



Green Logistics Enabler
Bruno Lukas

Online Workshop
Swiss Hydrogen Business Modell

H2 Energy Holding AG - Patrick Huber

Zurich, July 6, 2021



Jules Verne's quote on hydrogen

I believe that water will one day be employed as fuel, that hydrogen and oxygen which constitute it, used singly or together, will furnish an inexhaustible source of heat and light, of an intensity of which coal is not capable.

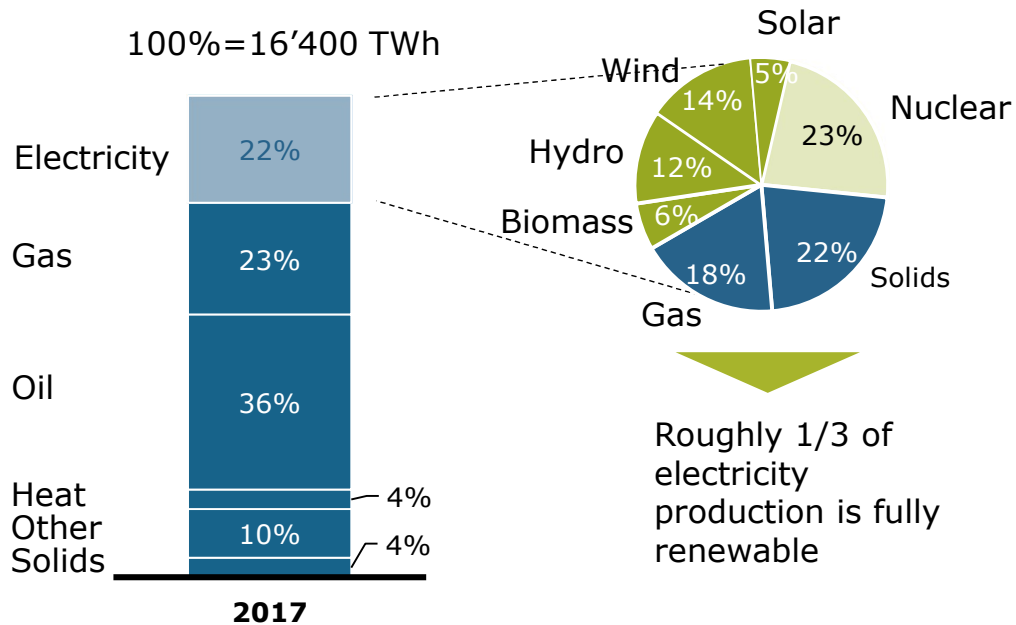
Jules Verne, 1877



85% of the current European final energy consumption must be decarbonised



Total European Final Energy Consumption

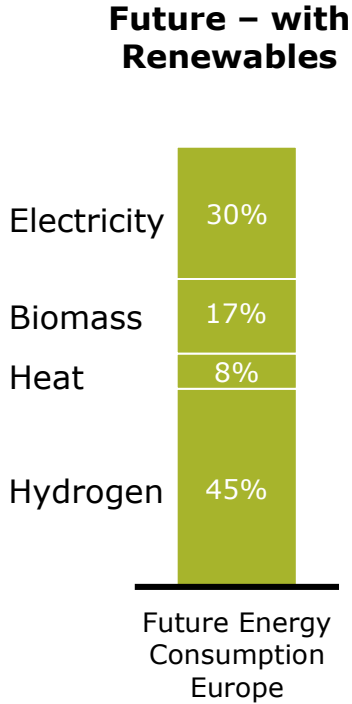
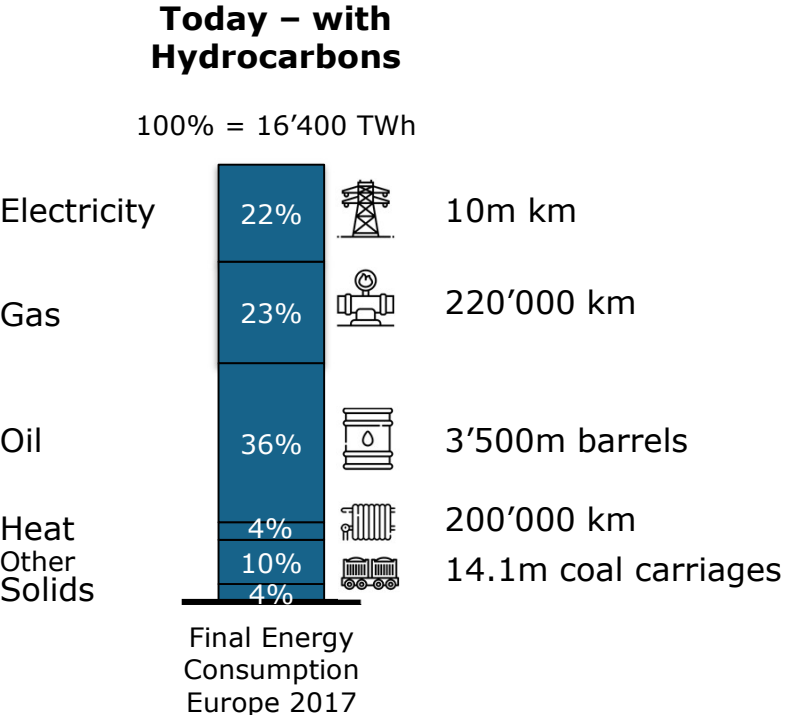


