



## **Dii Desert Energy**

Associated Partners' Meeting

9<sup>th</sup> February 2021, W Dubai, UAE





Dii

**The deserts of Northern Africa and the Middle East (MENA)** are a quasi unlimited source of emission-free energy. This shall in the first place benefit the region with its growing population (about 500 mln by 2050). We believe that MENA will eventually also become a major supplier of emission free energy to the world. Regional and international actors are challenged to take this major development jointly in their hands.....

**Dii Desert Energy** is an Industry Initiative founded in 2009 to connect regional and international players to make the energy transition happen in MENA and to capture synergies among regions and continents.





## Dii Desert Energy Vision

Increased **competitiveness of renewables** from the deserts shall swiftly lead to economic growth and secure 100% energy supply without harmful emissions or waste

## Our Mission: No Emissions!

Towards a (near) **emission-free energy supply** in MENA by 2050 and making MENA a '**power house**' for the global energy markets, offering benefits to the region

## Strategy

Connecting the international industry, active in the MENA region, with authorities and institutions. Focus on practical conditions for '**green electrons**' and '**green molecules**' along the energy value chains leading to tangible and profitable projects and other benefits for local and international stakeholders



# 11 Years Desertec 1.0 ---> 3.0

## Green Energy for North Africa, West Asia and the World



Development phases



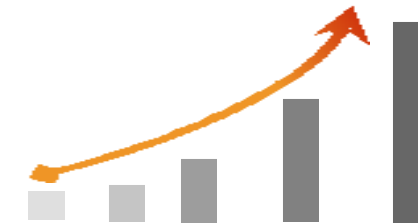
- Studies on the **Desertec vision** a.o. **TREC** (Trans-Mediterranean renewable energy Cooperation Studies)
- Creation of **awareness and motivation**



- Desertec 1.0**
- Power from the deserts for Europe**
- Foundation of Dii GmbH** (Munich) in 2009
- System, country and technology studies (Desert Power 2050, Desert Power: Getting Started)**
- Local adoption of idea
- Preparation of services** for implementation phase

