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Future role of green gases in Germany and the EU

Leon Stille
Energy Delta Institute, part of New Energy Coalition
IBC working comittee "Energy"

Energy Delta Institute

´Being the transitional knowledge bridge between traditional and new energy actors´

- Business School founded 2001
- Part of New Energy Coalition
- Focus:
  - Open market programs, courses, incompany training and networking events
  - Yearly training of over 1000 energy professionals
  - Supported by (in-house) academia and expert lecturers
- 50 FTE (13FTE EDI), 6M revenue/yr

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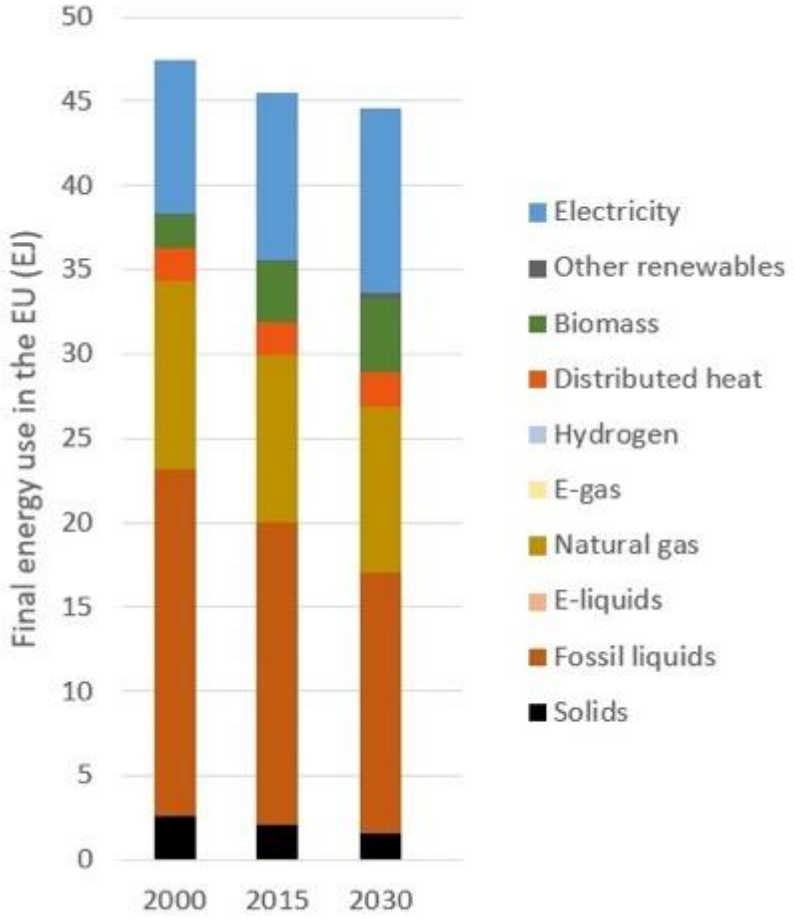
Leon Stille

General Manager Energy Delta Institute | Energy Transition | Innovation | Education | Hydrogen | CCUS | Green Gas | Speaker | Moderator

EU Energy system in transition→ net zero

Energy source and use Change



Source: EC 2018

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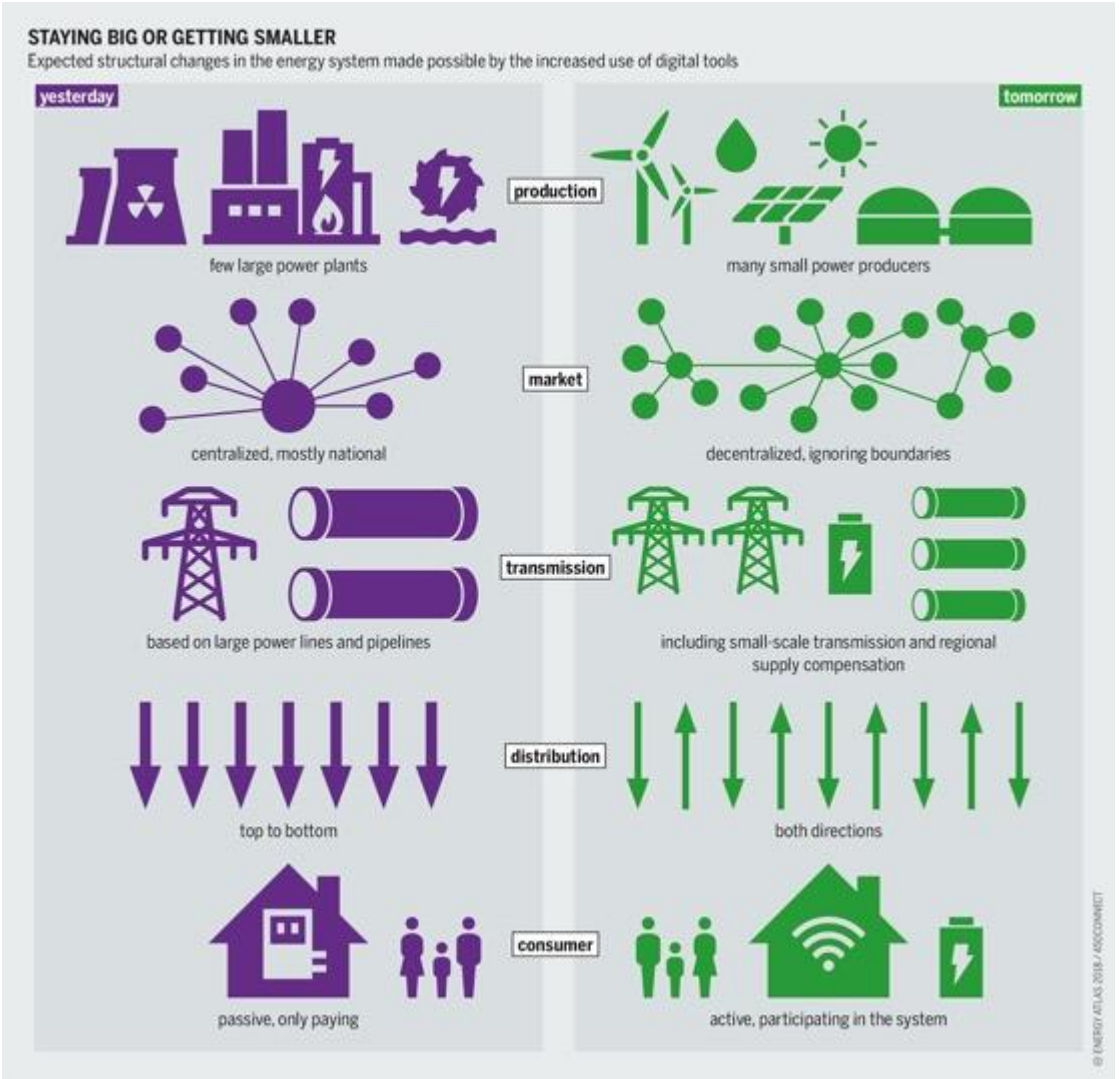
System Change