Green Deal Europe

- CO₂ neutral Europe until 2050
- Intelligent sector coupling (electricity, gas & heat)
- Use hydrogen for "hard to decarbonise sectors"

Decarbonise total of 14'100 TWh energy
 =
 85% of current final energy consumption

Hydrogen crucial for future energy transmission



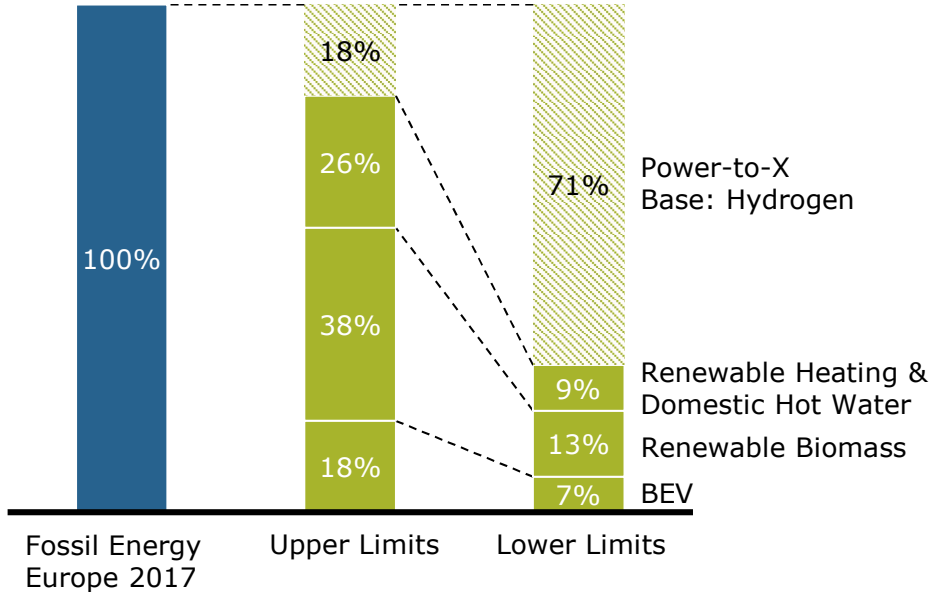
18-71% of fossil energy will have to be shifted towards hydrogen for decarbonization



Conversion of today's fossil energy carriers to fully renewable carriers

In TWh and Percent

100% = 14'100 TWh



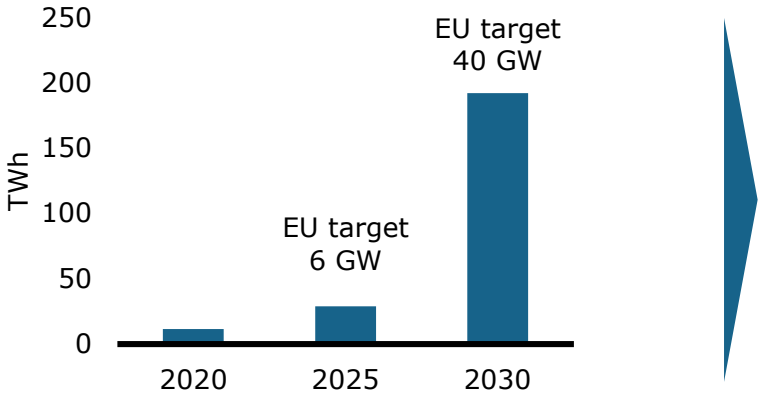
Massive shift to Hydrogen based energy economy without existing infrastructure

