

bifa Umweltinstitut GmbH

Environmental and Applied Research

Dr. Nico Bevilacqua

A truly circular economy is not just about recycling materials. It is also about closing energy loops.

Hydrogen – Key questions

Why?

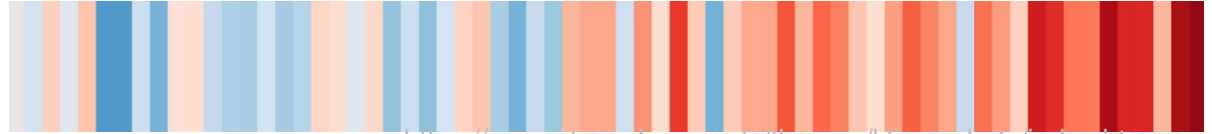
- Decarbonization
- Resilience and energy security

Where from?

- Centralization vs. decentralization
- Import vs. domestic production
- Sourcing

How?

- Road to cost reduction
- Enabling early adopters



<https://www.stmuv.bayern.de/themen/klimaschutz/index.htm>



Founded in
1991



Employees
40



Legal form: GmbH
(non profit)

Shareholders:



Free State of Bavaria



Stadt Augsburg

City of Augsburg



Chamber of Industry and
Commerce for Swabia

Across Germany, one of the leading application oriented institutes for



Research



Development



Consulting



Broad range of applied environmental research topics

Extensive network of experts in

- public and private sector
- national and international level

Sourcing H₂ in a circular economy

Applied research...

...ressource efficient, sustainable and climate oriented

Natural sciences

- Chemistry
- Physics
- Microbiology

Sociology and Psychology



Technical personell

Engineering

- Industrial engineering
- Mechanical engineering
- Process engineering
- Utilities engineering
- Biotechnology

Business adiminstration

System study for waste incineration plants

- Comissioned by Umweltbundesamt (German Environment Agency)
- Technology scouting
- Economical feasibility study

Potential:

- Yield of approx. $100 \text{ kg}_{\text{H}_2}/\text{t}_{\text{waste}}$
- 40-60% of primary energy in feed
- Production cost of $4.20 \text{ €/kg}_{\text{H}_2}$



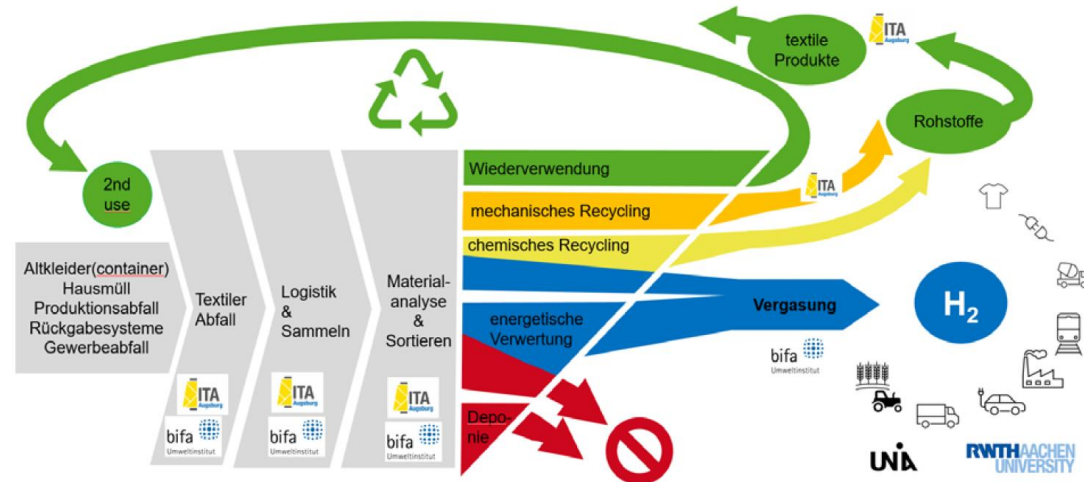
<https://www.ava-augsburg.de/>

Hydrogen generation from waste clothing

Pre-pilot phase study funded by Bavarian Ministry of Economic Affairs (among others)