EU Energy system transformation

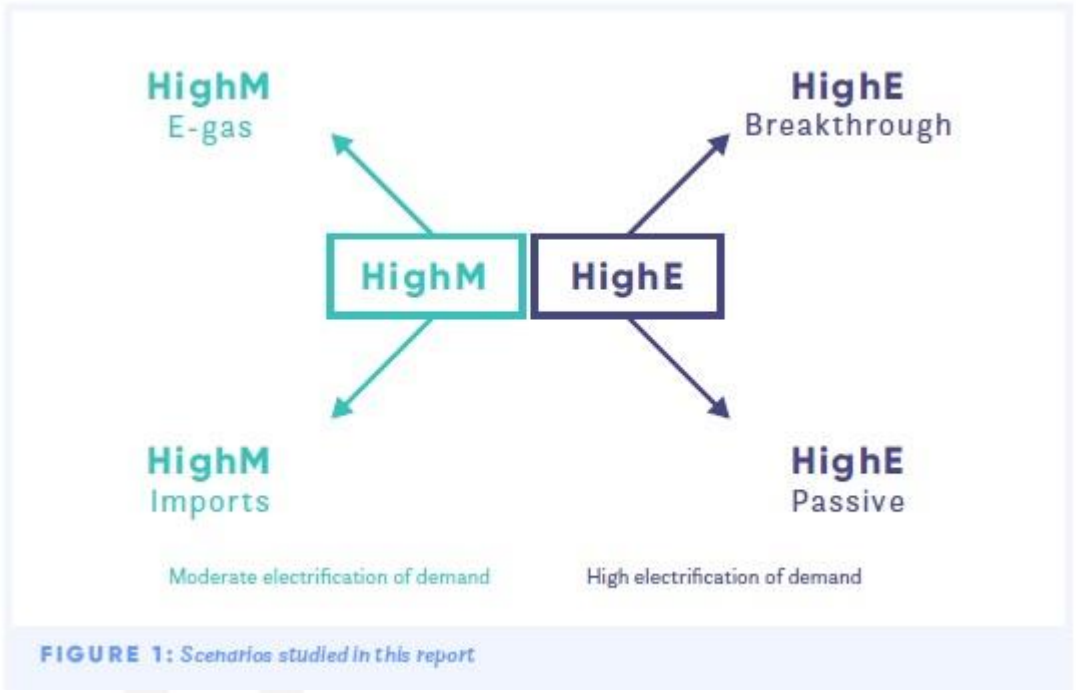


FIGURE 1: *Scenarios studied in this report*

Source: net zero 2050

How to further decarbonize?

Four scenario's:

- High molecules (renewable gas and fuels)
- High Molecules (import renewable gas and fuels)
- High electrons (breakthrough/smart)
- High electrons (passive/less smart)

Key Drivers for scenario choices

1. Economic
    - Cost and benefits
2. Social
    - Acceptance and disruption
3. Technical
    - Availability of (future) technology

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EU Energy system greening

Greening so far

- Electricity mix
  - Renewable around 30%
  - Fossil around 45%
  - Nuclear 25%
- Fuels and solids
  - Renewables around 4%
  - Fossil 96%

