# Legal Pathways for Green Hydrogen in Switzerland and Comparative Insights from the EU

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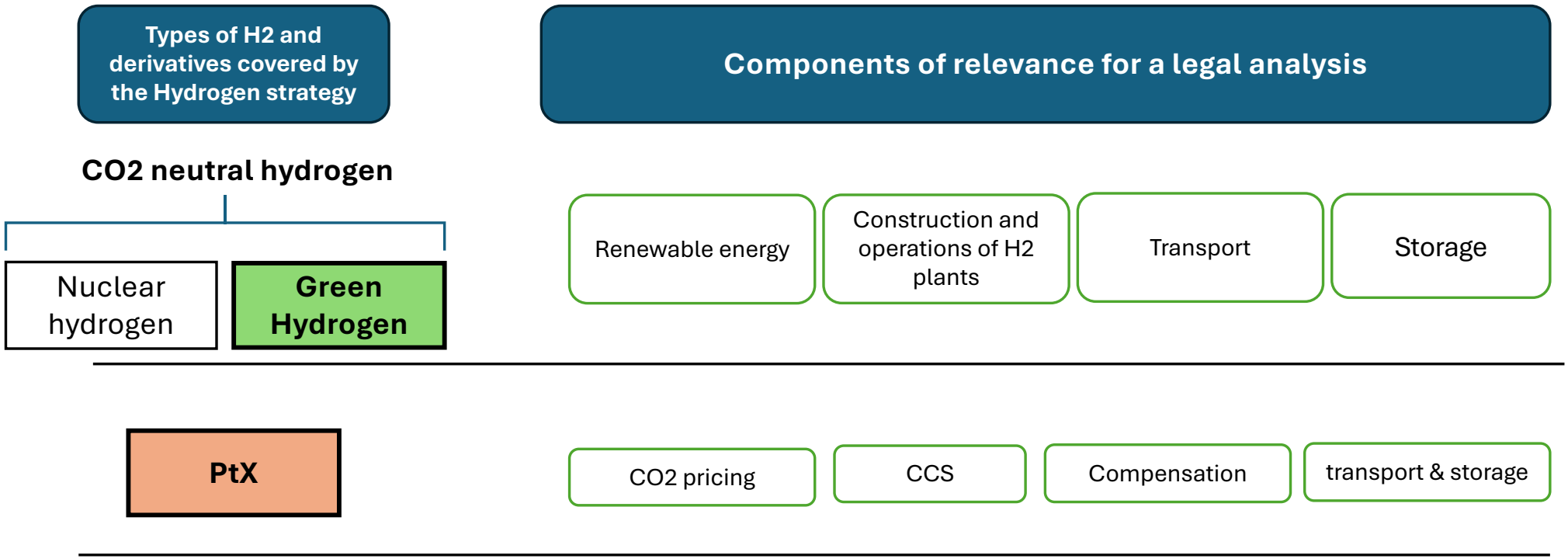
# Roadmap

1. **Green hydrogen and derivatives in Switzerland**
   - Green H2: targets, production, transport and storage
   - Legal frameworks for CO2 emissions, use, transport and storage

2. **Green hydrogen and derivatives in France and the Netherlands**
   - Green H2: targets, production, transport and storage
   - Legal frameworks for CO2 emissions, use, transport and storage

3. **Preliminary insights for Switzerland**

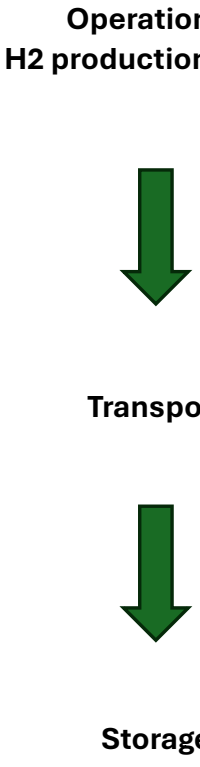
# Hydrogen in Switzerland



# Green H2: targets, production, transport and storage

| | Measures | Legal framework |
|---|---|---|
| **Production and use of renewable energy sources for electricity production** | **Legally binding targets**:<br>• For electricity production generated from renewable energy sources, excluding hydropower, the goal is to achieve an **average domestic production of at least 4,400 GWh by 2020 and at least 11,400 GWh by 2035.** | Art. 2 Federal Electricity Act |
| **Electrolyzer capacity** | Targets to be defined by private sector | Hydrogen strategy |
| **Construction of new plants for H2 production** | • **The role of Cantons**: Cantons are expected to minimize administrative obstacles.<br>• **Methanization plants and electrolyzers classified as of "national interest"**<br>• **Simplification for the licensing for critical infrastructures outside the building zone**: Licensing of biomass and other plants for the conversion of RE into hydrogen, methane and other synthetic hydrocarbons outside the building zone. This must be appropriate for a security supply of RE. | Hydrogen strategy<br>Spatial Planning Act<br>2023 Electricity Act (Umbrella Decree) |
| **Operation of H2 production plants** | **Exemption from grid fees for**<br>• **H2 production plants at electricity generation plants** (Art. 16.1 Energy Act).<br>This was extended to industrial producers by the Umbrella Decree. | Energy Act |