- 120M t/a textile waste, 80% of which is disposed of
 - 70k t/a in Bavaria alone
 - Doubled fiber production over 25 yrs
 - Mostly only downcycling possible
 - < 1 % recycling
- Pressure to act

Hydrogen gasification is a possibility



Hydrogen generation from waste water treatment plants

- Eco-PIK Project to evaluate potential for WWTP
- Combination of sewage gasification with biological methanation in a flexible micro gas turbine process
- Biological and chemical expertise
- **Harnessing energy dense sewage**



<https://www.augsburg.de/umwelt-soziales/umwelt/stadtentwaesserung/klaerwerk>

Technological projects

Recycling concept of rSOC stack

- Process development
- Market research
- LCA and eco design analysis
- Legal consulting

Project with Reverion (Eresing)

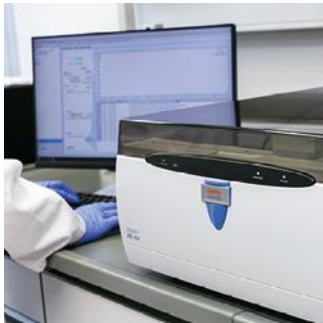
Funded by BMW (Federal Ministry for
Economic Affairs and Energy)



Research – Development – Consulting

Technical center with test workshop

- Industrial building: 940 sqm
- Operation of pilot systems and testing units



Various labs with different specializations

- Chemical
- Microbiological (S2)
- Mechanical Treatment

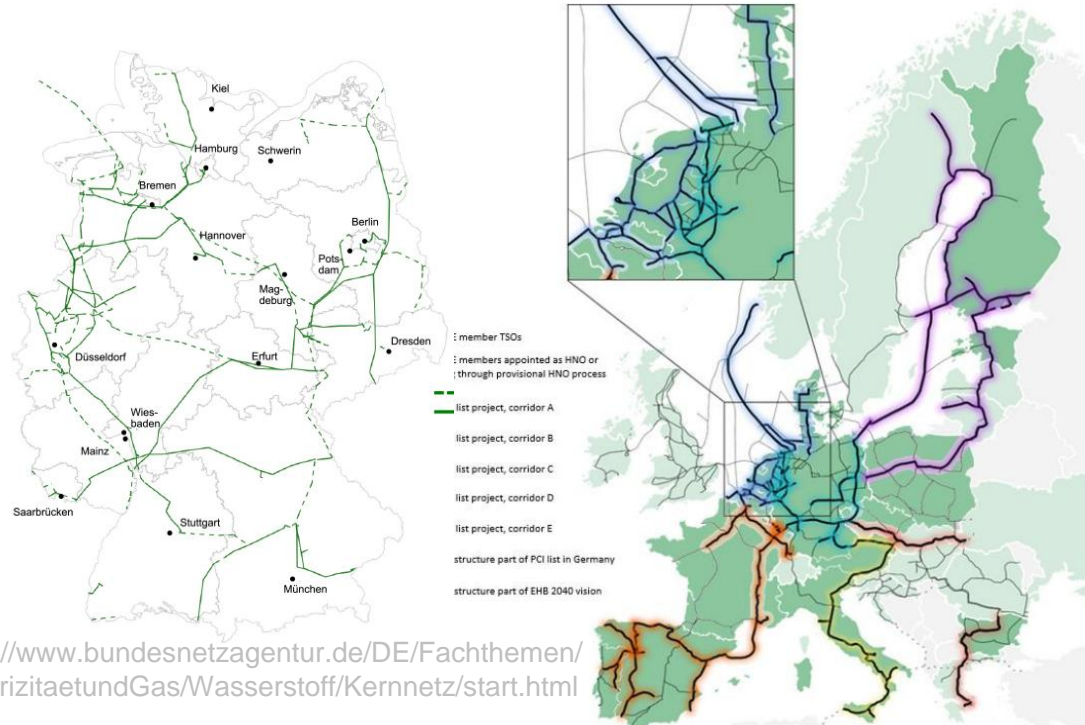
Road to cost reduction

Road to cost reduction

European H₂ backbone and
Germany-wide H₂ grid
Transport costs: 0.11 – 0.21
€/kg_{H2} per 1000 km