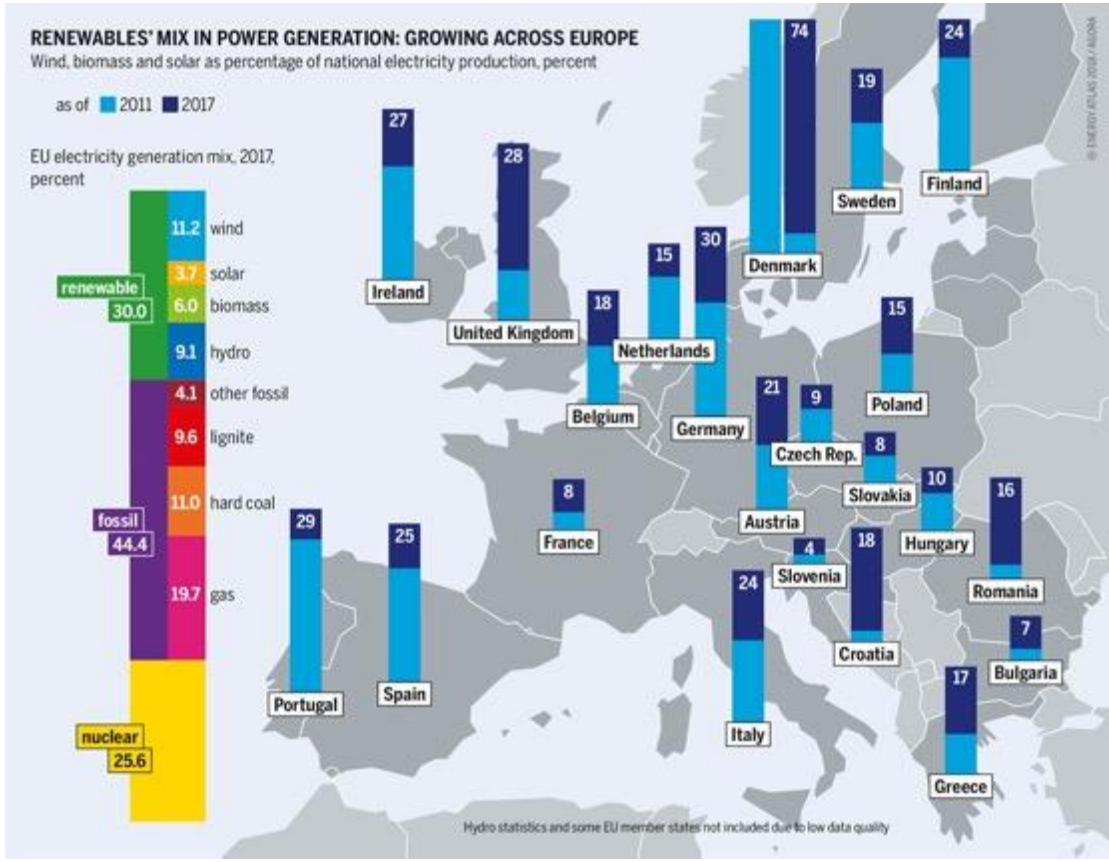
1000 billion euro
10 year time
0,5% EU economy

In total mix 2019

- 80% Fuel and gas, 20% Electricity

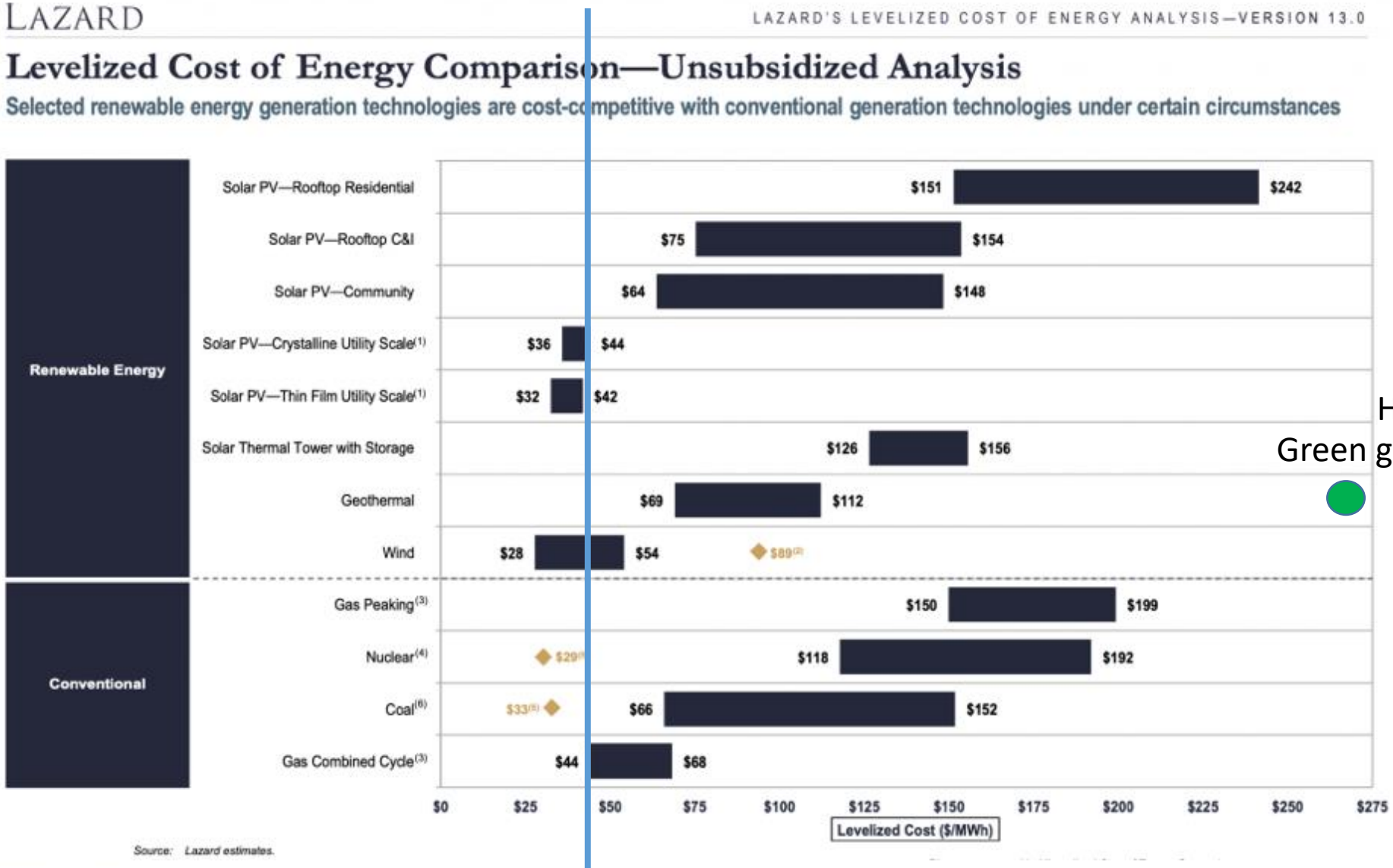
<u>HOWEVER, 100% Renewable required 2050!</u>

