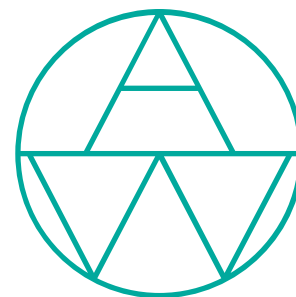


Green hydrogen generation from water and solar energy

a key role for the water sector?

Jos Boere*, Ron Bol*, Ad van Wijk**

Workshop Singapore International Water Week, April 17 2022



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** Delft Technical University/KWR, The Netherlands

Green hydrogen, a key role for the water sector?

CONTENTS

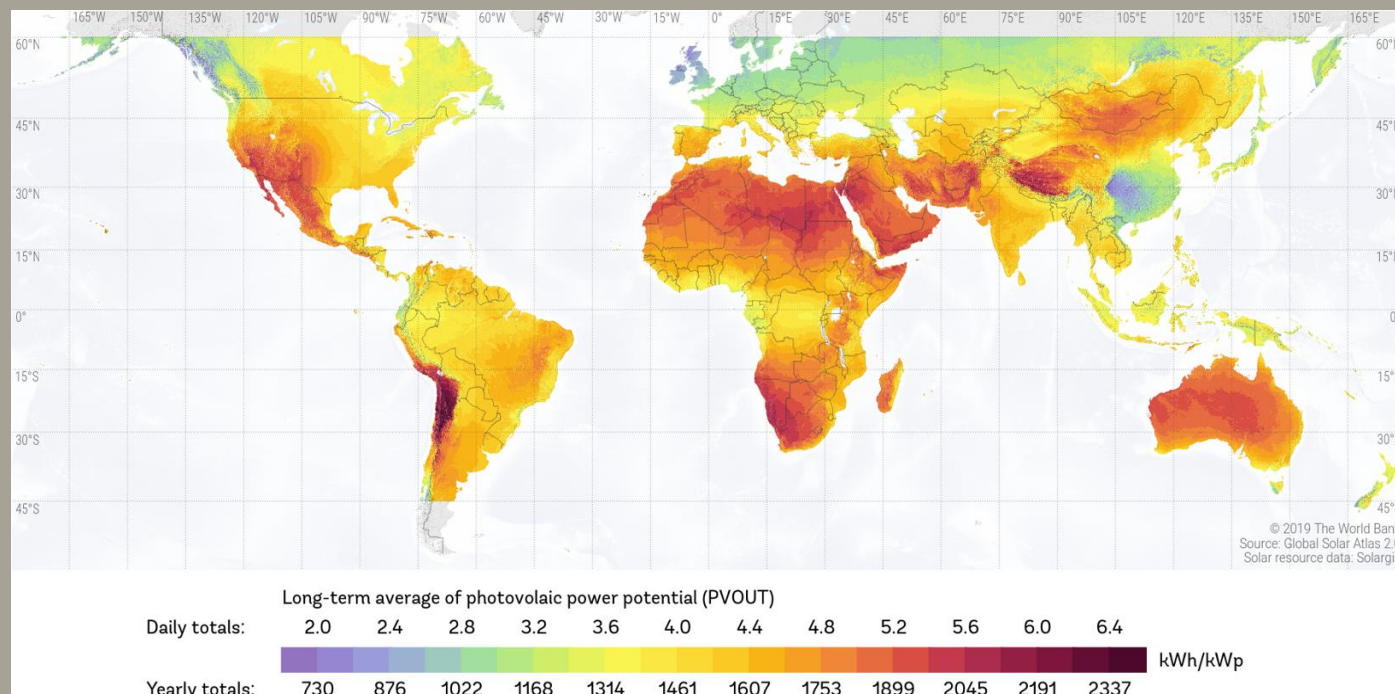
- 1) A carbon free energy system, global scale
- 2) A carbon free energy system, local scale
- 3) The water sector as an energy consumer
- 4) The water sector as an energy producer, green hydrogen
- 5) Green hydrogen: good friends never come alone
- 6) Concluding, about the role of the water sector