Incentive for investors
Enables long-term planning

Clear commitment
Creates confidence



<https://www.bundesnetzagentur.de/DE/Fachthemen/ElektrizitaetundGas/Wasserstoff/Kernnetz/start.html>

https://www.ehb.eu/files/downloads/1732103116_EHB-Boosting-EU-Resilience-and-Competitiveness-20-11-VF.pdf

Road to cost reduction

Deloitte finds that electricity costs can lower price of green hydrogen by 30% (short term)

Why?

100% renewable power system (even with batteries) will have to have overproduction
→ Negative spot prices

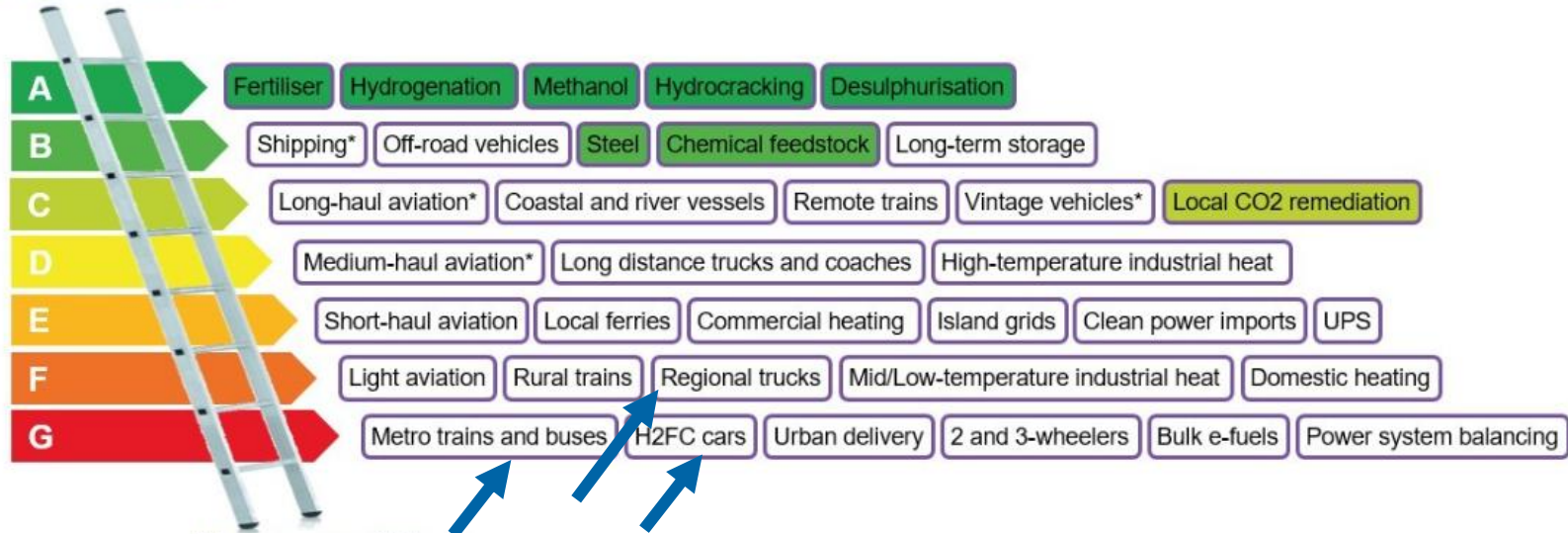
Clear commitment for renewables



Dr. László Eifert, Bayernwerk, private Archives

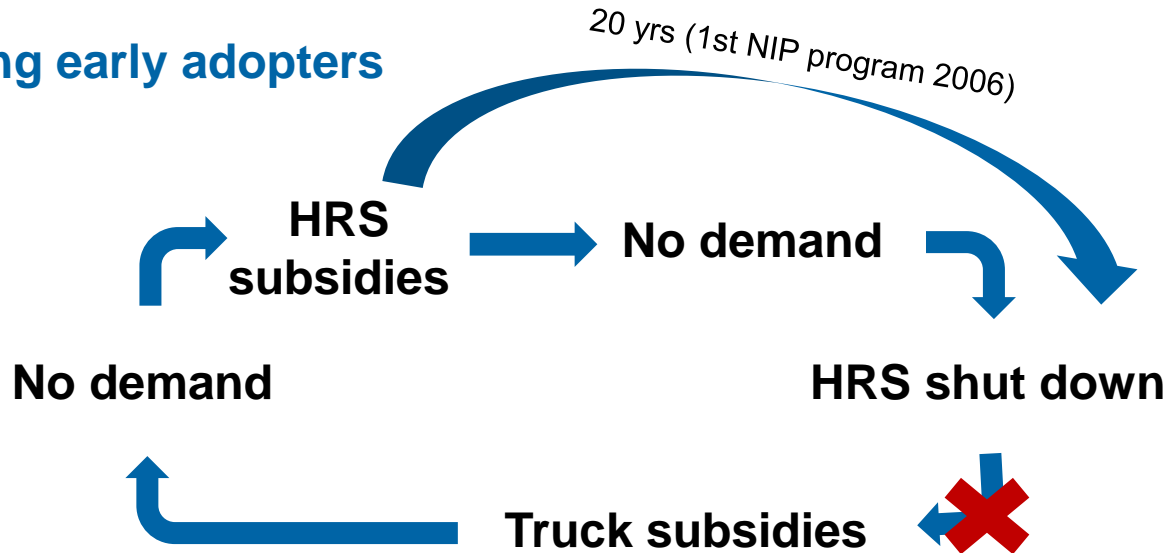
Enabling early adopters

Enabling early adopters



Immediacy vs. Efficiency
Transition-sequencing is much more important for the ramp up
Create confined corridors

Enabling early adopters



- Link offer and demand in one program for scale up
 - Long term program (10+ yrs)
- **Create confined corridors**

Enabling early adopters