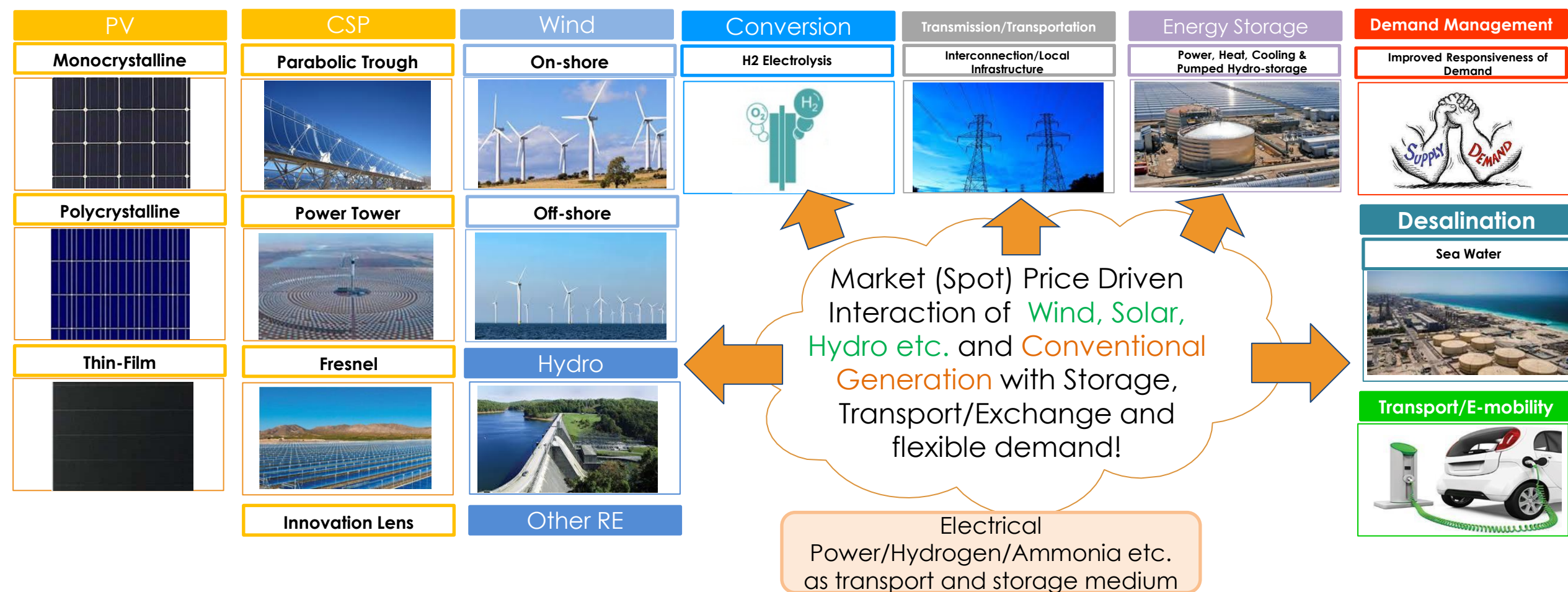


- Desertec 2.0**
- Development of the market in the MENA Region first**
- Dii active from Dubai, UAE
- Identifying and solving practical hurdles** of wind/solar/grid projects
- International industry network '**Dii Desert Energy**'
- Renewables become competitive!**



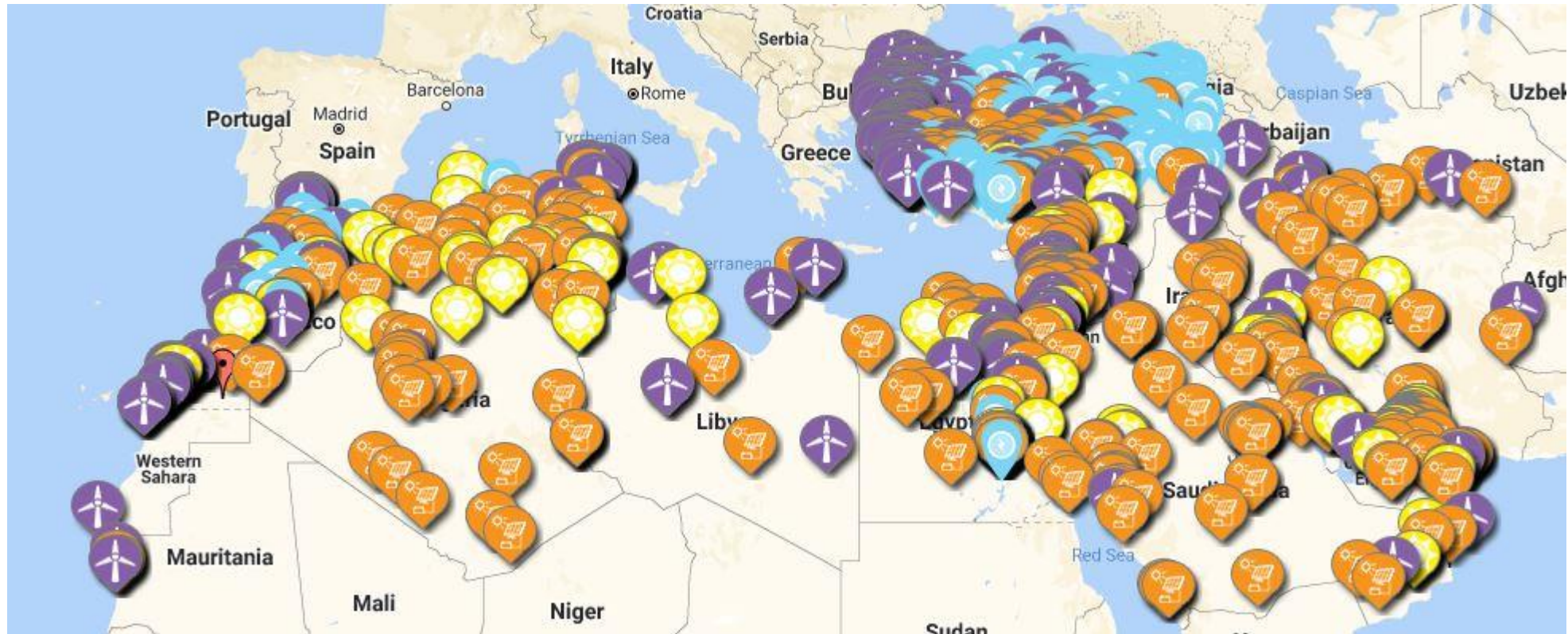
- Desertec 3.0 Market acceleration** towards full renewable supply of green electrons and green molecules, transportation, storage and flexible demand in MENA
- Full Market integration** throughout MENA and connected markets. MENA to become a 'Powerhouse for green electrons and green molecules for the world energy market'
- Increased focus on Industry Sector Coupling** through power, hydrogen etc.