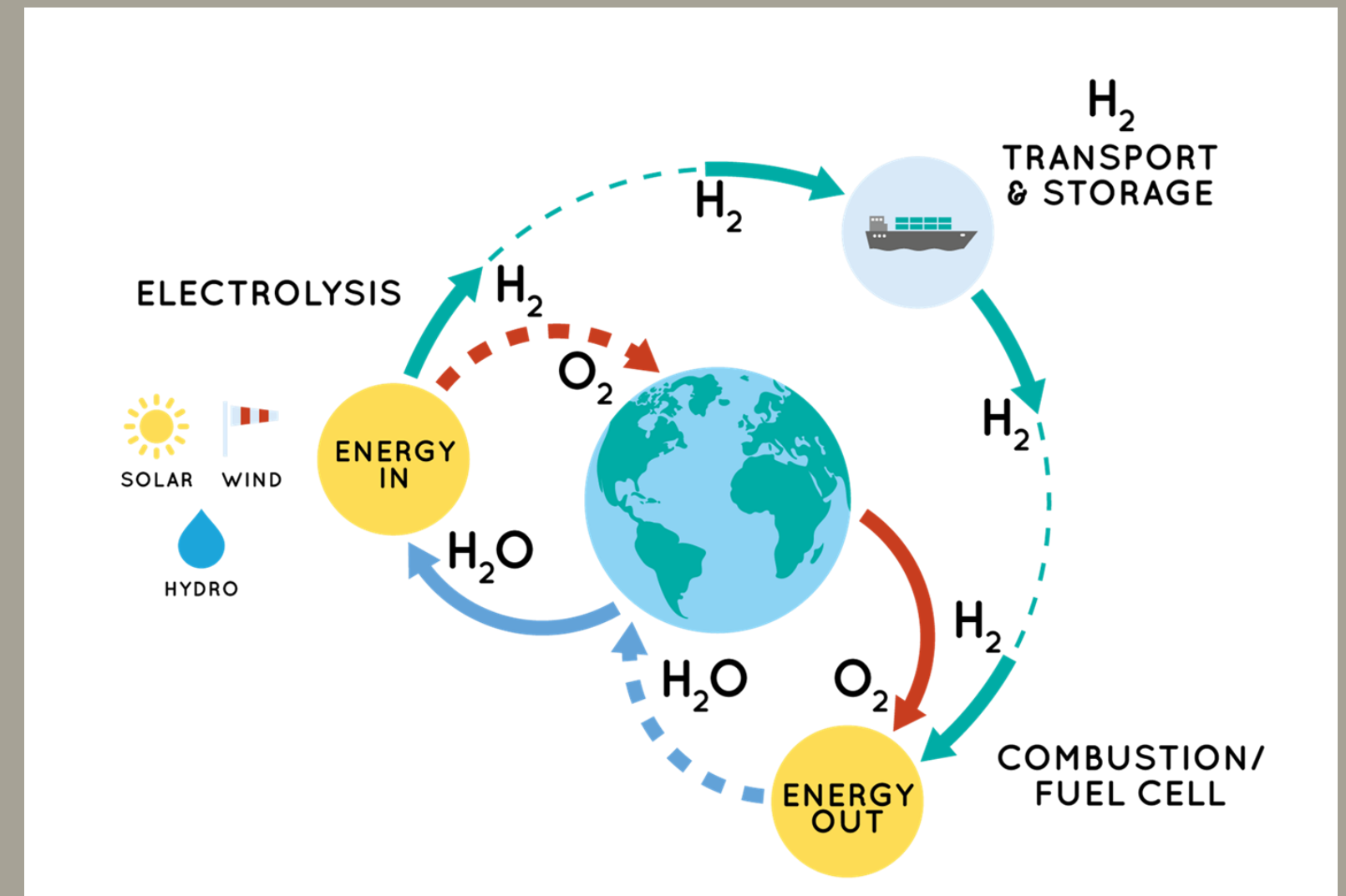
A carbon free energy system, global scale

KEY ELEMENTS

- 1) Renewable sources at highest efficiency
- 2) Electrification of energy use
- 3) Storage of energy: green hydrogen



Solar Resources Map

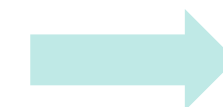


[19-12-ENG-Solar-Power-to-the-people.pdf](#) (alliedwaters.com)

