

Renewable Hydrogen Production, Storage, Transport and Utilization for Transport, Household and Industry. Urban Power Station © Forschungszentrum Jülich GmbH

The urban power station of the future: coupling of all sectors to one system - production, transportation, storage and utilization; off grid and all over the world.

### Climate protection and urban transportation

The future lies in hydrogen, fuel cells and batteries for electric mobility on the road, on rails, in the air, and on the water.

Climate change comes more and more swift, stronger, and threatening. In order to meet the climate treaty we need new urban transportation solutions, win form of electric vehicles.

Electric engines in any vehicle are powered by electricity from batteries or fuel cells, produced by conversion of clean and environmental-friendly hydrogen (and oxygen from the air) in fuel cells, directly on board of a vehicle. After approxi-

## Hydrogen Economy for Arab Countries Urban power station of the future for electric mobility with hydrogen gas, fuel cells and batteries

### ICEPS - CTC BONN

The Bonn Climate Project combines renewable energy and sectoral coupling projects for developing countries, especially in rural areas. German solar and renewable energy off grid technologies are based on low and zero carbon gases; bio hydrogen gas and bio methane gas from local and natural resources in combination with gas motors and gas fuel cells for universal use in households, for mobility and for industrial use as a feedstock

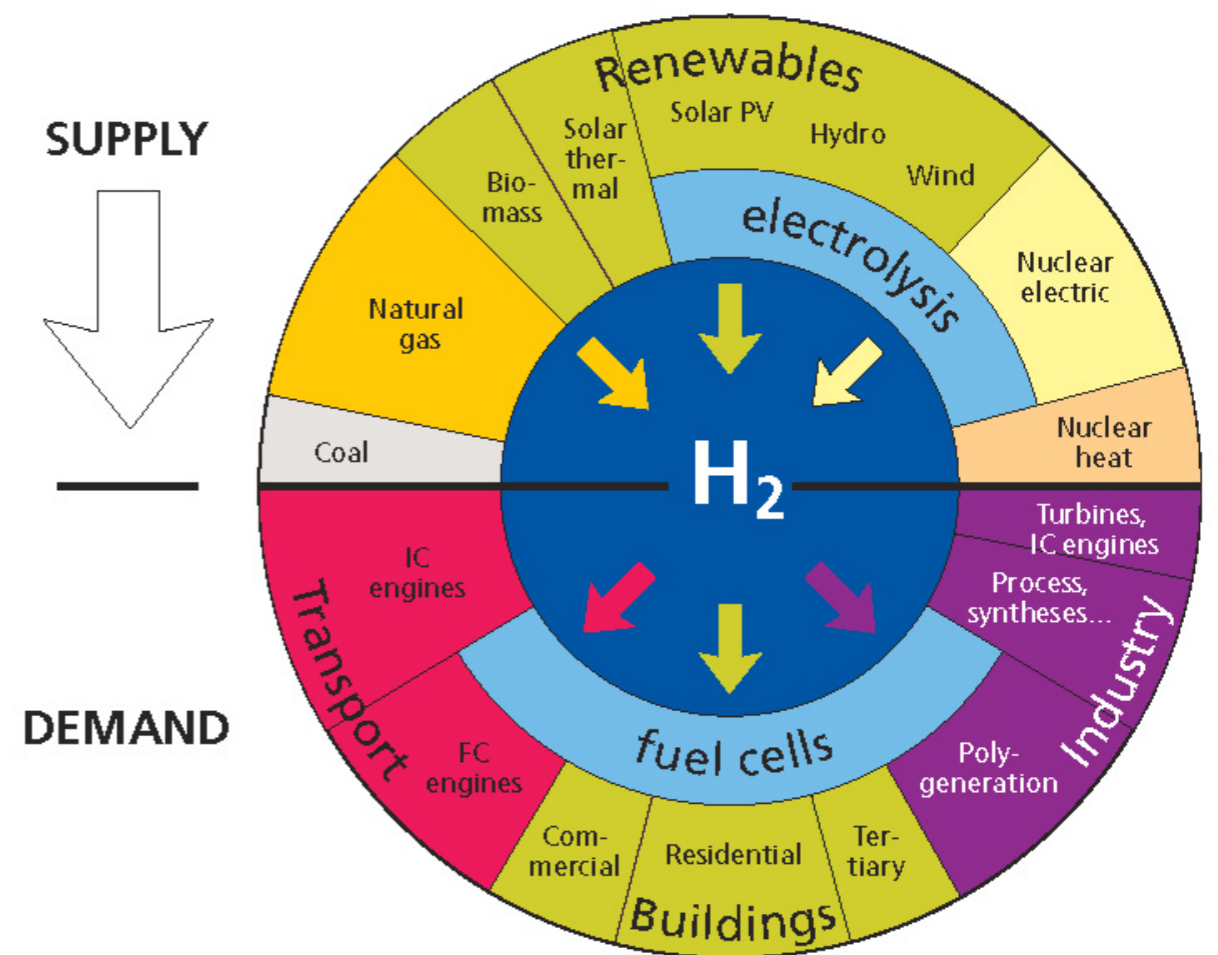
Renewable energies throughout the world are off grid using four elements: the sun, water, air and earth.