So the difference in the speed of greening between the electron and molecule part of the EU energy system is striking.



Source: energy atlas 2018

Energy costs



Hydrogen

Green gas

EU Energy system transformation

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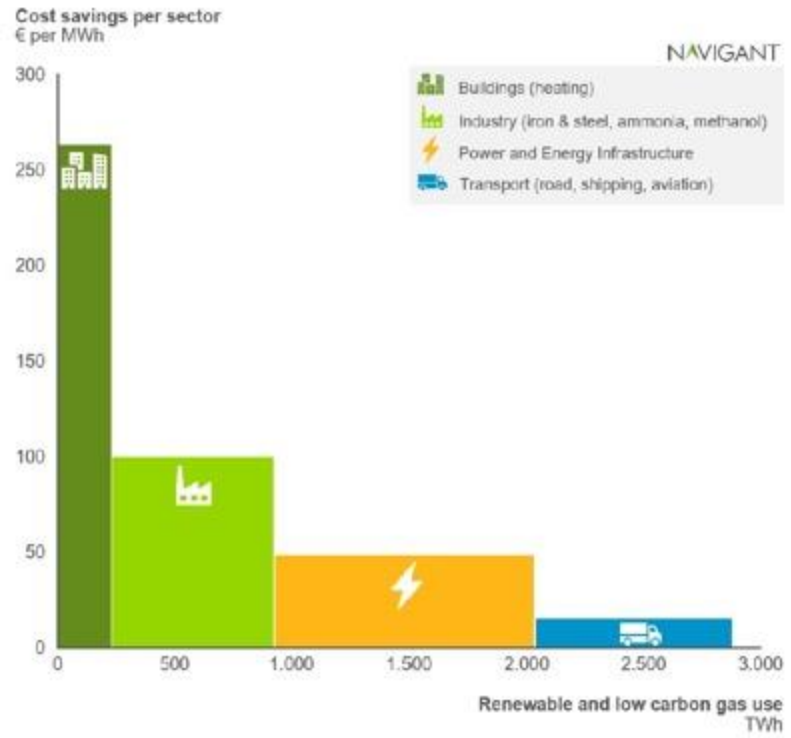

40% electric/60% molecules

Between 100-217 billion annual savings

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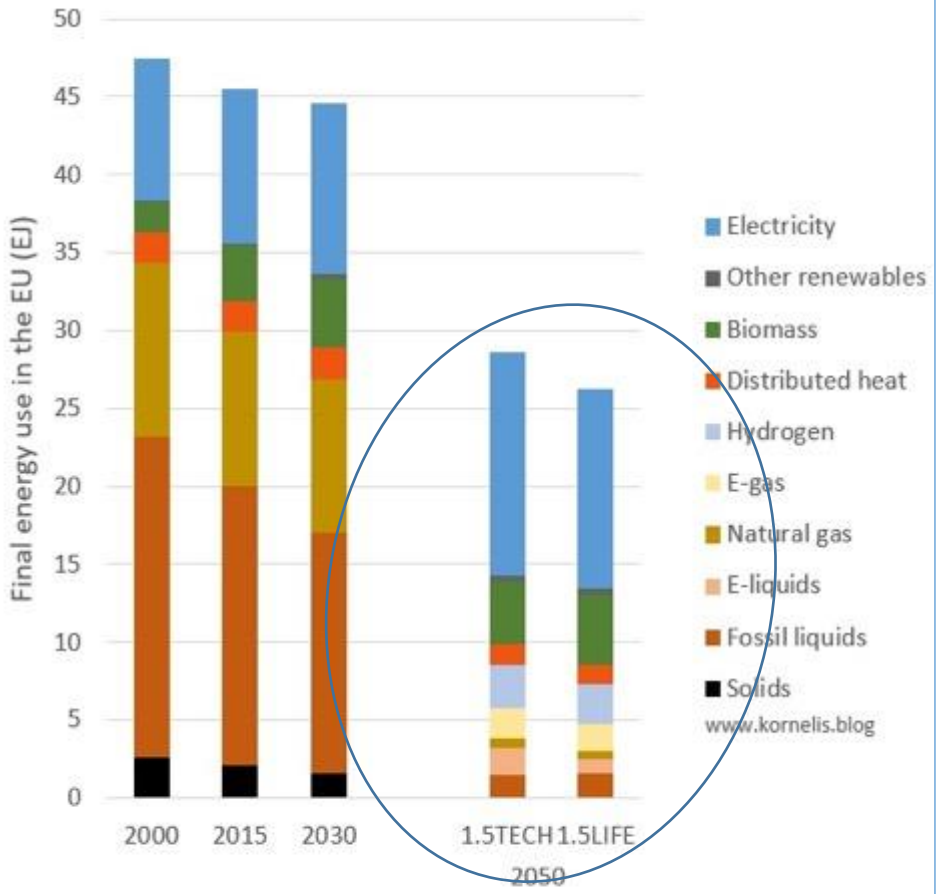
Source: Navigant gas for climate



