown H₂ ● Blue H₂ ● Green H₂

Conversion, storage, transport, and distribution

Conversion

- Hydrogen gas
- Liquid hydrogen
- NH₃
- Liquefied organic hydrogen carrier

Transport

- Trucks
- Trains
- Pipeline
- Tankers

Storage

- Geological storage
- Storage tanks
- Chemical reconversion
- Liquefaction and regasification

End use applications

Industrial applications

- Oil refining
- Chemicals production
- Iron and steel production
- High-temperature heat
- Food industry

Mobility

- Light-duty vehicles
- Heavy-duty vehicles
- Maritime
- Rail
- Aviation

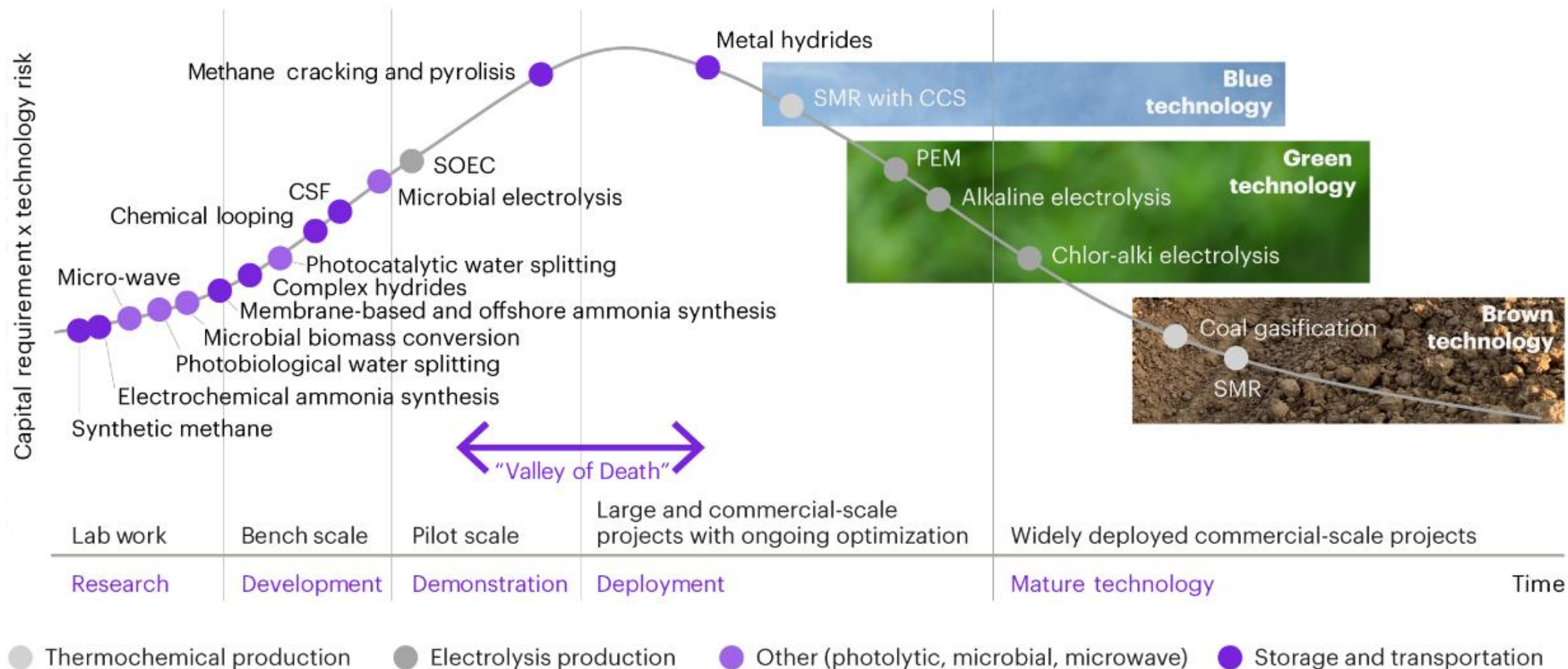
Power generation

- Co-firing NH₃ in coal power plants
- Flexible power generation
- Back-up and off-grid power supply