# Renewable energy as an imput – relevant frameworks and measures




| Measures | Legal framework |
|---|---|
| Grid fee reimbursement for **pilot and demonstration plants that are**<br>• **operated with electricity from RE**<br>• **until a total capacity of 200 MW**<br>• **converting hydrogen, gas or synthetic fuels with electricity into storable chemical substrates**<br>• The plant has novel technical or operational characteristics (Art. 54 Ord) | Energy Act and Ordinance |
| **Hydrogen can be transported via road, rail and pipelines.**<br><br>**Access of hydrogen in energy networks:** The network operator ensures the injection of hydrogen (blending) and renewable gases (biological and synthetic) into their distribution area, provided it is technically and economically feasible. Criticalities in this approach pertains to the discretion granted to the network operator, which could still refuse access to the network. | Hydrogen strategy<br><br>Pipeline transport law |
| Until 2030-2035, storage of hydrogen and derivatives is planned to take place on-site, close to the site of production.<br><br>**Incentives**: storage facilities without end electricity consumption are exempted from grid fees<br><br>In the long-term, international partnerships will play a key role. | Hydrogen strategy |

# CO2 regulation in Switzerland: from emission to storage via compensation

## CO2 is emitted

**Targets** *(Climate and Innovation Act & Ordinance)*

**Net zero GHG by 2050,** that is
- to eliminate, to the greatest extent possible, GHGE such as CO2 within Switzerland by 2050
- to offset the remaining and not avoidable GHGE in CH and abroad

**CO2 pricing framework**

**1) CO2 levy (CO2 act and ordinance):** currently, the CO2 levy is set to 120 CHF/ton.
- The levy applies to fuel importers, producers and users of fossil fuels (not motor fuels)
- **Reimbursement of the CO2 tax for reduction commitments**: to operators of installations who commit to the Confederation to reduce greenhouse gas emissions by a specified amount by 2040
- **Exemption from CO2 tax**
  - for operators participating in the CH ETS.
  - fuels of non-fossil origin.

**2) Swiss ETS**
- Emission allowances
- Emission reduction certificates
- International attestations
- **Possible future developments**: emissions from the use of biomethane gas transported by pipeline be may exempted from the obligation to surrender allowances

**3) Obligation to compensate CO2 emissions from fossil fuels**

## CO2 is captured and/or removed

**Targets** *(National long-term strategy)*

Overall CO2 removal targets:
- **Pilot phase up to 2030**: to stock up to 500'000 tons by 2030 in CH or abroad
- **7 Mt$CO_2$/year by 2050**
  - 2 Mt of which are to be conducted *nationally*, and
  - 5 Mt of which are to be conducted *abroad*

**Incentives for CCS/NET technology development and use**:
- **Agreements with interested economic players:** Waste treatment installations are expected to build at least one $CO_2$ capture plant by 2030, with a minimum capacity of 100,000 tons of $CO_2$/year (*Agreement with managers of waste treatment installation*)
- **Eligibility as compensation measures:**
  - **NET technologies:** provided that they meet the following requirements: (i) the project is economically viable; (ii) it meets the current state of the art; (iii) reductions are traceable and quantifiable; (iv) it contributes to sustainable development in CH or abroad -> No registration in ETS
  - **CCS technologies** : provided that they guarantee a CO2 capture for at least 30 years. Geological or biological storage projects in CH have to be registered at the land registry (*Art. 8a CO2 Ord*), whereas attestation for biological capture in forests abroad is not possible → no registration in ETS.
- **Economic and financial support schemes**: focus on research and innovation; support on investment and operating costs, compared to the ones incurred by traditional energy plants.

**CCS/NET infrastructure**
Any CCS/NET plant in CH needs to be **built** in accordance with the applicable planning, building and environmental rules.