50% electric/50% molecules

Source: EU 2018

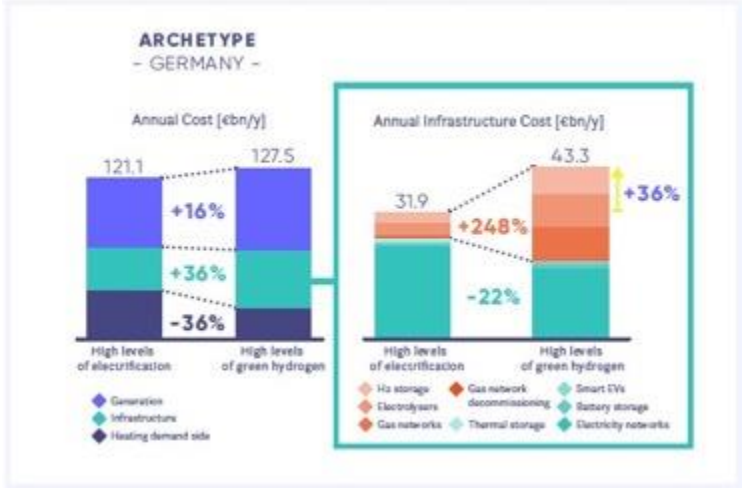


FIGURE 3: Scenario comparison of whole system costs for archetype Germany

90% electric vs 40% electric

Between 80-100 billion annual saving

Source: net zero 2050

Renewable gas EU

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Renewable gas EU - Bio methane

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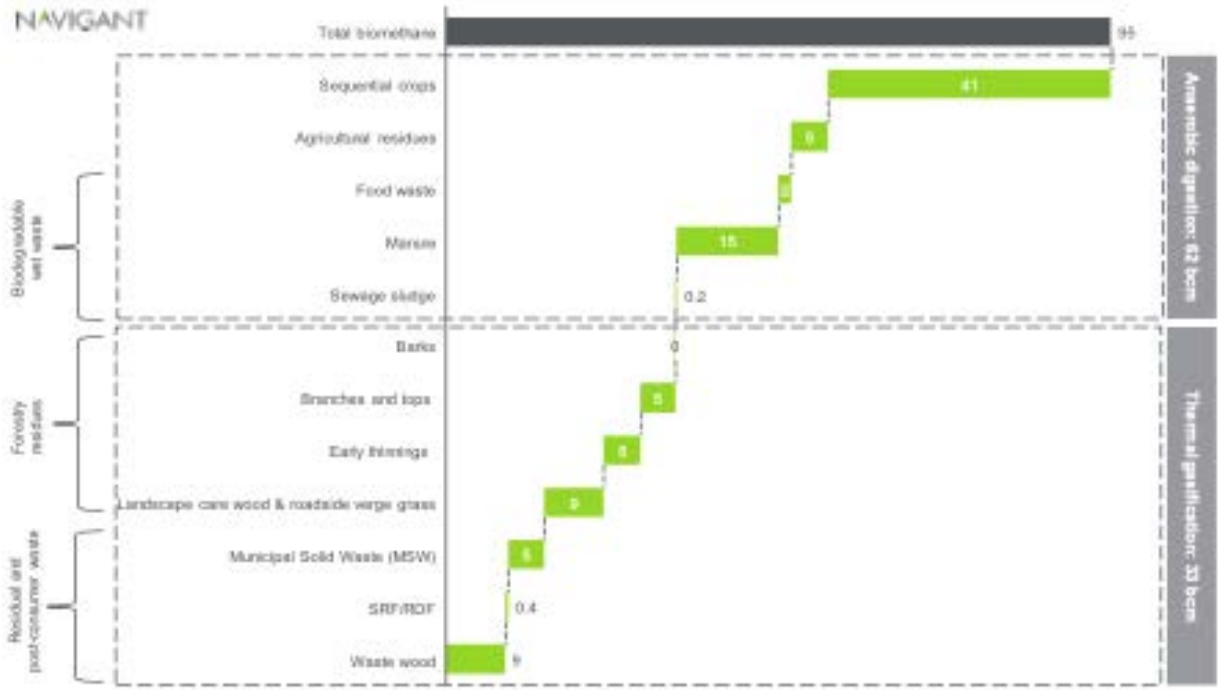