Gas energy

- Long-term, large-scale storage
- Blended H₂
- Methanation
- Pure H₂

Maturity curve of key hydrogen technologies



Fonte: Kearney Energy Transition Institute



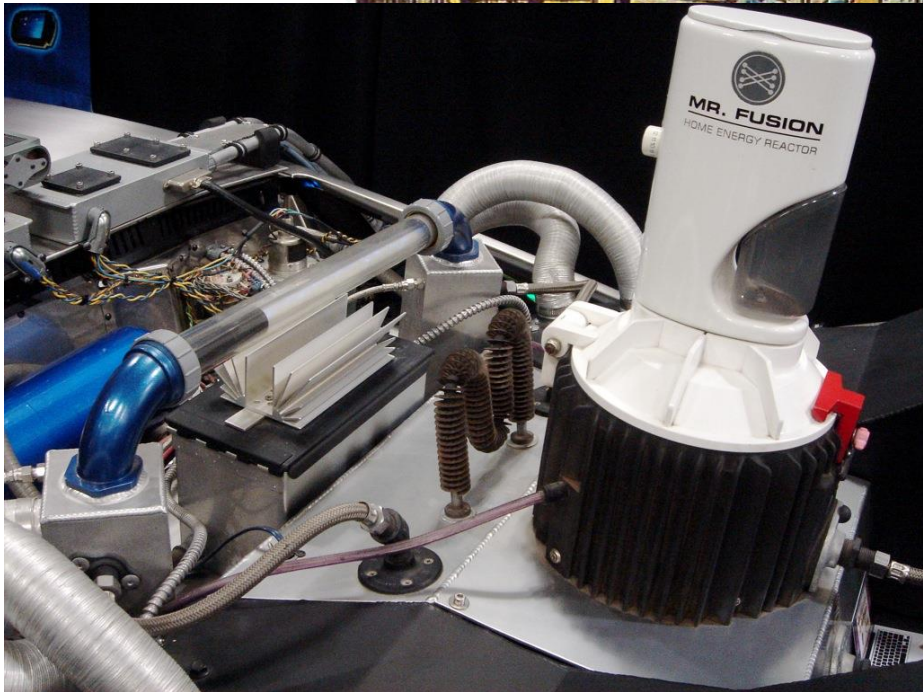
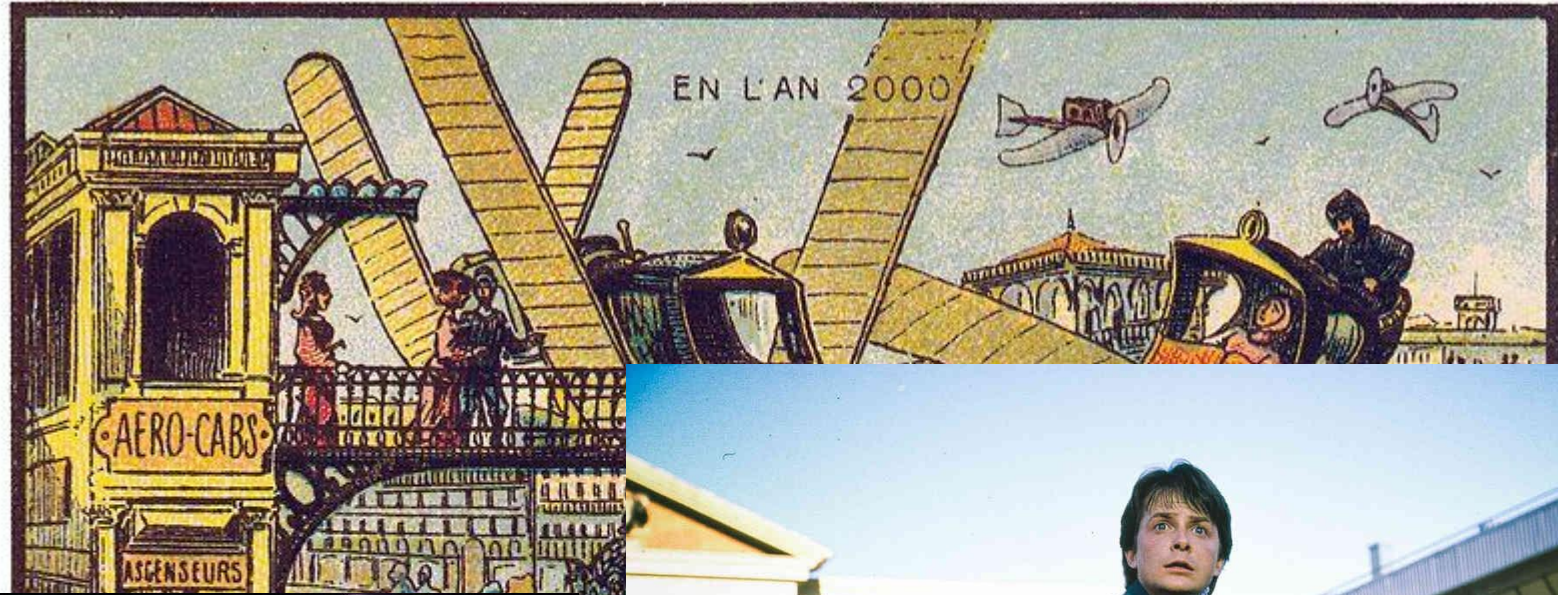
1870



1958



ANTI-GRAVITY CARS. In the far future, motor-cars may be suspended and propelled smoothly by invisible magnetic beams. This special form of driving stream, with a "magnetic" highway of the future may be like. Above is a one-way passenger car; the one below is reserved for goods traffic.



Obrigado!