



## ***HYDROGEN INITIATIVE FOR TURKEY***

***- FOOD FOR THOUGHT -***



***«TOGETHER TO A HYDROGEN SOCIETY FOR A GREEN AND CLEAN FUTURE»***

# HYDROGEN INITIATIVE FOR TURKEY

- FOOD FOR THOUGHT -

Global warming, environmental protection and alternative energies have rocketed into sharp focus following the most recent catastrophic and global weather events. However, these tragedies have clearly brought home the need for urgent action.

The production and use of green hydrogen can make an important contribution and has been recognized as a key topic in Turkey, already under research with multi-lateral support. As early as 2012, various possibilities and projects in Turkey were shown and demonstrated.<sup>1</sup>

There are draft concepts<sup>2</sup> and discussion forums in Turkey, which are currently defining the set-up of possible production and use of this energy carrier. Moreover, political and business leaders in Turkey are trying to implement feasible projects for de-carbonization<sup>3</sup>, including an official hydrogen strategy, which is soon to be expected. Turkey's recent accession to the Paris Climate Agreement is another argument in favor of this initiative.

In the foreseeable future, CO<sub>2</sub>-free production will also be an important prerequisite for Turkish access to the European market, which will then also be regulated by the "EU Carbon Border Mechanism"<sup>4</sup>

With the production of green hydrogen, Turkey can not only reduce its dependence on energy imports, but can also become a major exporter of green hydrogen.



**ALI KÖSE**  
CEO

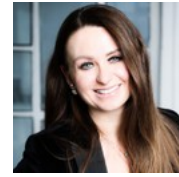
*Ali Köse*

## About H2Energy Solutions



Team H2Energy Solutions. Bild: H2Energy Solutions

- **Founded in 2020** with the aim of planning and supporting projects for the generation and use of green hydrogen.
- Has been involved in investments in listed companies in the field of **hydrogen production, fuel cells** and **environmental protection** for several years, good understanding of political framework conditions and funding opportunities.
- **International and intercultural** work experience as an employee of renowned multinational corporations as well as in an entrepreneurial function.
- Our **expertise** and professional networks cover sectors such as energy plant construction, law, finance, business, and intergovernmental bodies such as the **EU Parliament** and **NATO**.



**KATHARINA  
BEDNARZ**  
MANAGING  
DIRECTOR



**KAYA GÖNENÇER**  
DIRECTOR  
BUSINESS & LEGAL  
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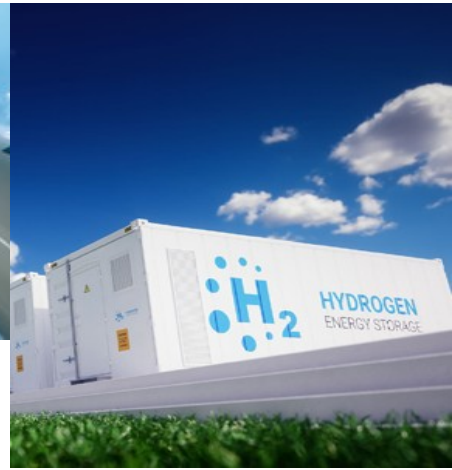
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PROJECT MANAGER



Bildquellen: NOW GmbH



## A Hydrogen Initiative for Turkey

H2energy Solutions proposes to concentrate on some areas for the production and use of especially green hydrogen in Turkey and has drafted this initiative for this purpose.

It should serve as a basis for discussion and a starting point for specific projects. While the focus should be on hydrogen, it should not be viewed as the only alternative energy source.

Through sector coupling and tailor-made concepts, the most suitable approaches to de-carbonization should evolve.

This initiative is intended to provide further consideration for the measurable and expandable establishment of a hydrogen-based economic sector in Turkey.

The expansion could gradually take place in stages until 2030.