Green electric power and green hydrogen can be manufactured suitably and everywhere and can be used in combination for power, heat, all types of transport and mobility; residential use and industry (as a raw material) and even for drinking water production.

Decentralized, as well as in an existing supply network such as gas, and electricity and heat, by feeding green hydrogen

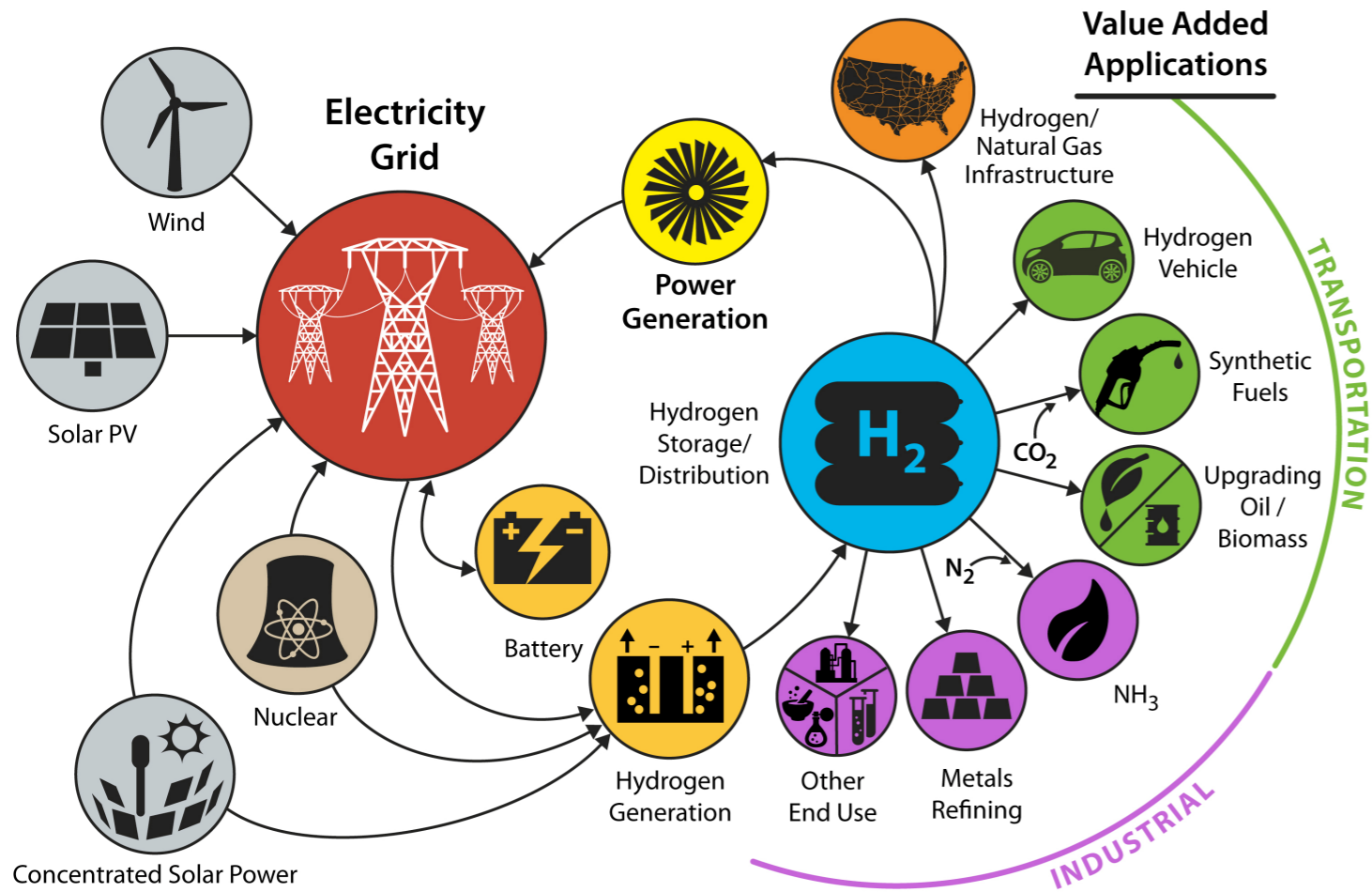
and/or green electricity into the different grids. Also by additional heat which is produced as a by-product in fuel cells during electricity production, and which can be fed into a heating grid.