European Hydrogen Strategy not sufficient to cover energy transition



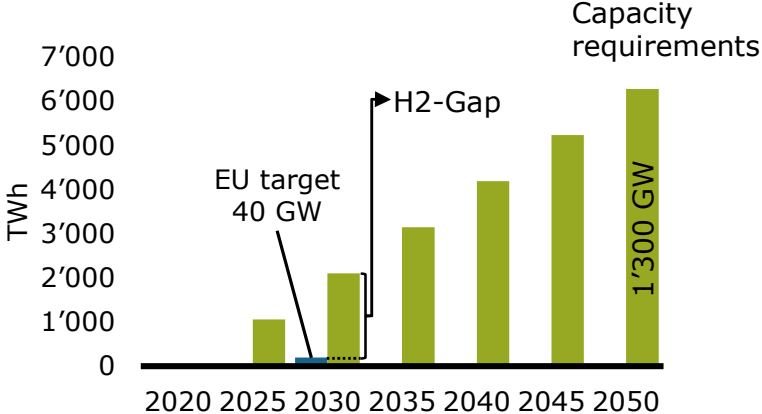
H2 capacity objectives according to European Hydrogen Strategy

In GW and TWh



Hydrogen production capacity to fully enable renewable energy transition

In GW and TWh



H2 Energy Holding Corporate Profile



Vision

The goal of H2 Energy is nothing less than stopping climate change and to promote hydrogen as supporting pillar of our energy system

Activities

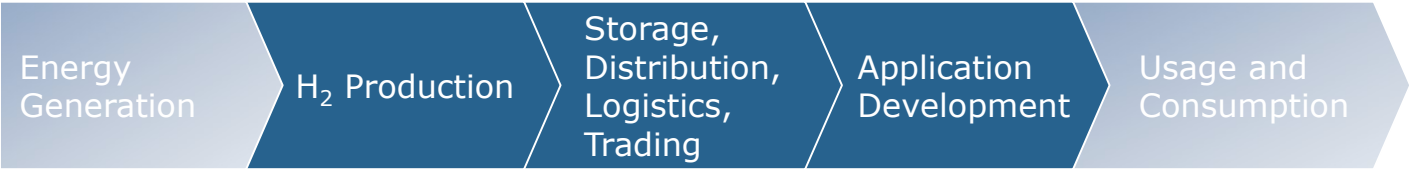
- Hydrogen Strategies and Eco-Systems
- Fuel Cell Application Engineering
- Power to Gas Engineering
- Hydrogen Refueling Station (HRS) Engineering

Entrepreneurs / Partners



Funding

- Self-Funded
- Profitable
- Free of Debt



Four Business Segments within H2 Energy

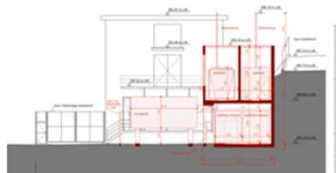


HRS Engineering



- Feasibility studies hydrogen refueling projects
- Technology selection
- Building permits
- HRS technology integration
- Defining refueling ramp
- Conformity
- Service optimization

Power to Gas Engineering



- General contracting of hydrogen infrastructure (production and logistics)
- General technical layout
- Building permit
- H2 specific knowledge transfer
- Implementation

FC Application Engineering



- Non-automotive fuel cell applications
 - Ships
 - Trains
 - Stationary, off-grid power
 - Snow groomer
- Systems engineering
- Technical system integration
- Prototyping

Hydrogen Strategies



- Designing eco-system for specific applications
- Commercialization of hydrogen solutions
- Technology assessment
- Country strategies and business planning

H2 Energy established Coop hydrogen system – closing the energy cycle



Hydrogen trucks allow fleet operators to decarbonize their logistic and supply chain

Run-of-the-river-plants deliver renewable energy



Delivering to hydrogen refueling stations of Swiss H2 association

PEM electrolyzers transform water and renewable energy into hydrogen

Hydrogen transport

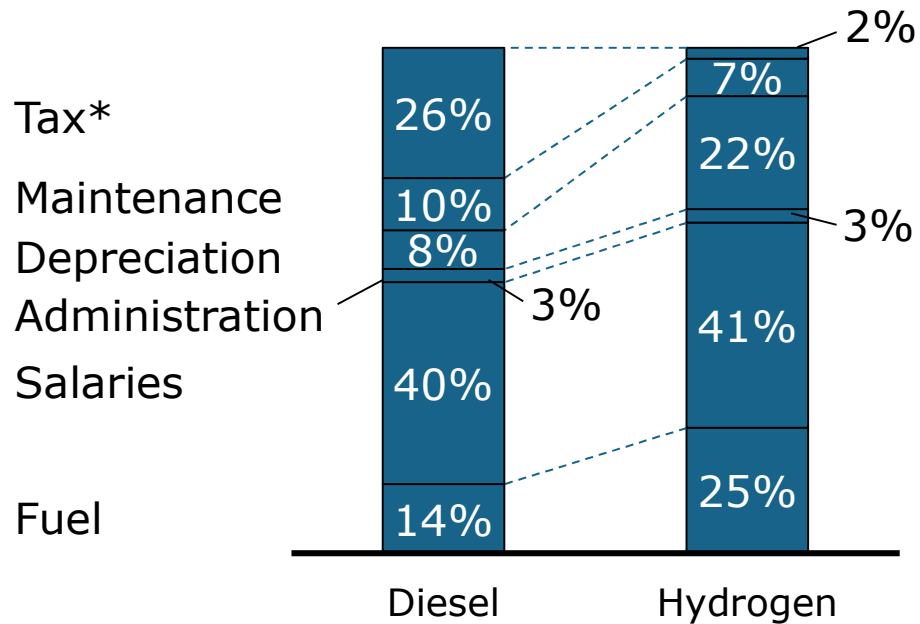
Functioning H₂ Energy hydrogen production plant, Coop HRS and fuel cell truck