In the considerations below, we will focus on the following areas:

- ✓ 1. **PRODUCTION AND EXPORT OF GREEN HYDROGEN**
- ✓ 2. **DEVELOPMENT OF HYDROGEN CENTERS ("HUBS") AND E-MOBILITY / HYDROGEN CORRIDORS**
- ✓ 3. **DISSEMINATION OF HYDROGEN-POWERED VEHICLES**
- ✓ 4. **ESTABLISHING AND STRENGTHENING LOCAL POWER SUPPLY**
- ✓ 5. **CREATION OF A LOGISTIC NETWORK FOR THE DISTRIBUTION OF HYDROGEN**
- ✓ 6. **EXPANSION OF TURKEY AS A SUPRA-REGIONAL HYDROGEN TECHNOLOGY HUB**
- ✓ 7. **USE OF GREEN SYNTHETIC GAS AS A SUBSTITUTE FOR NATURAL GAS**

## 1. Production and Export of Green Hydrogen

Production of green hydrogen from various sources (primarily through electrolysis from photovoltaics, wind power, geothermal energy but also bio-electrolysis and others) for use in **Turkey**<sup>5</sup> and export to other European countries - especially to Germany

With these steps, existing technologies can be used and the rapidly growing global demand for green hydrogen can be met.

Due to climatic conditions, as well as good expansion of regenerative energy production, Turkey has excellent prerequisites for the manufacture of **green hydrogen**.<sup>6</sup>



Image: NOW GmbH

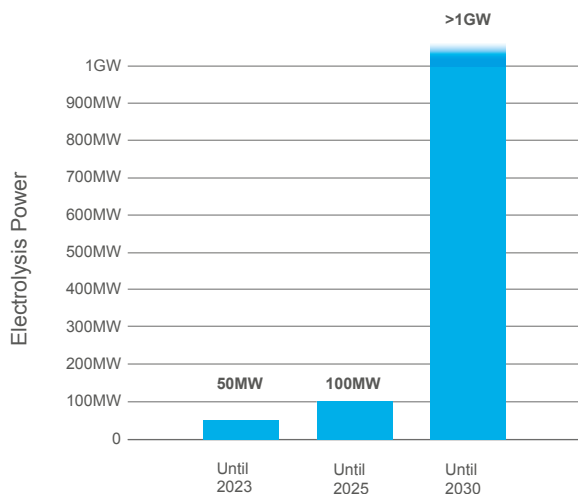
## 2. Development of Hydrogen Centers ("Hubs") and E-Mobility / Hydrogen Corridors

**The mobility sector accounts for approx. 25% of the total energy demand in Turkey**<sup>7</sup>, and is therefore an important starting point for **de-carbonization**<sup>8</sup>. In addition to battery-powered e-mobility, the use of hydrogen can be put to good use, particularly in the field of heavy goods traffic, as well as in passenger transport (buses and rail transport).

The prerequisite for this, however, is the establishment of a network of hydrogen filling station. This can initially take place within the metropolitan areas of Istanbul, Ankara, Bursa, Izmir, Antalya, Konya and Adana. In addition, the Black Sea coast is to be connected via Samsun to Trabzon as well further the the East as Gaziantep, Erzurum and Van. This would also facilitate travel between the metropolitan areas.