The use of valuable water which is produced instantly and is an addition in fuel cells by the chemical reaction of hydrogen and oxygen is a valuable asset in many dry regions of the world: green hydrogen and green electricity from the four elements.



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mately 500km and more, the hydrogen tank is filled up at a hydrogen filling station, and the journey can be continued. These are considerable advantages over the charging time of battery-electric vehicles (cars, lorries, buses, trains, boats, ships, or aircrafts).

Even batteries can be charged at home or at charging stations in the city within hours. Both electric transportation solutions have their markets and will help to avoid air pollution by CO<sub>2</sub>.

In the years to come, we swiftly need to set-up the course for the introduction and market launch of different electric vehicles, and as the pre-requisite, the infrastructure in form of hydrogen filling stations for clean and affordable hydrogen gas, or electric charger stations, all over Arab countries.

### Made in Germany, for Mena and GCC

In the past few months, the first f-cell cars were presented to the international press in different countries, as well as

hydrogen f-cell railway trains and likewise, aircrafts, while on German roads, hydrogen f-cell cars and city buses are already evident. Now, we can also inform about the Hydra, the world's first hydrogen fuel cell-electric water taxi, far ahead of its time, which also can immediately be manufac-

tured in series, and then promptly be an excellent contribution for active climate and water protection. Indeed, the boat, a passenger ferry, is a master piece of innovation Made in Germany

### Climate Action, how? What can be done? Comprehensive information needed!

How to escape the climate disaster and how to build a clean and affordable energy infrastructure? The solution is widespread, global deployment of clean energies, CO<sub>2</sub>-free and low-carbon fuels, especially hydrogen and fuel cells.

Today the world is more active in climate protection than ever before. Air, water and soil, must be protected, any resource consumption should significantly be reduced, and waste of all kinds should be reutilized. People need clean, affordable energy worldwide, even in remote rural areas, and particularly in the deserts and steppes of the Arabic countries.

The citizens of any country need to know about solutions, and our actions and decisions to copy and use.

### Some principals

1. Water is life, energy and a fuel
2. Water is composed of hydrogen and oxygen
3. Water changes its state into hydrogen and oxygen and then back to water

4. Nothing is lost in the world. Everything only changes its status and can be used over and over again: from the solid to the liquid state to the gaseous state This is the hydrologic and hydrogen circle.

5. Our energy is utilized in the form of oil, gas, coal, or wood; all are hydro-carbon elements and compounds.

6. Take away the carbon and use only the hydrogen as CO<sub>2</sub>-free energy for universal use, as shown just before

### UAE and Arabic countries, promoters of climate protection

Urban water and waste management - Urban energy & transport - Urban planning and building - Clean air solutions all belongs together and is an active climate protection, a perfect overall project for sectoral coupling with hydrogen gas as a basic clean energy.