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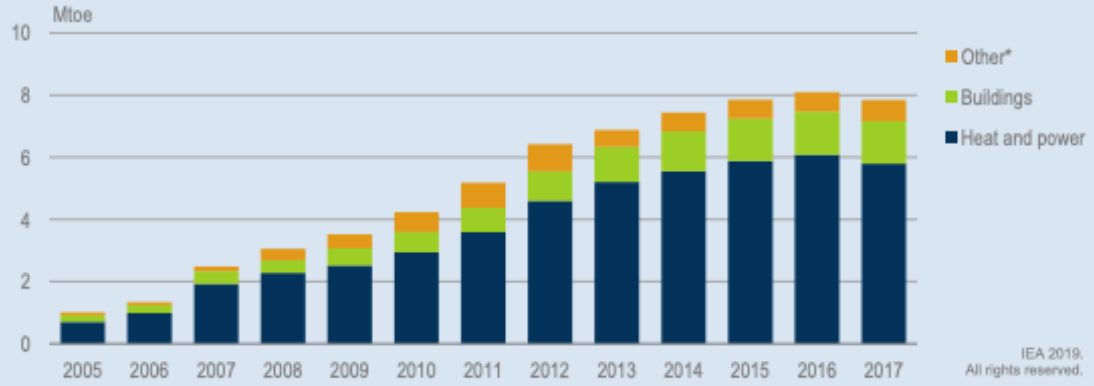
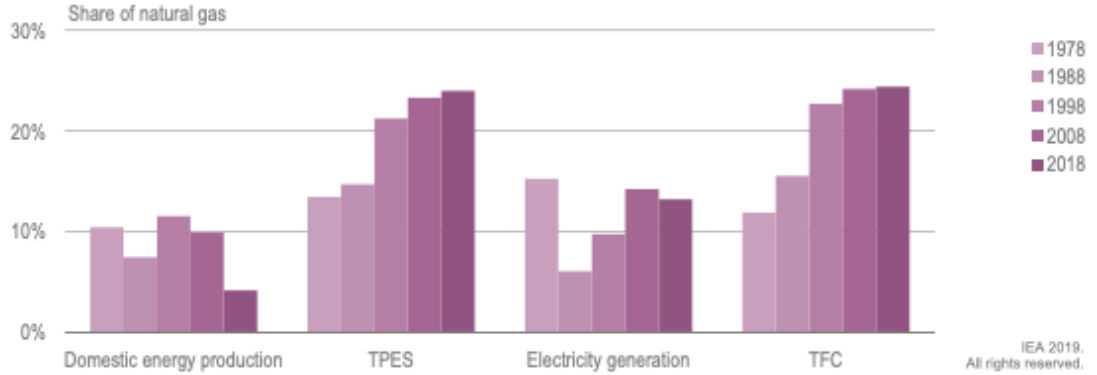
Figure 5.4 Biogas consumption by sector, 2005-17



Germany produces more biogas than any other IEA member country, most of it used for heat and power generation or in residential and commercial buildings.

Figure 8.1 Share of natural gas in the German energy system, 1978-2018



Natural gas is the second-largest energy source (after oil) with nearly 25% of TPES and TFC, but the share of gas has stabilised and the share of gas in domestic production is falling.

Renewable gas EU – Hydrogen

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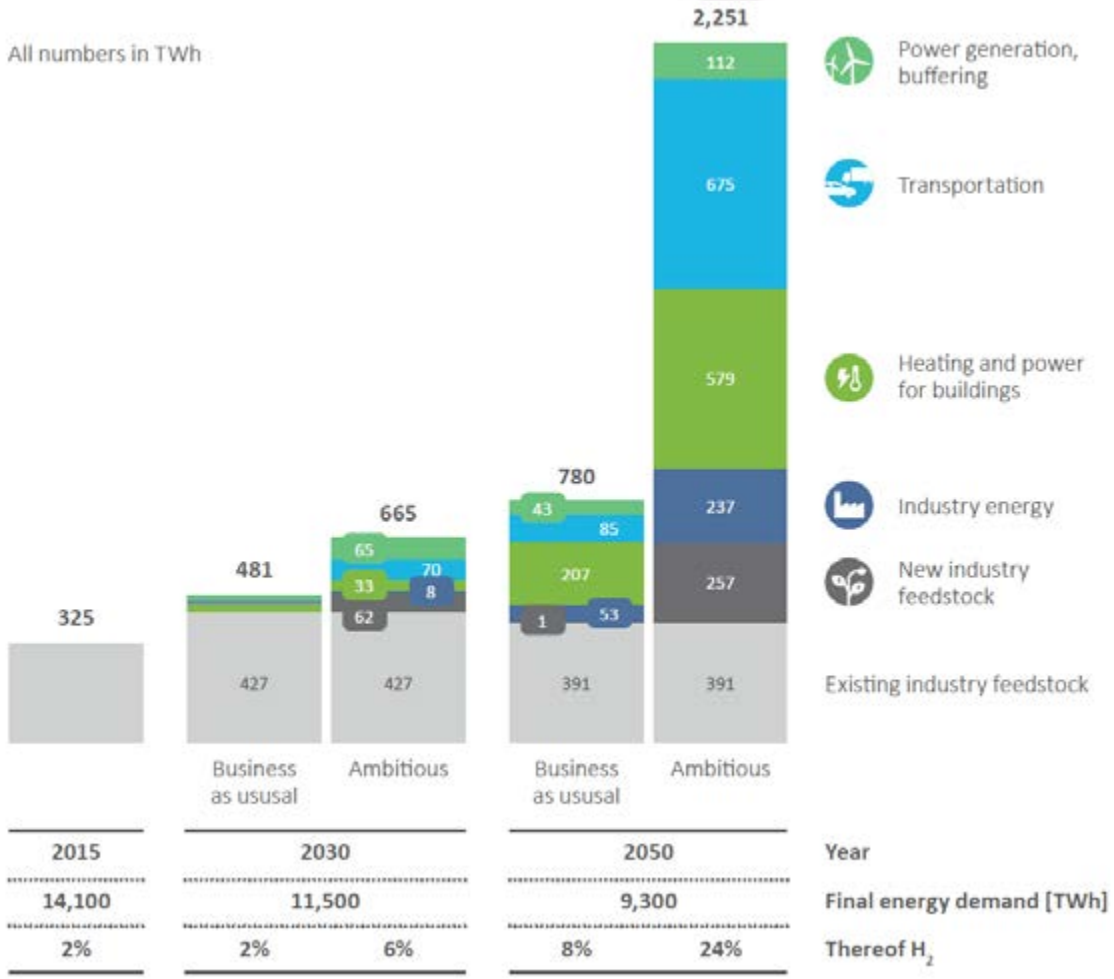