# 'Green Electrons' and 'Molecules' along the energy value chain



# Over 1,250 Wind, PV, CSP Projects in MENA! Dii

(2020 Dii Project Database >5 MW)





# MENA in the LEAD....And a wave of new interesting Associated Partners



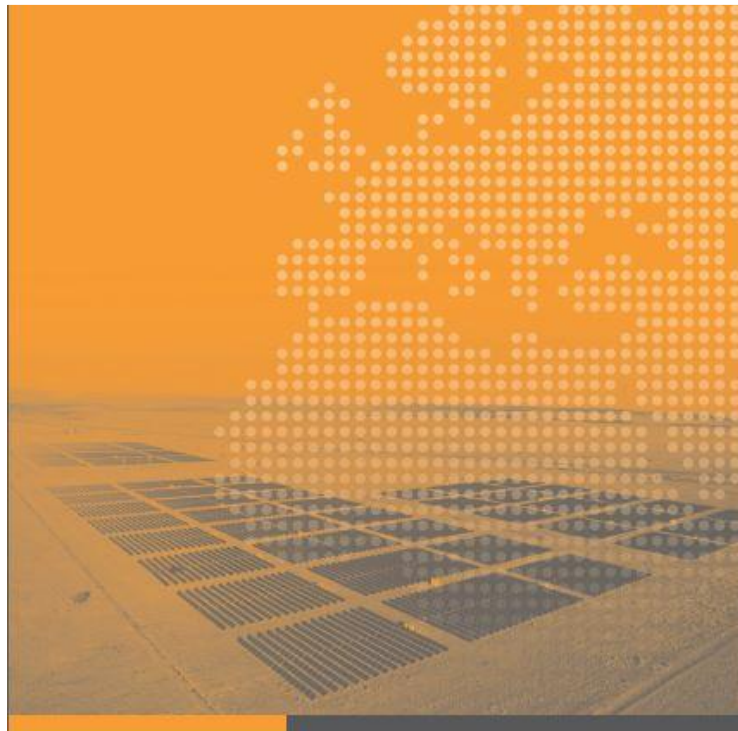
## Key Promoters



## Associated Partners



# Desertec 3.0 studies on green 'molecules' and 'electrons'



## A North Africa - Europe Hydrogen Manifesto

Prof. Dr. Ad van Wijk  
Frank Wouters, MSc  
Dr. Samir Rachidi  
Dr. Badr Ikken



- Published **November 2019** in cooperation with IRESEN (Morocco)
- Presented to **Frans Timmermans**, EVP EU Commission in charge of Green Deal
- Discussed with key **stakeholders for hydrogen in Europe and MENA**