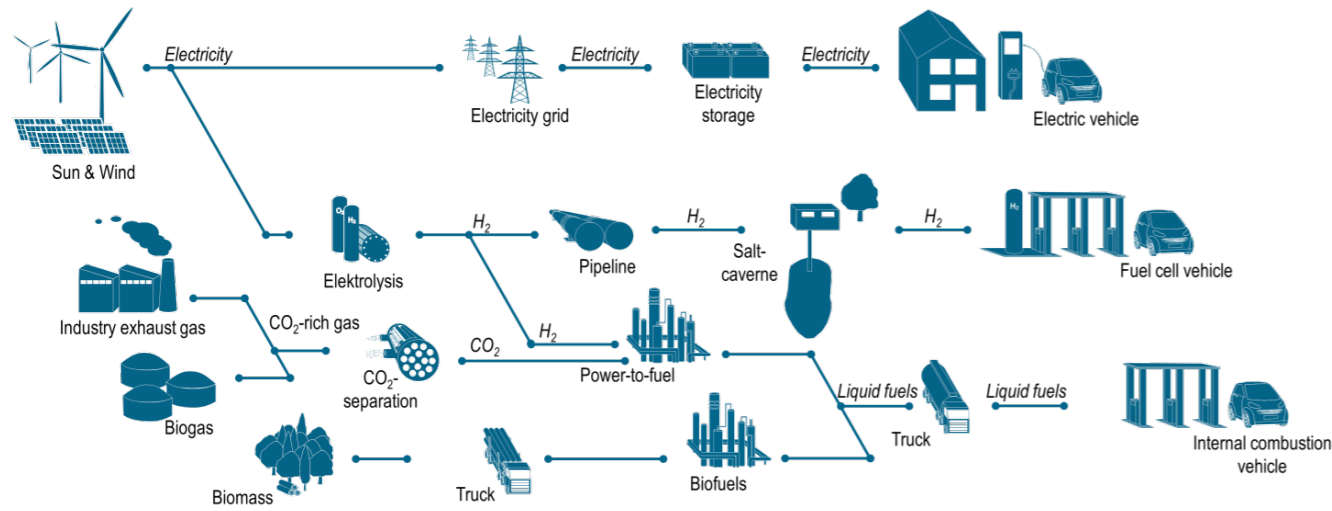
If the above-mentioned individual sectors work together, plan at an early stage and build on the basis of hydrogen and fuel cells, in the future, villages, cities, new living habits and ways of life can be created. The architecture of buildings will change significantly and construction will be simplified, many decentralized small fuel cells in buildings will enable simple electricity and heat production everywhere and decentral. Buildings will no longer depend on large central power plants for an entire building and wiring in the building.

New transport concepts based on electric vehicles of all kinds make life easier for us and are good for our health.

Hydra Boat. Electric mobility on the water by hydrogen gas/ fuel cells. A Project of ICEPS CTC BONN Technology Foundation







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Clean air and no noise and stress from a car's internal combustion engine or diesel generators, which generate electricity in addition to many buildings. Also no vibrations or noises are generated by the different uses of the hydrogen and the fuel cell in the transport sector as well as in the building sector.

form of ashes. All other elements are valuable substances and come back into the life cycle, including valuable water from the biomass which is gasified.

Hydrogen supplies us with clean and affordable energy.

### Water and Waste Management

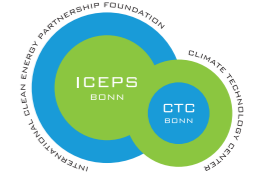
The production of hydrogen via gasification technologies, by means of the steam refurbishment of all biomass waste, will completely solve the major problem of waste disposal. All types of biological household waste, (which contain the Elements hydrogen, oxygen, Nitrogen, Carbon and Minerals,) Industrial waste and other waste are completely gassed. In this case, the synthesis gas, hydrogen gas, CO<sub>2</sub> and all minerals such as phosphorus, potassium, magnesium, calcium and metal parts in the garbage such as PB, Ferrum and others, are reused or deposited in the



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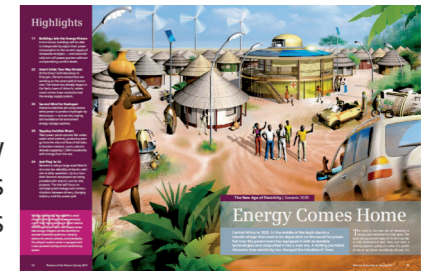
## BONN CLIMATE PROJECT

Energy is the source for life, food, business, development, health, information and transportation. The constantly raising energy prices are threatening billions of people around the world and prevent growth and stability. Unrest and poverty rule.

In order to provide solutions for emerging countries, who are in urgent need for clean and affordable energy, decentralized and holistic gas-electric energy systems based on renewable and sustainable energies need to be available.

### The SCOPE OF WORK OF THE BONN CLIMATE PROJECT

Providing renewable, sustainable innovations & technology transfer based on clean natural and hydrogen gases, Gasmotors and Fuel Cell Systems, Natural- and Hydrogen Gas Technologies & Energies of the Future.



## BONN CLIMATE PROJECT – FOR A HEALTHY FUTURE

Research & Development of alternative Energy-, Environment-, Security-, Health-and Mobility-Concepts based upon renewable and green/clean energies. Electric appliances and mobility by batteries, Biogas, Hydrogen gas/fuel cells, gas batteries, hybrids and energy & environmental technologies of the future.

With 2000 years of continuously grown history, perfect infrastructure, leading scientific research and international competence, BONN is the ideal city in Germany for fast development of international energy solutions and environmental development.



### BONN – The Science- and United Nations City.

For sustainable development worldwide – creating tomorrows potential.

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