LSVA Exemption enables cost party to Diesel



100% approx. 250 kCHF 100% approx. 250 kCHF



- Swiss Heavy-Duty Tax «LSVA» is an «Emission-Tax» going back to the Swiss Alp initiative
- The exemption of «LSVA» offers the opportunity to commercialize emission free heavy-duty trucks in a commercially viable model

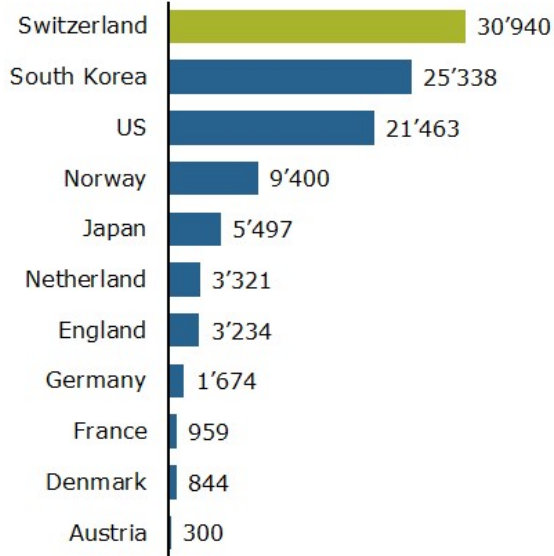
* Includes Insurance and Financing costs, Swiss Heavy Duty Tax «LSVA» for Euro 6 trucks (2.28 Rp./tkm; i.e. 91.2 Rp per km for a 40 ton vehicle)

Switzerland today: number one hydrogen volume generator at the refueling stations worldwide

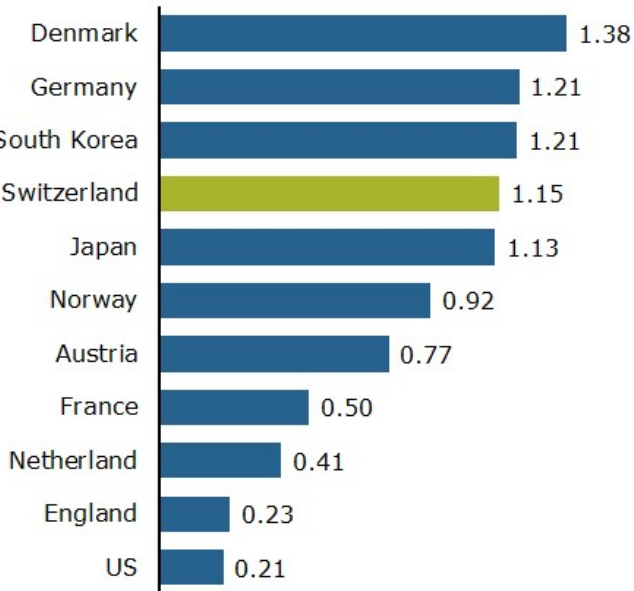


H2 dispensed per hydrogen refueling station (HRS) and country

In kg H2 per HRS and year



Number of hydrogen refueling stations per one million inhabitants and country



Source: LBST, www.h2stations.org

How did Switzerland catch-up?



Sound plan, eco-systems approach, private initiative



Pragmatic entrepreneurs aiming to fight climate change



Proactive, excellent research institutes supporting private initiatives



Very little subsidies hit the sweet spot, permitting, support, internalizing external costs



Up to date, Switzerland is the first and only country,

- with a serial mass produced H2 truck fleet
- 'green' hydrogen supply
- large scale hydrogen eco-system
- purely private H2 initiative

Thank you for your
attention!

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A large, semi-transparent blue circular graphic containing the letters 'H2O' in a bold, sans-serif font. The 'H' and '2' are in a darker blue, while the 'O' is a lighter shade. The background of the slide is a solid dark blue.