**International partnerships**: MoU with Sweden and the Netherlands.

# CO2 regulation in Switzerland: from emission to storage via compensation

| CO2 is transported | CO2 is stored |
|---|---|
| Provisions concerning rail, road or pipelines transport will be applicable.<br>The regulatory framework includes regulations on the transport of dangerous goods.<br><br>The Federal Act on pipeline transport facilities of combustibles and liquid or gaseous fuels is not applicable as CO2 is not a fuel according to art. 1 para 1.<br><br>The Federal council estimates that namely a CO2 **pipeline system** with international connections will be necessary but it considers that the Confederation is only responsible for promoting CCS/NET, while not competent to regulate and put in place transport and storage infrastructure. | General rules on planning and building are equally applicable.<br><br>**The role of Cantons: Cantons** also have laws governing the utilization of the underground.<br><br>**Land registry**: Geological or biological storage projects in CH have to be registered at the land registry (Art. 8a CO2 Ord). |
| | **Strategic international partnerships for storage**: It is key for Switzerland to establish strategic internatonal partnerships to exploit other countries' storage potential.  It is important the Switzerland regulatory framework aligns with the EU.<br><br>**International partnerships**: MoU signed with Norway and Iceland. |

# Green hydrogen – insights from France and the Netherlands

| | France | The Netherlands |
|---|---|---|
| **Types of Hydrogen covered** | Green H2 produced from renewables<br>Low-carbon hydrogen (i.e., nuclear hydrogen) | Green H2 produced from renewables<br><br>Low carbon hydrogen with CCS |
| **Production and use of renewable energy sources for electricity production.** | 570 TWh of renewable energy domestic consumption by 2030.<br><br>The *loi énergétique pour la croissance verte* aims at the following **RE consumption targets**:<br>Increase the share of renewable energy to **23%** of gross final energy consumption by 2020; to **32%** of gross final energy consumption by 2030.<br><br>**Governmental support** for RE: A range of tax credits and grants target enterprises, research institutions, and industrial entities to drive investments in renewable energy technologies and infrastructure, foster the **industrialization of innovative components**, and support decarbonization efforts by industries and citizens. | By 2030, the country aims for **27% to 35%** of its total energy consumption to come from renewable sources.<br><br>The Integrated National Energy and Climate Plan sets a target of **74.4% renewable energy in the electricity sector** by 2030.<br><br>**Governmental support**:<br>Provided in the form of contracts for difference and **Carbon Contracts for Difference**. |
| **Electrolyzer capacity** | •6,5 GW by 2030<br>•10 GW by 2035 | •3-4 GW by 2030 |

## Green hydrogen – insights from France and the Netherlands

**Construction and operation of plants for H2 production**

| France | The Netherlands |
|---|---|
| The strategy to incentivize the production of hydrogen relies on a mix of regulatory and economic incentives.<br><br>**National level**<br>The support provided for green and low-carbon H2 production and use in France revolves around two main types of projects – complementary to each other - administered by the *Agence de la transition écologique* (ADEME) through *Appel à projets (AAP)*:<br>• 'Hydrogen Territorial Ecosystems' (ensuring the development and production of essential infrastructures for H2 production and transport);<br>• 'Hydrogen Technology Bricks and Demonstrators' (DEMIBac and IBaC PME), (which aim to boost the development of key components for hydrogen production).<br><br>**International level**<br>IPCEIs | **National level**<br>The strategy to boost H2 production relies on a number of support schemes, which aim to *bridge the cost gap between producing renewable hydrogen and conventional hydrogen production methods*, such as steam methane reforming (SMR) using natural gas.<br><br>As regards innovative programs for hydrogen production, R&D programme of 'Groenvermogen van de Nederlandse economie' ('GroenvermogenNL') was funded by the Dutch government in the context of the National Growth Fund (NWO) and aims to accelerate the green hydrogen economy focusing on promoting and accelerating the use of green hydrogen in Dutch industry through research and development (R&D).<br><br>**International level**<br>IPCEIs |

# Green hydrogen – insights from France and the Netherlands

**Hydrogen transport**

| France | The Netherlands |
|---|---|
| **National initiatives:**<br>**Existing operational hydrogen pipelines**: 300 km of operational hydrogen pipelines.<br>Based on project announcements, more than **1 000 km of hydrogen pipelines could be developed by 2030** à both through repurposing of existing pipelines and construction of new ones.<br><br>**International cooperation**<br>BarMar: pure hydrogen pipeline between Barcelona and Marseille.<br>H2Med: Spain and Germany<br>Lacq Hydrogen Project (France and Spain) | **National initiatives:**<br>Port of Rotterdam (PoR) as an Energy Hub handles 8,800 PJ of fossil fuels annually, over 3 times Dutch energy consumption and 17% of the EU's energy consumption. PoR is expected to become a **major import hub for hydrogen and derivatives in Europe**.<br><br>**Dutch Hydrogen Backbone**: Gasunie was tasked in 2021 to develop a hydrogen transport network, **largely repurposing existing gas pipelines**. The aim is connecting industrial hubs, storage facilities, and export points (e.g., Belgium and Germany)<br><br>**International cooperation**<br>Key partnerships with Germany and Belgium for H2 trade and shared infrastructure. North Rhine-Westfalia plans to import half of its H2 demand via the Netherlands.<br>Hy3 project explores offshore wind energy for H2 production with cross-pipeline collaboration. |

