

On the way – to a real

# Hydrogen Society

# Outline

## Energy Supply and Consumption in the World

- World Energy Balance 2007
- World Energy Balance Comparison 1973 - 2007

## The Production of Hydrogen: Where are we?

- Hydrogen Production from Fossil Fuels
- Hydrogen Production from Renewable Energies

## New Pathways to a real Hydrogen Society

- H<sub>2</sub> Generation from Concentrating Solar Power
- Fitting it all together



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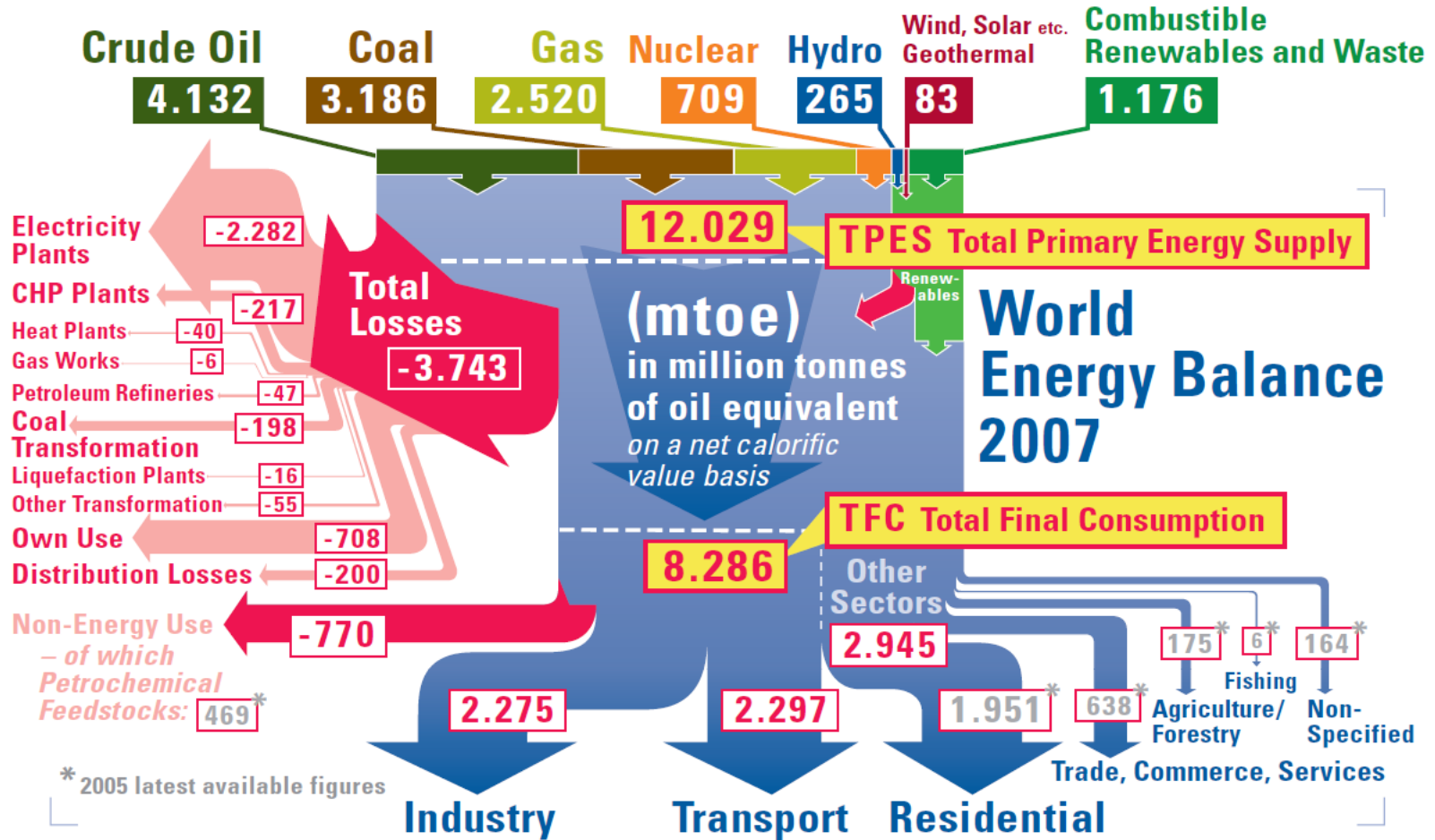
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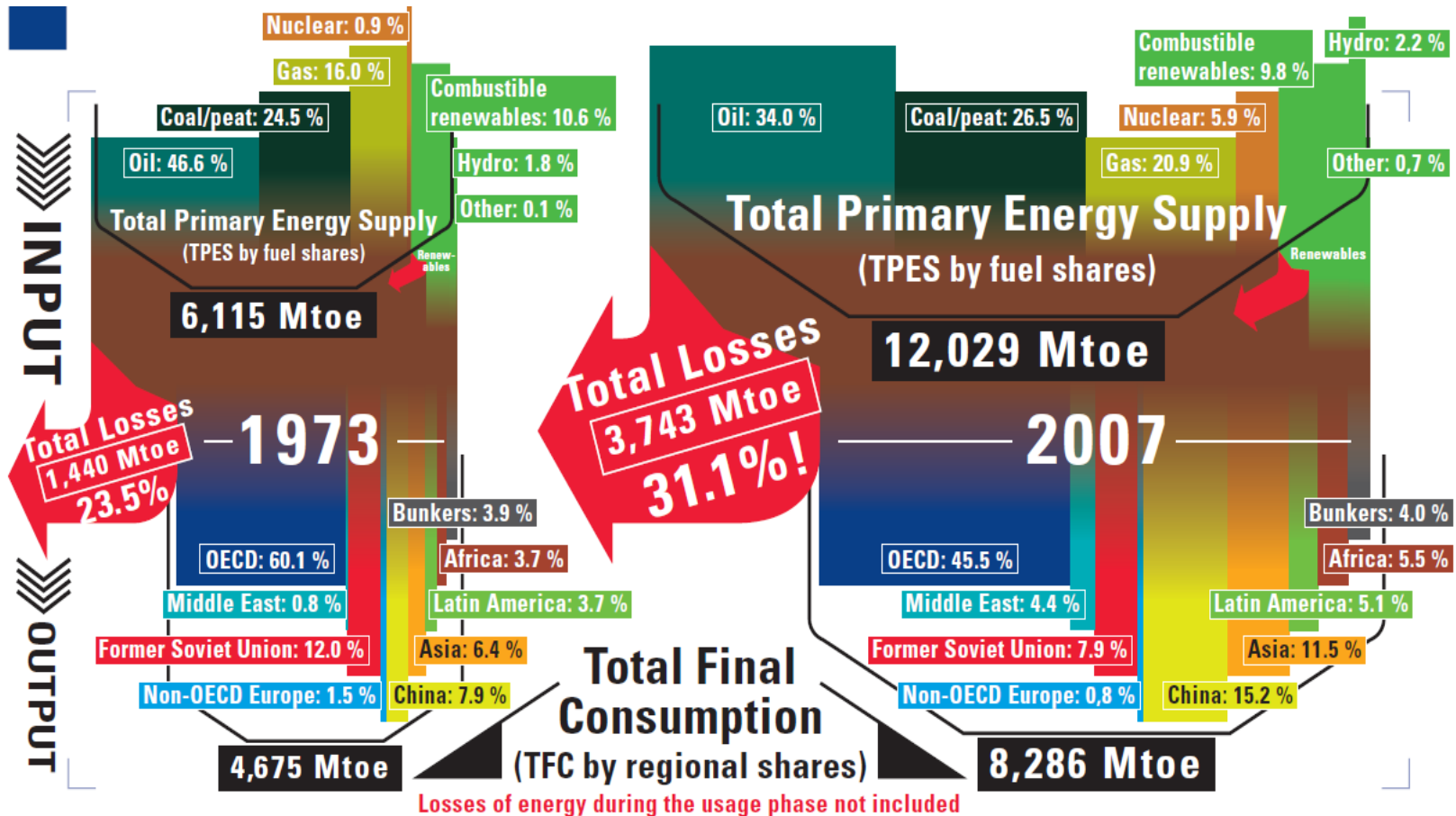