China:

- Confined corridors with long-term plans with strong regional focus

UK:

- State offers Contracts for Difference (price)
- Subsidies decrease over time as effects of economy of scale increase

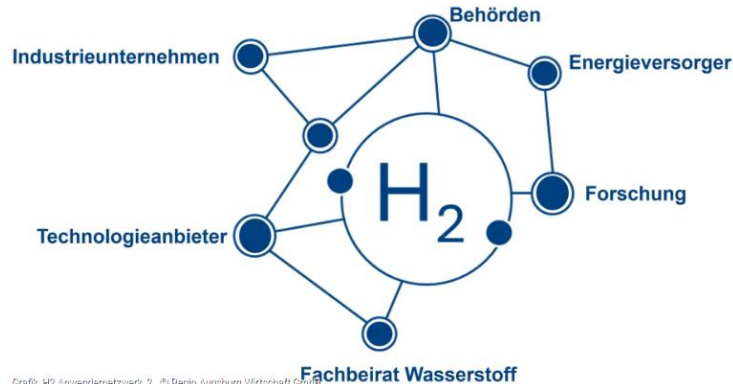
Create confidence



<https://www.gov.uk/government/news/new-uk-certification-to-boost-british-hydrogen-sector>

Enabling early adopters

Transformations- und H₂-Anwendernetzwerk
für den produzierenden Mittelstand
Augsburg | Schwaben | Bayern



Grafik_H2 Anwendernetzwerk/2 © Regio Augsburg Wirtschaft GmbH

H2 Anwendernetzwerk Regio Augsburg Wirtschaft GmbH



Stakeholder communication, coordination and connection between partners

Summary

CCC

Chaos
Changes
Confusion

CCC

Confined corridors
Clear commitments
Create confidence

Contact

bifa Umweltinstitut GmbH
Am Mittleren Moos 46
86167 Augsburg

Tel. +49 821 7000-0
Fax. +49 821 7000-100
marketing@bifa.de
www.bifa.de

CCC

Chaos
Changes
Confusion

CCC

Confined corridors
Clear commitments
Create confidence

More information