# CO2 regulation in the French and Dutch legal systems

| | France | The Netherlands |
|---|---|---|
| **CO2 emissions** | **Reduction targets**<br>• 50% by 2030 (SNBC 3) – NB: the *loi énergétique pour la croissance verte* envisages a 40% reduction, in line with the SNBC 2.<br>• Carbon neutrality by 2050<br><br>**CO2 pricing**<br>Composante carbone: carbon tax that applies to all fossil fuel use at a nominal rate of **EUR 44.6** per tCO2. It will raise with an increasing trajectory for until 2030. | **Reduction targets**<br>• 49% by 2030<br>• Carbon neutrality by 2050<br><br>**Carbon levy in industry introduced in 2021**: the measure adds a contribution on top of the EU ETS allowance price. If the EU ETS price falls below the Dutch national carbon price, companies pay the difference as a tax. |
| **CO2 capture / removal** | Roadmap:<br>By 2030: use of CCS Technologies in the industry sector is planned to start in 2027.<br>By 2050: 30 and 50 MtCO2/year across all sectors (including biogenic CO2) | CCS for H2 production, when applicable.<br><br>Roadmap<br>Until 2030: governmental support in the form of grant is provided. Aid is limited to techniques, processes and sectors without cost-effective alternatives. The support won't be provided after 2035. |

## CO2 regulation in the French and Dutch legal systems

| | France | The Netherlands |
|---|---|---|
| **CO2 storage** | The French government supports the development of CO2 storage solutions through a number of subsidy schemes.<br><br>**International cooperation**<br>Most of the carbon capture projects currently under development in France are located in industrial regions with identified storage capacities:<br>In the North Sea, with the Northern Lights project in Norway and Aramis in the Netherlands. France joined the North Sea Basin Task Force, a working group of countries bordering the North Sea focused on the deployment of CCS (Carbon Capture and Storage) in the region.<br>In the Mediterranean, with the Callisto project in Italy and Prinos in Greece. | **Porthos (Port of Rotterdam $CO_2$ Transport Hub and Offshore Storage**), a joint venture managing $CO_2$ transportation and storage infrastructure focuses on capturing $CO_2$ emissions from industries in the Port of Rotterdam and storing them in depleted gas fields beneath the North Sea.<br><br>**Aramis carbon capture and storage project**. Aramis is a collaboration between TotalEnergies, Shell, Energie Beheer Nederland (EBN), and Gasunie, focused on developing infrastructure for the **transportation of $CO_2$ to empty gas fields beneath the North Sea for storage**. |

Key points

•France leverages on nuclear hydrogen, benefitting from established framework. While the Netherlands follow a more stringent approach.
•France appears to aiming at establishing its national technological industrial sovereingty regarding a number of elements relevant to H2. The Netherlands focuses on the strengthening of H2 infrastructures and networks.
•Different conception of CCS: France aims at supporting its development, while the Netherlands conceive it as a transitional technology
•They both envisage a central role of ports for the development of green hydrogen trade.

# Preliminary insights for Switzerland

**Decarbonization targets aligned with analyzed EU countries**

**A number of convergences with the French Hydrogen strategy and legal framework**

- Multi-energy hubs with H2 production close to the place of consumption.
- Types of H2 covered
- Support for CCS technology

**A number of divergences can also be identified**

- Switzerland does not have one single instrument encapsulating hydrogen and related value chain components regulation. This generates a system based on a multi-level regulatory framework with potential coordination issues.
- Targets are mostly defined by the private sector.

**Preliminary considerations for paths forward**

- France and the Netherlands seem to have the potential to be strategic partners for Switzerland.
- France in particular from the perspective of the transport of Hydrogen, especially in light of the international initiatives in place. --> important to closely monitor and harmonize transport regulations.
- The Netherlands represent a strategic partnership for CO2 storage --> interesting to consider also transport solutions, beyond the CCS.

*Thank you for your attention!*

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