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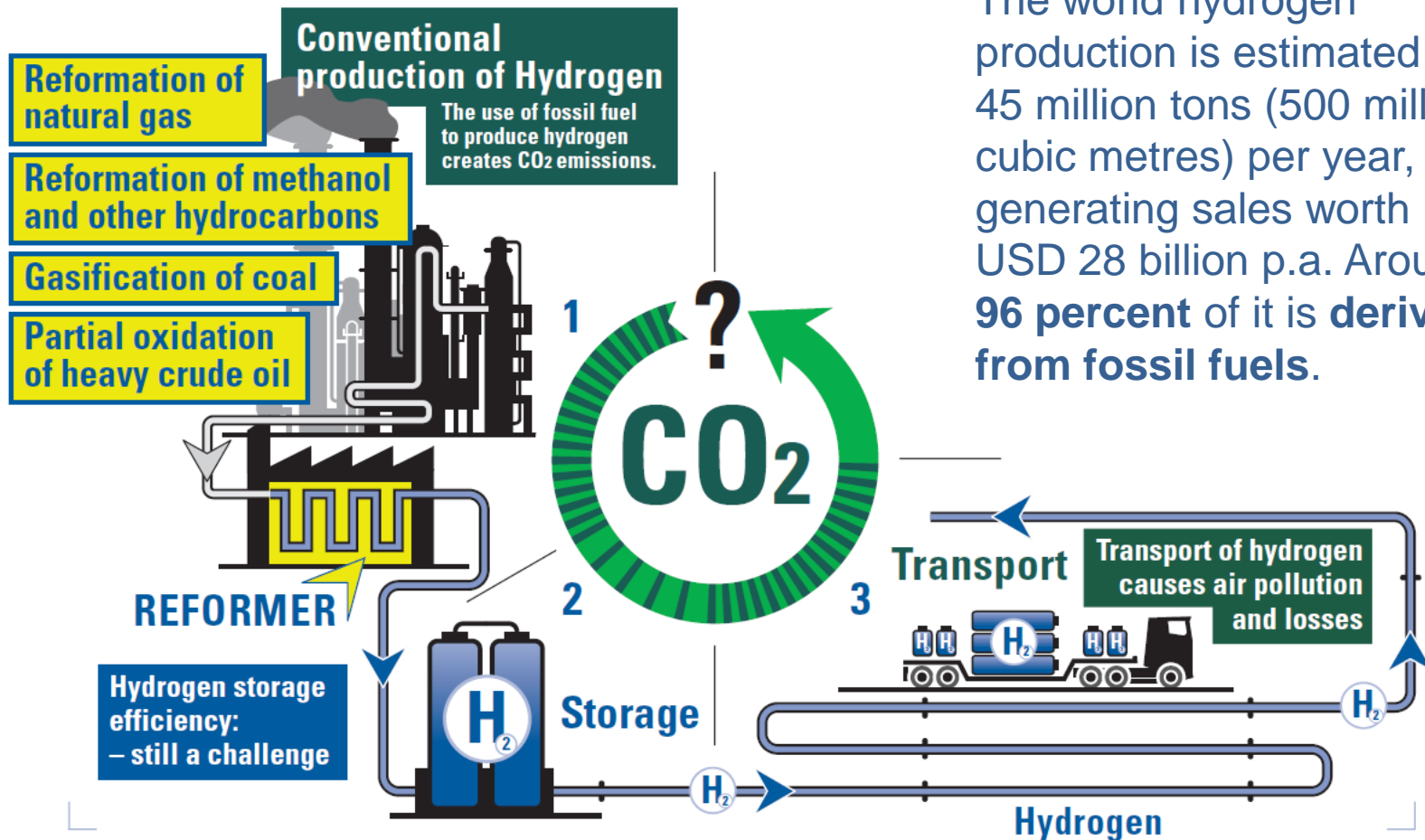
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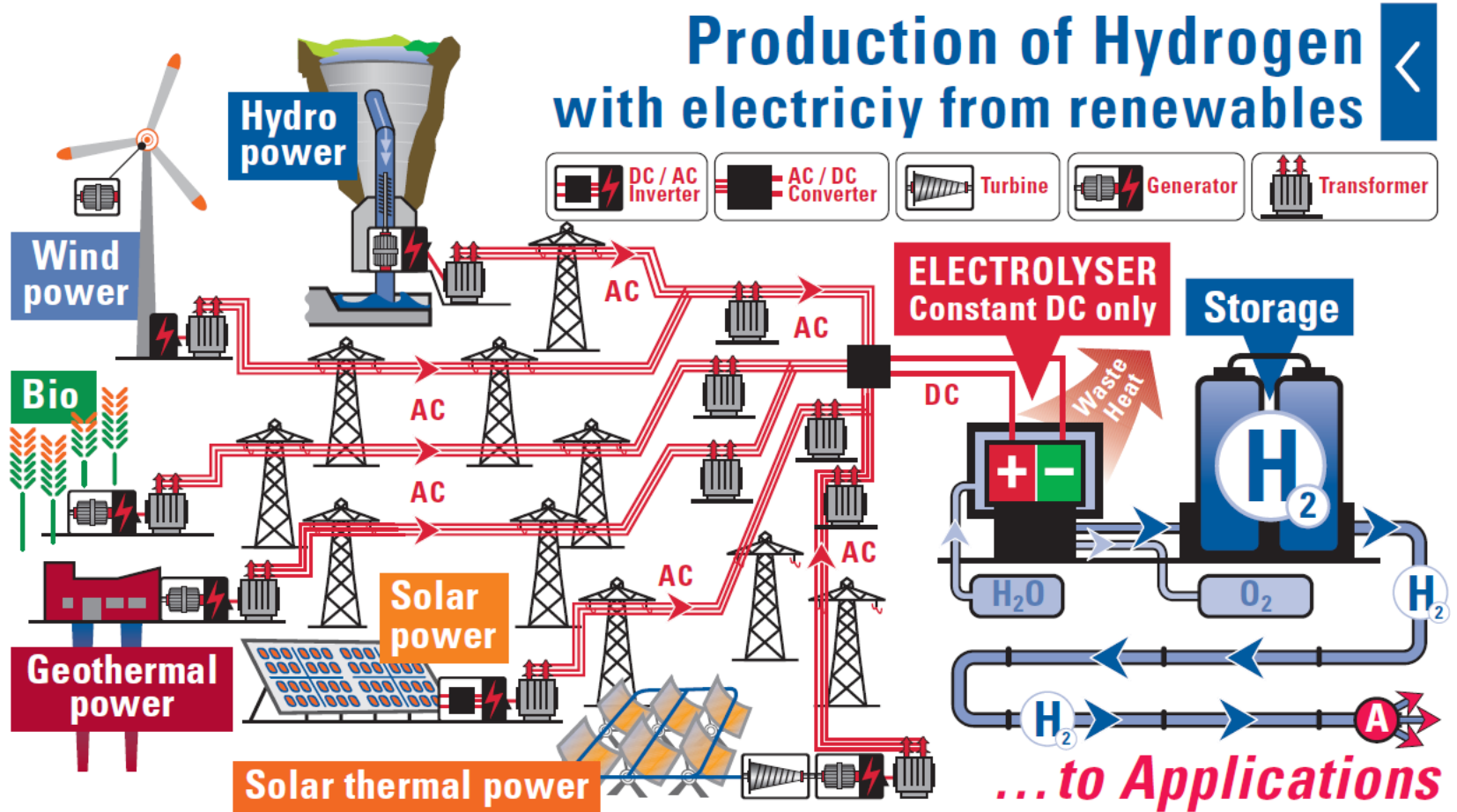
- Hydrogen Production from Fossil Fuels