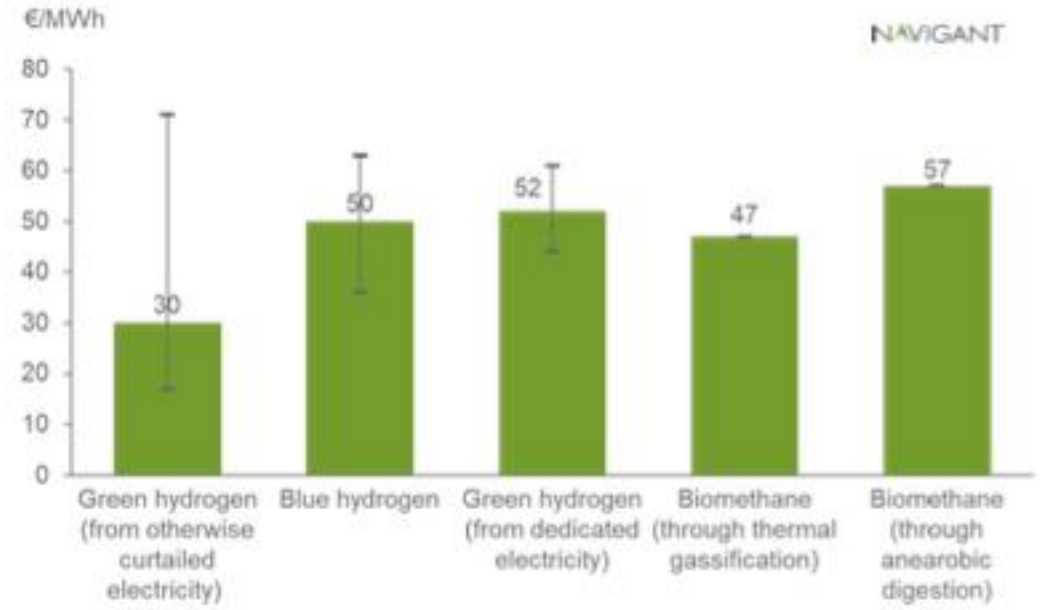

Figure 18 Comparison of hydrogen and biomethane production costs in 2050.

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NATIONAL HYDROGEN STRATEGIES

ELECTROLYSIS CAPACITY AND INVESTMENT TARGETS [1] (GW AND EUR BILLION)