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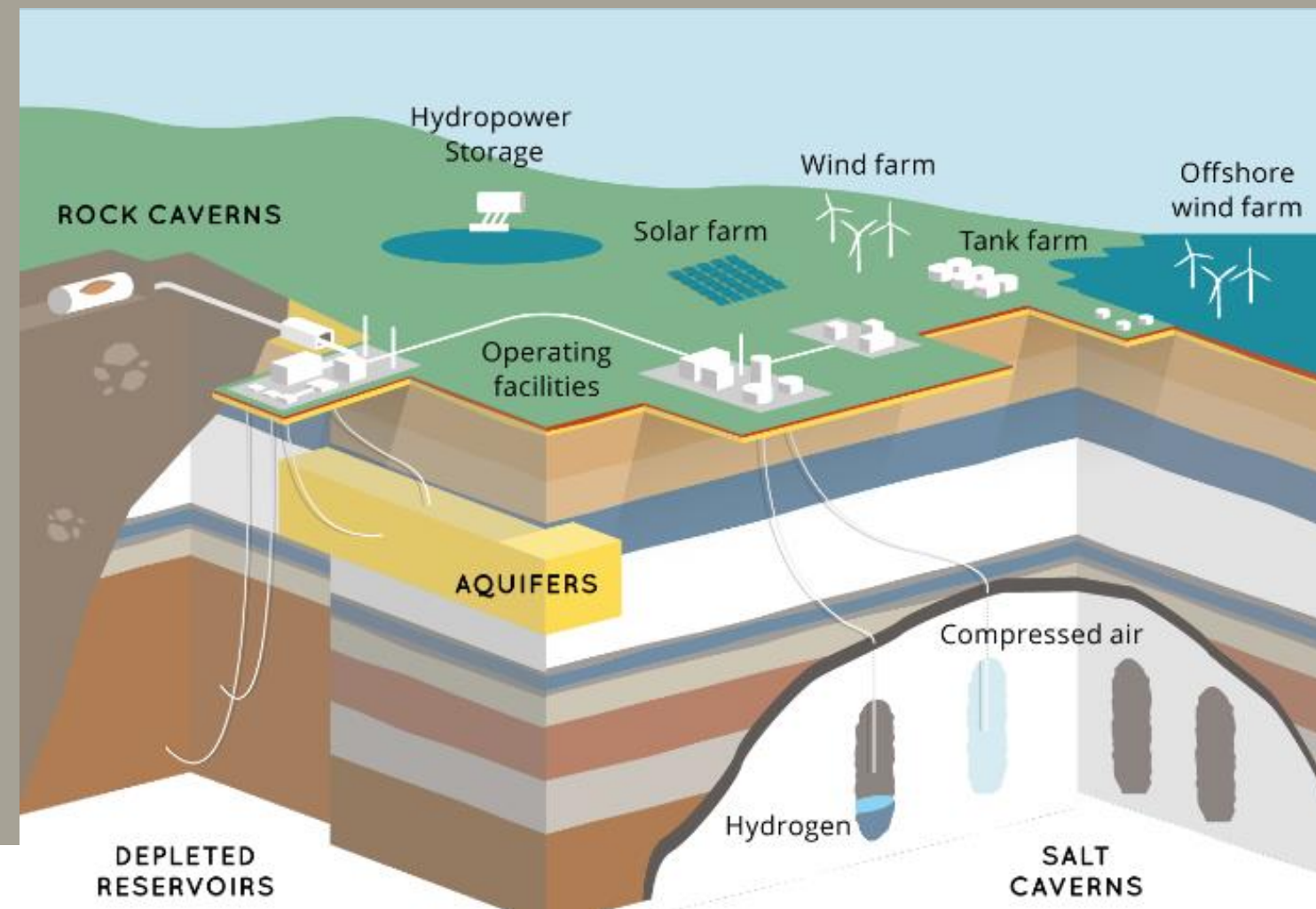


Take home: if applied at large scale, the concept is technically and economically feasible

A carbon free energy system, local scale

KEY ELEMENTS

- Local green electricity generation
- Gas network and storage options



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European Hydrogen Backbone

75% re-used gas pipelines
25% new hydrogen pipelines
40.000 km pipelines

The water sector as an energy consumer

MAIN USES AT WATER AUTHORITIES

- 1) Electricity for pumps, aerators etc.
- 2) Transport e.g. of sludges by truck or boat
- 3) Heavy duty machinery for maintenance of a.o. waterways