## Battery Storage: Is the Middle East ready yet?

*A joint study by Dii Desert Energy and Arthur D. Little*

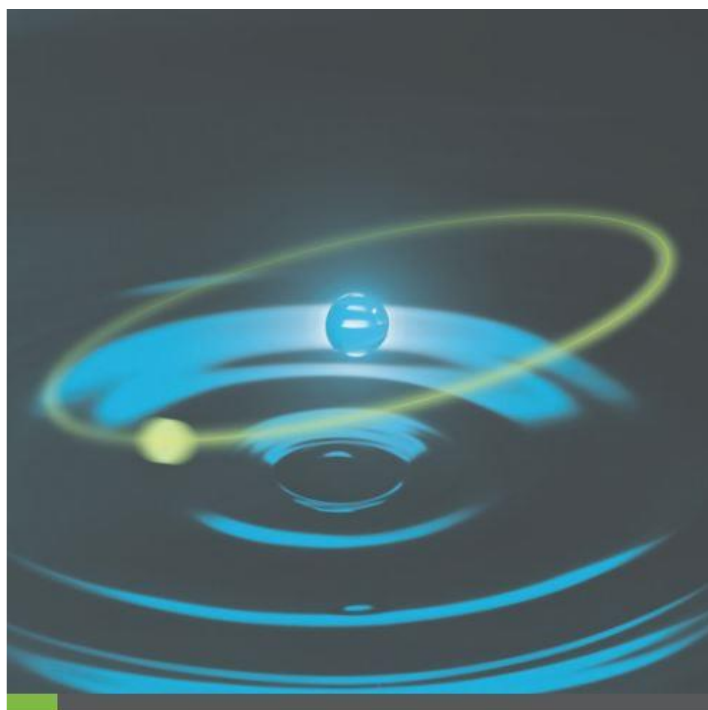
November 2019

**Arthur D Little**





# Green H2: an historic opportunity of Europe – MENA partnership!

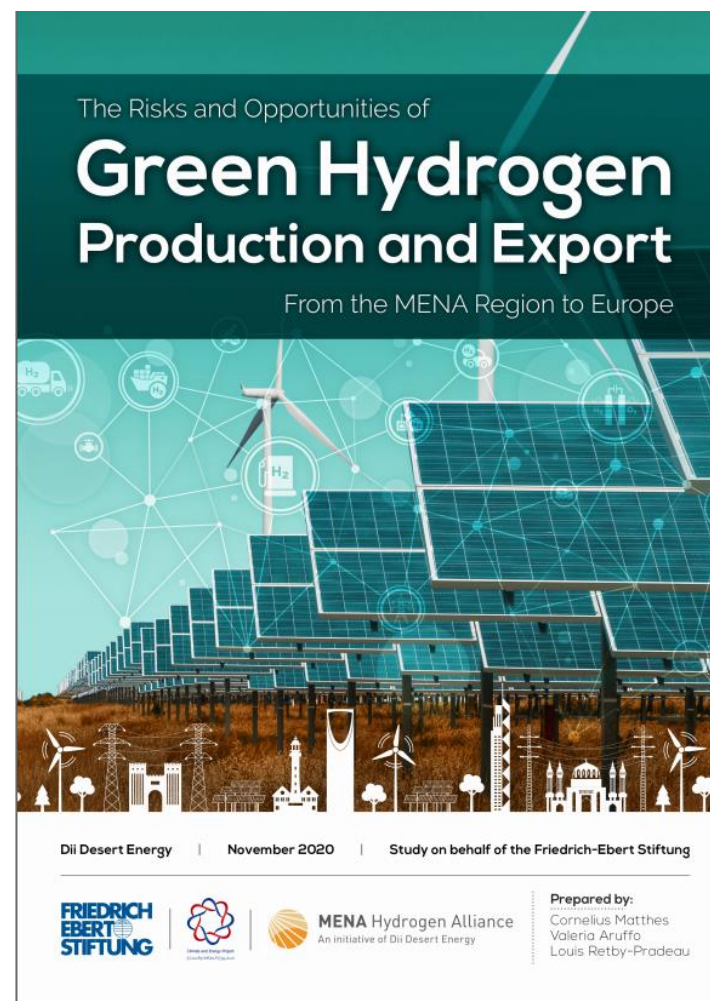


## Green Hydrogen for a European Green Deal A 2x40 GW Initiative

Prof. Dr. Ad van Wijk  
Jorgo Chatzimarkakis



- Published **April 2020**, in cooperation with Hydrogen Europe
- **Presented to Frans Timmermans**, EVP EU Commission in charge of Green Deal and 14CEOs of utilities and companies active in hydrogen value chain
- Discussed and partnered with **Energy Minister of Morocco**