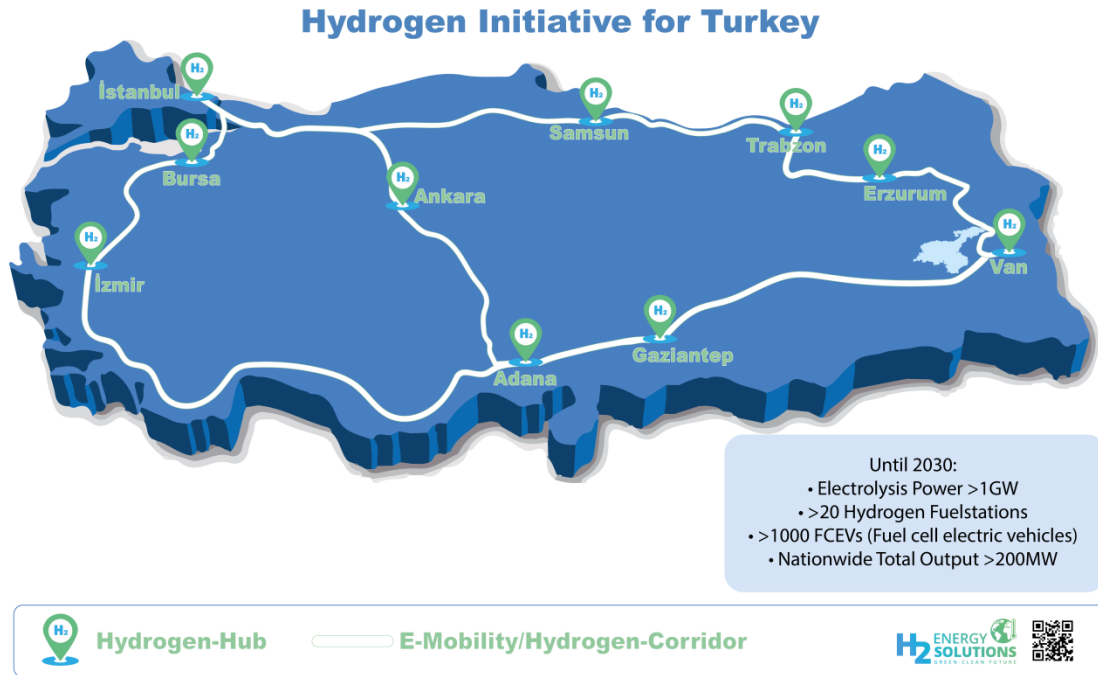
With these **"Hydrogen Hubs"** all different kinds of regional users can be serviced, starting with public transport, supply and disposal, individual transport and industry, as well as regional markets. This should also include the possibility of use in rail transport.

### Electrolysis Power



Thus **"e-mobility / hydrogen corridors"** will be created which not only offer the possibility of connecting with one another, but also the broadening of the network along these corridors.

This network must also be expanded further South and East into the potential regions of hydrogen production. Sufficient charging infrastructure must be provided along these corridors for both **BEVs** and **FCEVs**.<sup>9</sup>

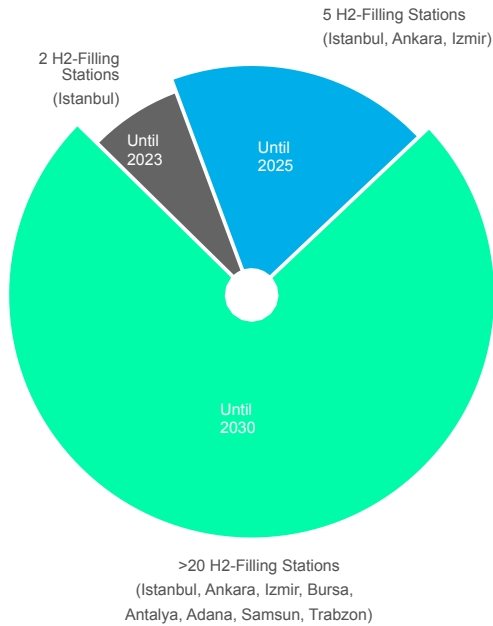


Turkey Hydrogen Initiative Map. Image: H2Energy Solutions



Hydrogen transport with a 500 bar hydrogen trailer. Image: Linde

## H2 Filling Stations

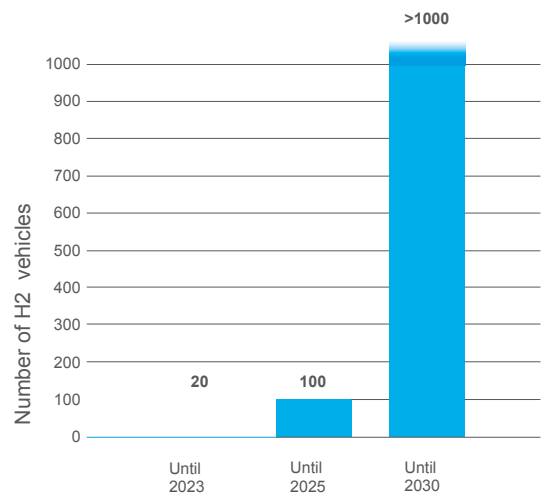


H2 Filling Station Hamburg Harbor. Image H2Energy Solutions

## 3. Dissemination of Hydrogen-Powered Vehicles

Use of electric vehicles with hydrogen supply (FCEVs) but also battery supply (BEVs) in all fields (buses, trucks, small commercial vehicles and mini-buses, cars, ground-handling vehicles e.g. fork-lifts).