The world hydrogen production is estimated at 45 million tons (500 million cubic metres) per year, generating sales worth USD 28 billion p.a. Around 96 percent of it is derived from fossil fuels.

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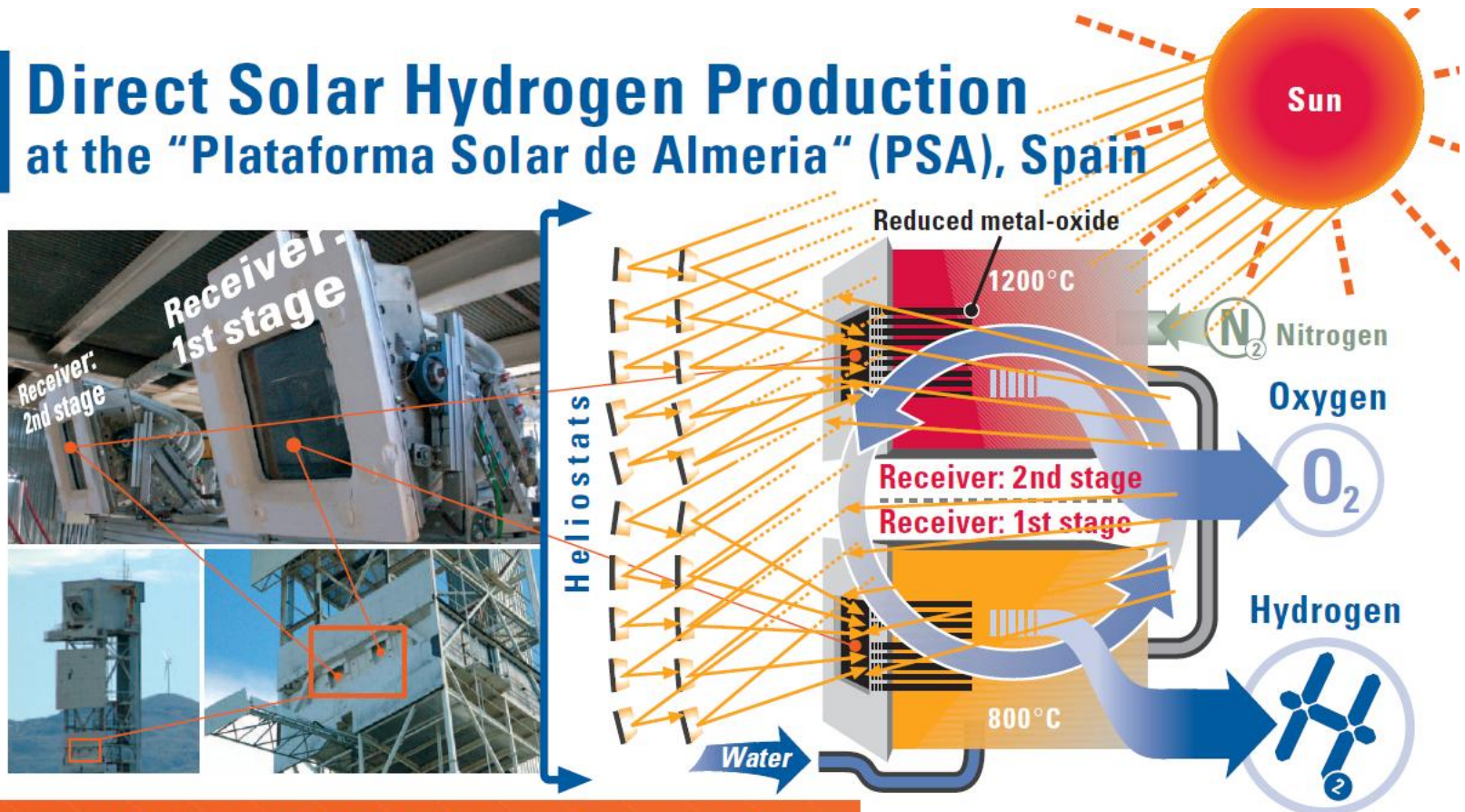
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## New Pathways to a real Hydrogen Society