The water sector as an energy producer, green hydrogen

GREEN HYDROGEN THROUGH ELECTROLYSIS

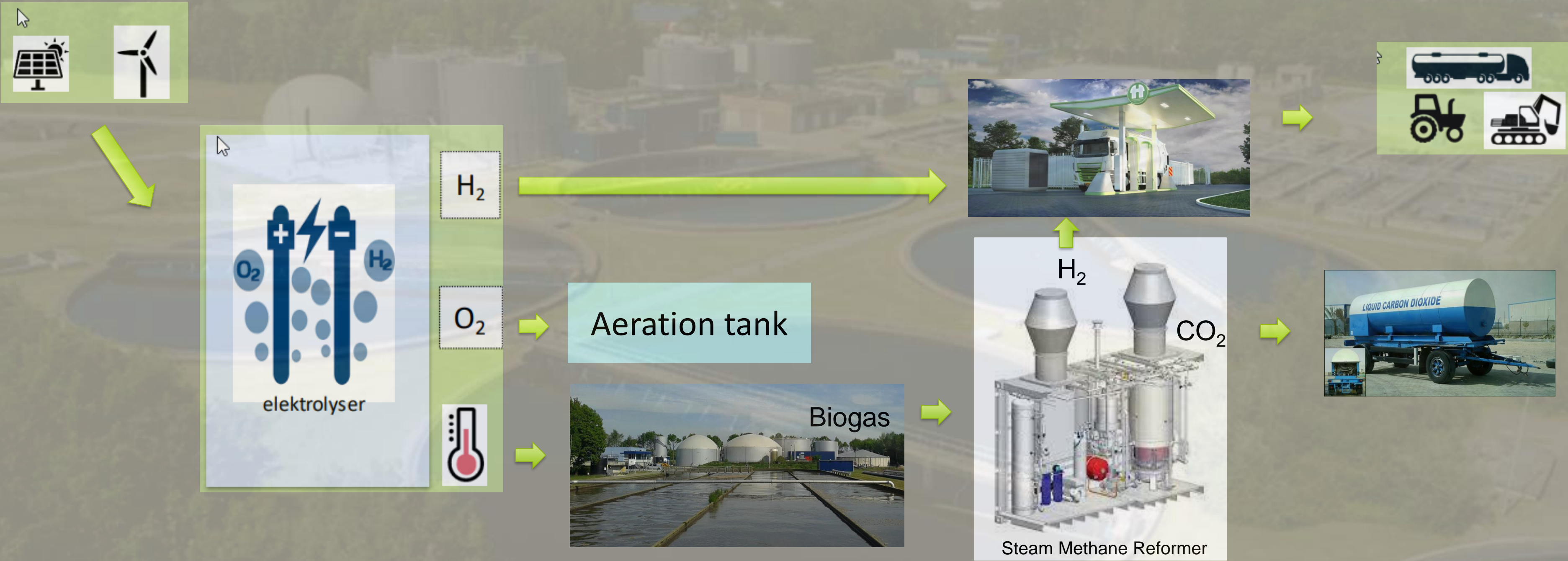
Process	Generation of green electricity by (floating) PV panels or wind turbines Electrolysis of water using green electricity
Products	Green hydrogen Oxygen Heat

GREEN HYDROGEN THROUGH BIOGAS

Process	Generation of biogas by digestion of sludge or clippings of waterways Conversion of methane, harvesting/separation green hydrogen and CO ₂
Products	Green hydrogen CO ₂ (gas or liquefied)

Green hydrogen: good friends never come alone

an integrated approach



- Hydrogen for a.o. mobility purposes
- Energy saving in the aeration stage (O_2 being a by-product)
- Reduced emission of N_2O (strong greenhouse gas!)
- Beneficial use of CO_2 e.g. in horticulture or industry

Concluding, about the role of the water sector

THE WATER SECTOR, WE ARE:

- A green sector sharing high sustainability ambitions
- Consumer of substantial amounts of energy
- High potential producer of renewable energy
- Creator of smart synergies

AND THEREFORE, WE ARE:

A natural leader of the transition!



Green hydrogen generation from water and solar energy

a key role for the water sector, YES !!

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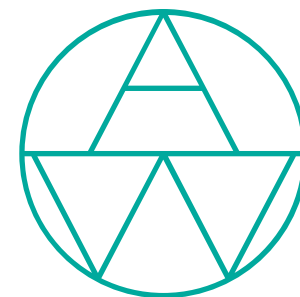
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