### H2 vehicles



## 4. Establishing and Strengthening Local Power Supply

The energy requirement for the operation of buildings and similar infrastructure in Turkey is currently around 31% of the total energy requirement in **Turkey**<sup>10</sup>. The **industrial sector** accounts for a further 33% of the country's energy demand.<sup>11</sup>

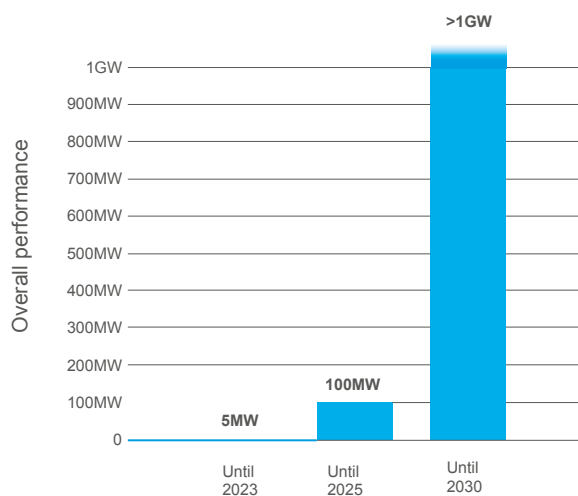
Part of the solution can be the creation of independent micro-grid solutions for decarbonization, as well as strengthening the resilience in the event of impending natural disasters (earthquakes, floods, fires) in urban and rural areas.



Image: NOW GmbH

This can be used for entire city districts, larger building complexes (hospitals, universities, public administration, data centers), in the communications sector (transmission mast supply), but also for individual residential complexes or houses. These solutions can also be used for decentralized heat supply of the above-mentioned buildings and settlements. Moreover, these solutions should also make a significant contribution to the de-carbonization of regional industrial and *service institutions*.<sup>12</sup>

## Nationwide Total Output



## 5. Creation of a Logistic Network for the Distribution of Hydrogen

Creation or expansion of a logistic network for the transport of hydrogen within Turkey, the *"Hydrogen Hubs"*, along the *"E-Mobility / Hydrogen Corridors"* for internal supply and connections abroad. This includes the use of existing *gas pipelines*<sup>13</sup>, the creation of new hydrogen supply lines from electrolysis centers to ports, expansion of other hydrogen infrastructure (road transport, storage), and the use of hydrogen technologies in the waste and disposal sector.

## 6. Expansion of Turkey as a Supra-Regional Hydrogen Technology Hub

Creation and expansion of Turkey as a supra-regional technology hub for the hydrogen sector, expansion of research and production of hydrogen technologies through appropriate technology transfer in close cooperation with the Turkish *industry*.<sup>14</sup>



DMFC Stapeln. Image: HYREF



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## 7. Use of Green Synthetic Gas as a Substitute for Natural Gas

In addition, both Synthetic Gas (SynGas) and hydrogen can be generated through the use of organic waste materials by means of a gasification process. In this way, for example, the resulting SynGas can partially or completely replace natural gas.



Wood gasification plant Spain. Image: EQTEC

### What can H2Energy Solutions contribute?

**H2Energy Solutions** thus confirms a very good basis for the establishment of a comprehensive hydrogen economic sector in Turkey. This is one goal of our deliberations.

The way there will, however, require a high degree of cooperation, time and patience. In addition to important, positive political framework conditions, individual enthusiasm and commitment will be indispensable for the undertaking. We bring these with us and are prepared to share them with other people and institutions.