- H2 Generation from Concentrating Solar Power

# > Direct Solar Hydrogen Production at the "Plataforma Solar de Almeria" (PSA), Spain



Successfully set up in 2008 by German Aerospace Center

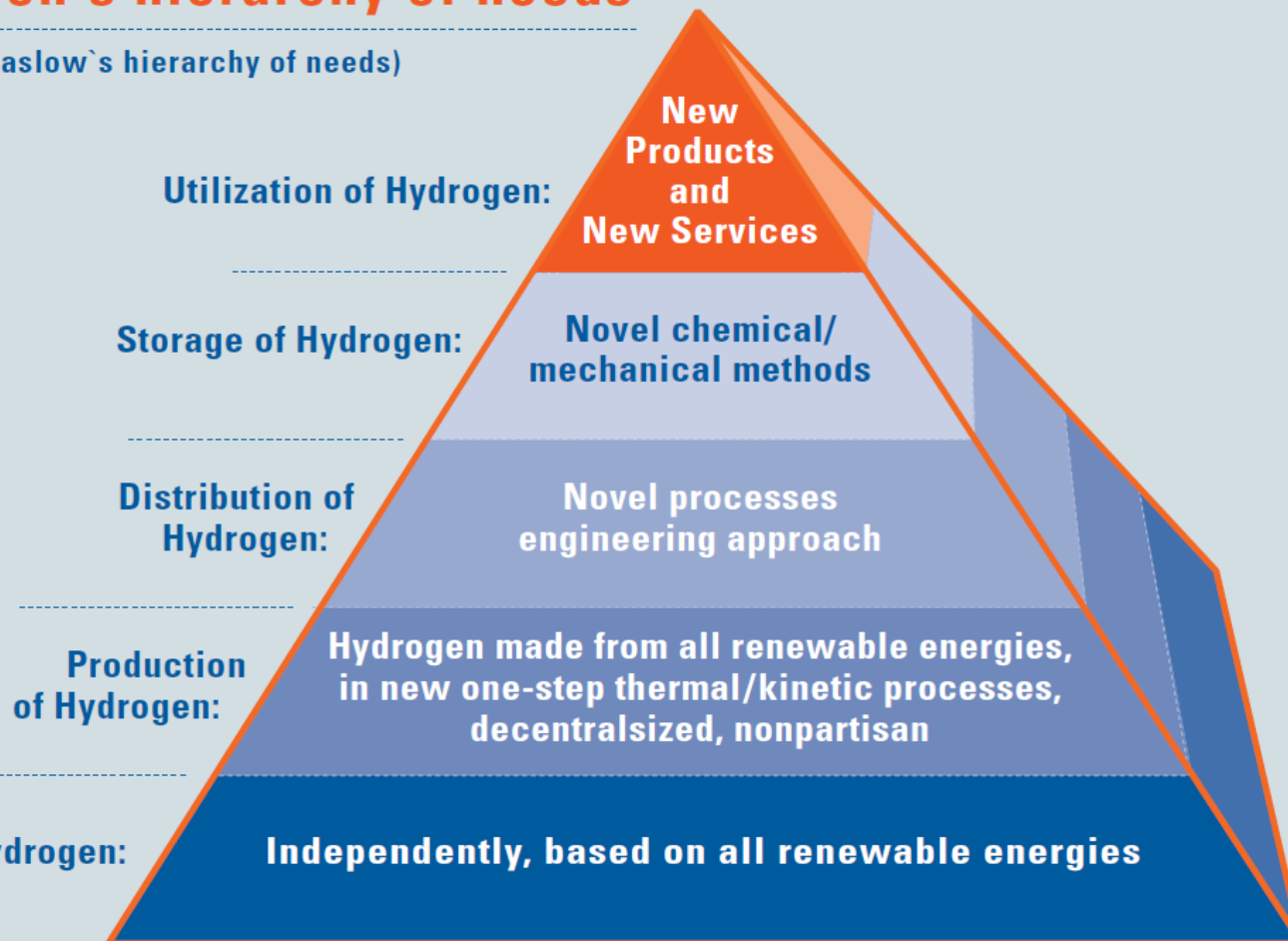
(Deutsches Zentrum für Luft- und Raumfahrt; DLR) in the context of the HYDROSOL I and II EU projects

## New Pathways to a real Hydrogen Society

- Fitting it all together

### Hydrogen's hierarchy of needs

→ (following Maslow's hierarchy of needs)



Source: Own Research



[www.hydrogenambassadors.com](http://www.hydrogenambassadors.com)

## New Pathways to a real Hydrogen Society

- Fitting it all together

### *Hydrogen Vision:*

- 1) Hydrogen has to become a common commodity
- 2) Hydrogen has to be produced free of pollution and losses
- 3) Hydrogen has to be traded locally, based on supply and demand
- 4) Hydrogen has to be used for electrification, transportation and convenience

### *Fuel Cells Vision:*

Fuel Cells have to utilize their advantages in connecting the markets for:

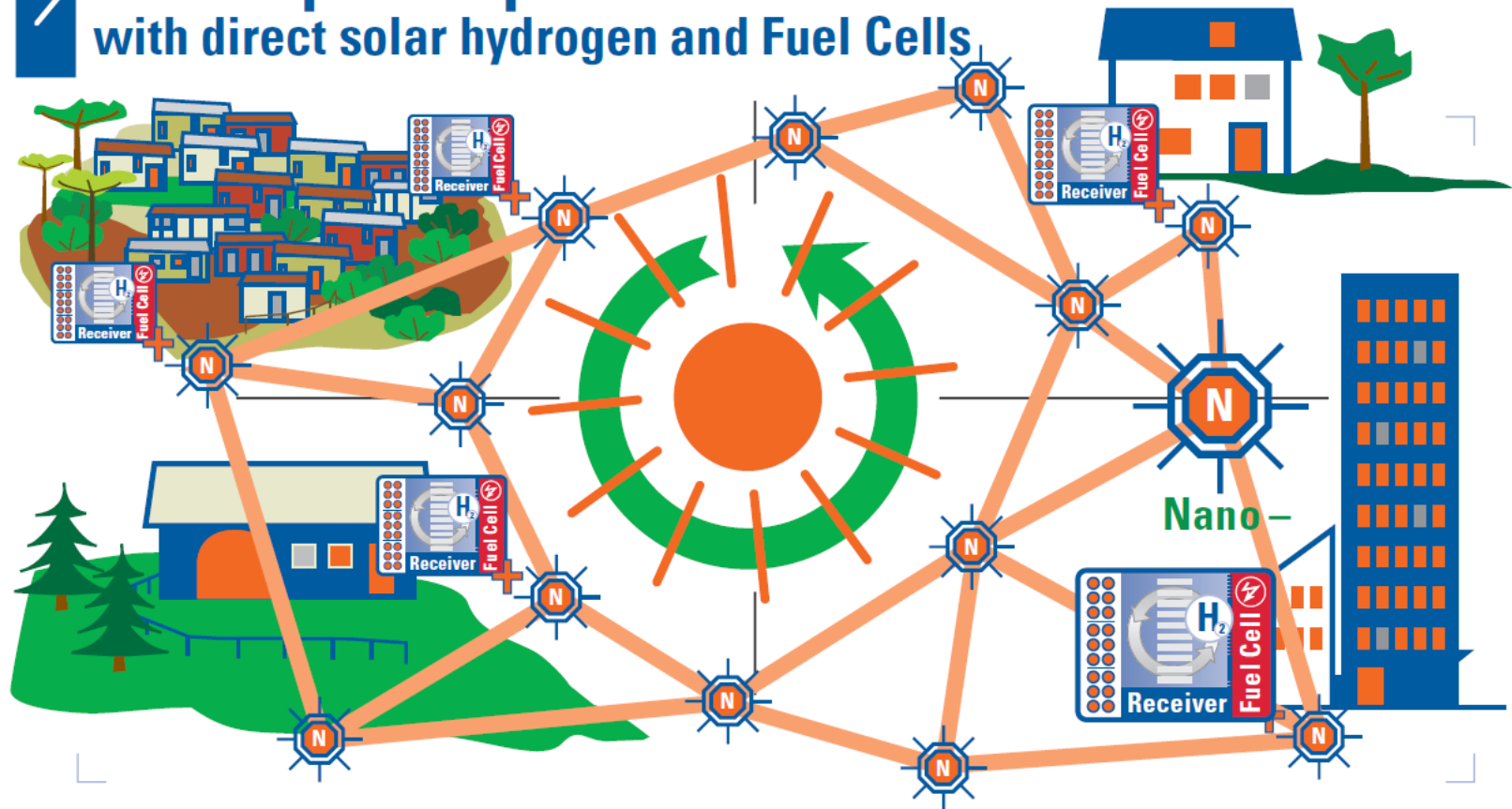
→ 1. Electricity → 2. Heat → 3. (clean) water