Adopted hydrogen strategy

Hydrogen strategy in development

X GW Electrolysis capacity commitment

€X bn Funding commitment

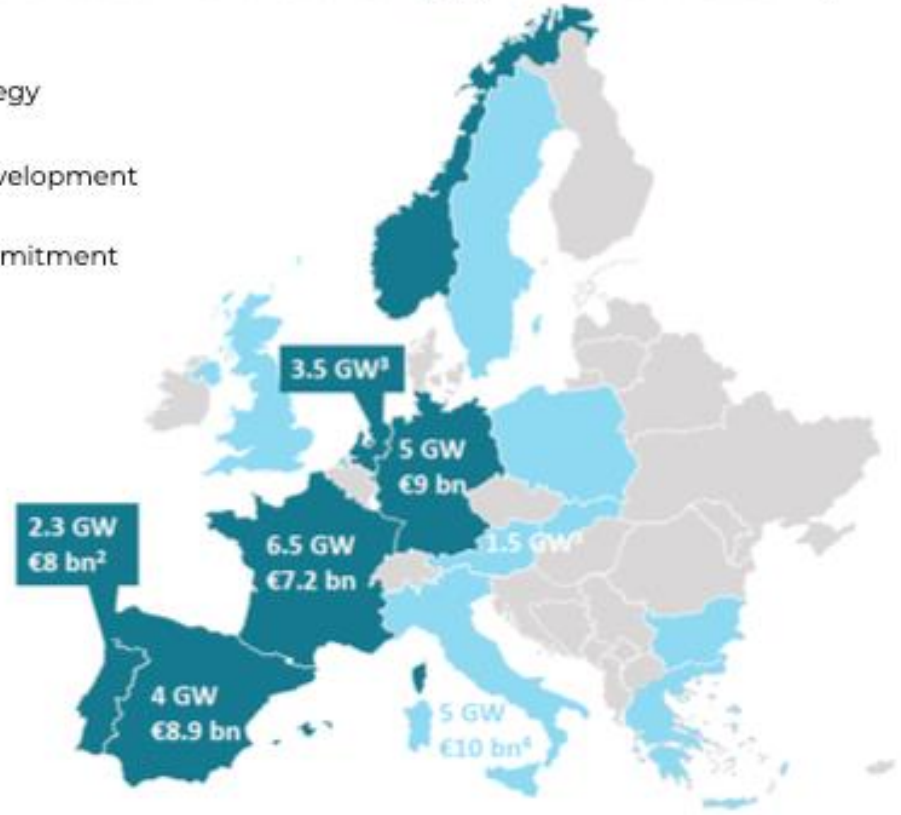

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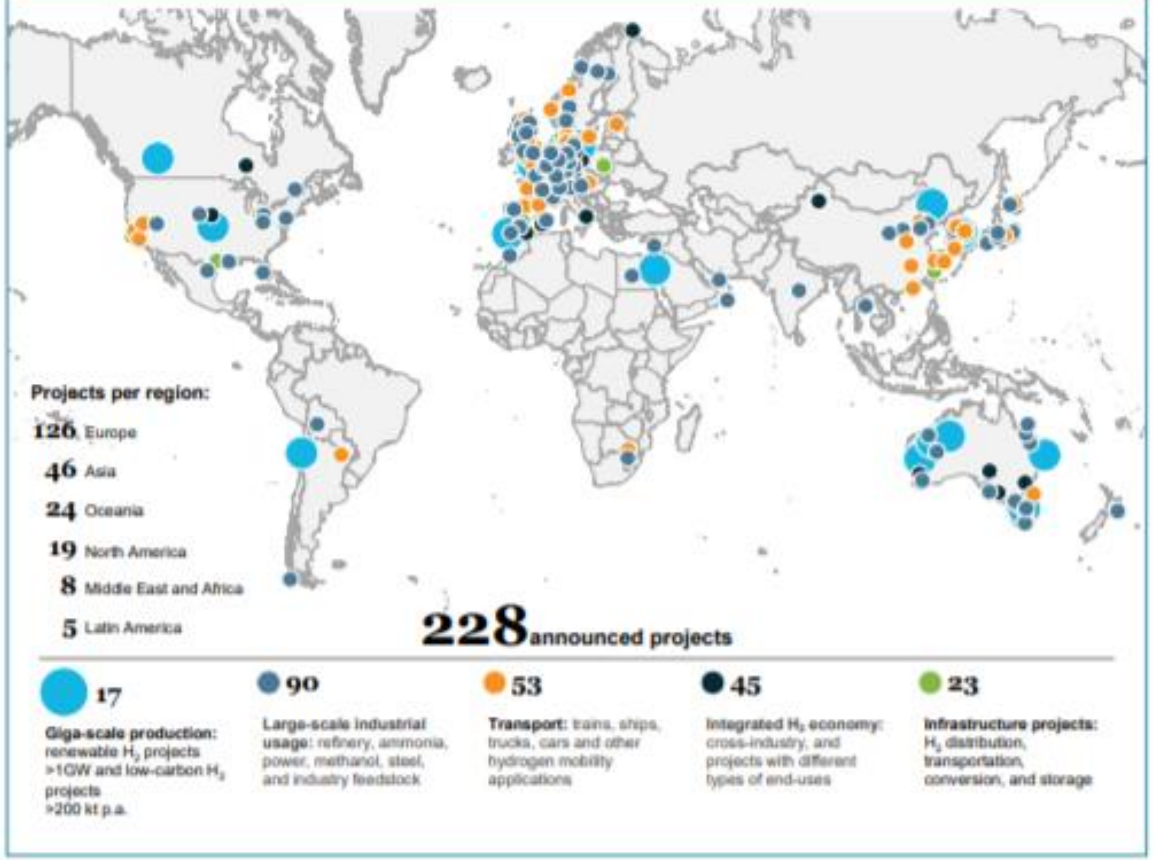
Exhibit 2: Global hydrogen projects across the value chain



https://hydrogencouncil.com/wp-content/uploads/2021/02/Hydrogen-Insights-2021.pdf

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Conclusions

- Initial effort was mainly in electric due to
  - characteristics of the renewables (solar, wind, hydro)
  - Molecules has a well developed supply chain, more difficult to change
  - Electricity is less polluted and more modern in the minds of the people
- Most realistic scenario's predict around 50/50
  - Large role for renewable gasses (hydrogen, biomethane) and natural gas
  - Primarily for storage/balancing and (chemical) industry
- Unclear as to the exact costs and benefits
  - Different investment costs and savings
    - Navigant: 200+ billion/yr savings→ optimized gas scenario
    - Net zero 2050: 10-15%/yr savings→ full electric scenario
  - Who bears the costs?
  - Industry is not always counted in, or costs are shifted
- Social acceptance and ease of transformation increasingly important
  - Previously scenario's always stated 100% electric
  - Reliability of supply, drop in solutions, empowering citizens (decentralization), etc
- Ongoing 'contest'

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Thank you!

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