**H2Energy Solutions** can be a *competent, consultant, developer* and *partner* for the Turkish hydrogen market in at least three areas:

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**1. We represent companies that produce or use *green hydrogen* with modern technology but are not yet represented on the Turkish market. The applications range from small systems (house and business supply) to industrial production in the MW range. With our partnership, we also guarantee that these companies have confidence in the Turkish market. In addition, we can provide interesting financing models from these companies.**

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**2. As a German company, we can offer project planning processes and establish contacts with German and / or European investors and financing institutions. The appropriate foundations for this have already been defined by the Turkish side.<sup>15</sup>**

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**3. We represent potential buyers of *Green Hydrogen* in Germany and can thus provide possibilities for the implementation of large-scale hydrogen production in Turkey, both as a realistic and economic undertaking.**

**We will develop and implement our own initiatives, build networks, participate in existing and future forums and discussions in business and politics and work constructively to increase the awareness of the topic and the implementation of a new hydrogen coalition. We are already well positioned for this with our new location in Istanbul and Turkish-speaking employees.**

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**We are now working on the following next steps:**

- 1. Formation of partnerships and strengthening of networks for the further development of the initiative, or embedding in superordinate planning.**
- 2. Developing the initiative into a more detailed implementation plan.**
- 3. Development of specific projects with partners from business, finance, academia and the public sector.**

**Until 2030**

- ✓ Electrolysis performance hydrogen >1GW
- ✓ >20 Hydrogen filling stations
- ✓ >1000 WHydrogen powered vehicles Total
- ✓ Total output fuel cells >200MW

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  2. Energy Policy Research Center & SHURA Energy Transition Center, *Priority Areas for a National Hydrogen Strategy for Turkey*, 23 March 2021
  3. Republic of Turkey, Ministry of Trade, *Turkey's Green Deal Action Plan*, 15 July 2021
  4. Republic of Turkey, Ministry of Trade, *Turkey's Green Deal Action Plan*, 15 July 2021, page 44
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  6. *Turkey's Green Deal Action Plan*, 15 July 2021, page 26
  7. Energy Policy Research Center & SHURA Energy Transition Center, *Priority Areas for a National Hydrogen Strategy for Turkey*, Sabanci University, 2021, page 23
  8. *Turkey's Green Deal Action Plan*, 15 July 2021, page 32
  9. BEV - Battery Electric Vehicle, FCEV - Fuel Cell Electric Vehicles
  10. Energy Policy Research Center & SHURA Energy Transition Center, *Priority Areas for a National Hydrogen Strategy for Turkey*, 23 March 2021, page 23
  11. Energy Policy Research Center & SHURA Energy Transition Center, *Priority Areas for a National Hydrogen Strategy for Turkey*, 2021, page 21
  12. Energy Policy Research Center & SHURA Energy Transition Center, *Priority Areas for a National Hydrogen Strategy for Turkey*, 23 March 2021, page 30
  13. Energy Policy Research Center & SHURA Energy Transition Center, *Priority Areas for a National Hydrogen Strategy for Turkey*, 23 March 2021, page 41
  14. Energy Policy Research Center & SHURA Energy Transition Center, *Priority Areas for a National Hydrogen Strategy for Turkey*, 23 March 2021, page 7
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2. *Investors Guidance for Electricity Sector in Turkey*, Republic of Turkey, Ministry of Energy and Natural Resources
3. *Priority Areas for a National Hydrogen Strategy for Turkey*, Energy Policy Research Center & SHURA, Sabanci University, 2021
4. *Turkey's Green Deal Action Plan*, 15 July 2021



## CONTACT

**LOOKING TO INCLUDE GREEN HYDROGEN SOLUTIONS IN YOUR  
BUSINESS, MUNICIPALITY OR UTILITY?**

**TURNKEY CONCEPTS FOR THE PRODUCTION OF GREEN HYDROGEN:  
WE HELP WITH FEASIBILITY, NEED ANALYSIS, FINANCING AND MORE.  
GET IN TOUCH TODAY**



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