**Fuel Cells have to be used as decentralised,  
personal power systems**

## New Pathways to a real Hydrogen Society

- Fitting it all together

### > Virtual power plants with direct solar hydrogen and Fuel Cells



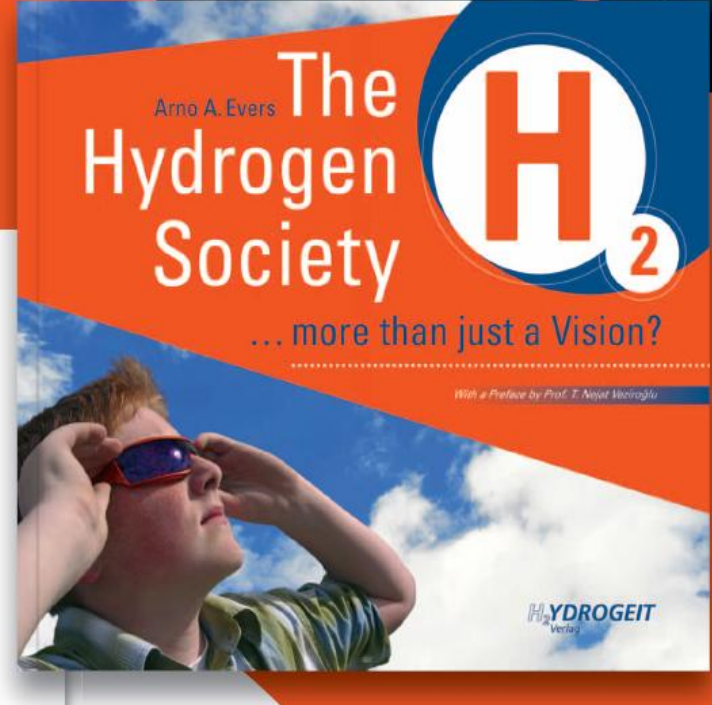
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 Arno A. Evers' The Hydrogen Society

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ISBN 978-3-937863-31-3

Publisher: Hydrogeit Verlag  
 14220 Dornum, Germany

Printed and bound in Germany by  
 Schmidt-Druckerei und Medien-Druck, Berlin  
 First published in Germany, April 2010

Printed on 100% recycled paper with 50% recycled content  
 and 100% recycled ink.

All Director, Executive, Type setting and DTP:  
 Team at Creative, Kommunikationstechnik  
 Mainz, Germany  
 E-Mail: [info@hydrogeit-verlag.de](mailto:info@hydrogeit-verlag.de)

Illustrations: Creative and online editing  
 Daniela Poths, Arno A. Evers/AGG PPS, Germany, Germany

Lektorat: Gisa Winkler, CTC, Köln, Zurich, Switzerland

Arno A. Evers asserts the sole right to be identified as the author of this work.



Prof. T. Nejat Veziroglu, President, International Association for Hydrogen Energy (IAHE) and Dr. Yasuaki Saitoh, Minister for Environment and Water Resources, Government of Singapore (visited) met the author Arno A. Evers at the World Hydrogen Technology Convention (WHTC) 2009 in Singapore.

Preface

Fossil fuels (i.e., petroleum, natural gas and coal), which meet most of the world's energy demand today, are being depleted fast. Also, their utilization is causing global problems, such as the global warming, climate change, ozone layer depletion, acid rains, oxygen depletion and pollution, which are posing great danger for our environment and eventually for the life in the planet Earth. Many engineers and scientists agree that the solution to these global problems would be to replace the existing fossil-fuel system by the Hydrogen Energy System. Hydrogen is the most efficient and the cleanest fuel. Its combustion will produce no greenhouse gases, no ozone layer depleting chemicals, little or no acid rain ingredients, no oxygen depletion and no pollution.

The book "The Hydrogen Society – more than just a Vision?" covers the concept and the developments relating to Hydrogen Energy from the beginning of 20th century on, follows historical and logical sequences showing that a real renewable Hydrogen Society is

achievable, and it would be the permanent solution to the global energy and environmental problems caused by the fossil fuels. It elucidates the developments in energy area in general, and Hydrogen Energy and Fuel Cells areas in particular. Following the adage "One picture is better than a thousand words", the book is lavishly illustrated. The conclusion is that the Hydrogen Society is not just a vision, and should be realized in a not too distant future, ensuring that the Planet Earth will be hospitable to life and the humankind will have clean and abundant energy.

I strongly recommend this excellent book to energy engineers, industrialists, environmentalists and decision makers, as well as to those interested in the future of humankind and the welfare of the planet Earth.

*T. Nejat Veziroglu*  
 President, International Association for Hydrogen Energy (IAHE)

ISBN 978-3-937863-31-3

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