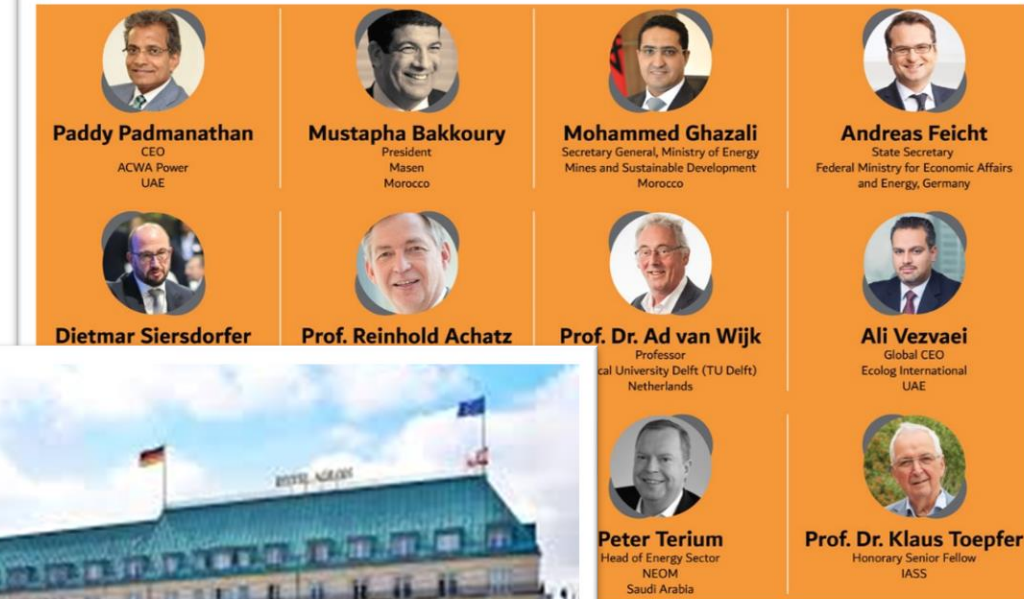
- Published **November 2020**, in cooperation with Friedrich Ebert Stiftung
- 2020: a turning point in the global energy industry (historic crisis in oil & gas, shift in mind towards climate friendly solutions)
- Faster energy transition in MENA and new green jobs!
- Europe as both off-taker and supporter (financially and technically)
- Deep dive into Morocco, Oman and Jordan

# 10<sup>th</sup> 'Dii Desert Energy – Ghorfa' Summit in Berlin

## 25<sup>th</sup> – 26<sup>th</sup> Nov 2019: Energy Transition in the Arab World



- 300+ participants at top executive level
- 60+ high-level speakers
- The program includes high-level panel discussions:
  - **Top Executive Panel:** The Energy Transition in the Arab World: Experiences, Challenges and Outlook
  - **The Energy Transition:** Towards a 100% Emission Free Energy System
  - Transitions in the Energy Mix: Oil & Gas - Innovative Technologies and Solutions
- Top level press conference, incl. President of MASEN, CTO thyssenkrupp, VP Technology ACWA Power
- Conference video can be watched [here](#)
- 10 Interactive Networking Roundtables covering the energy supply chain and presenting the new Dii reports :
  - Green Molecules
  - Power Grid Capacity and Interconnections
  - Financing Renewable Energy Projects & Investments





# Dii partner of choice for top events with policy makers



Dii Egypt Conference & Workshop



Dii Algeria Workshop

# New publication in German and English together with German – African Business Association

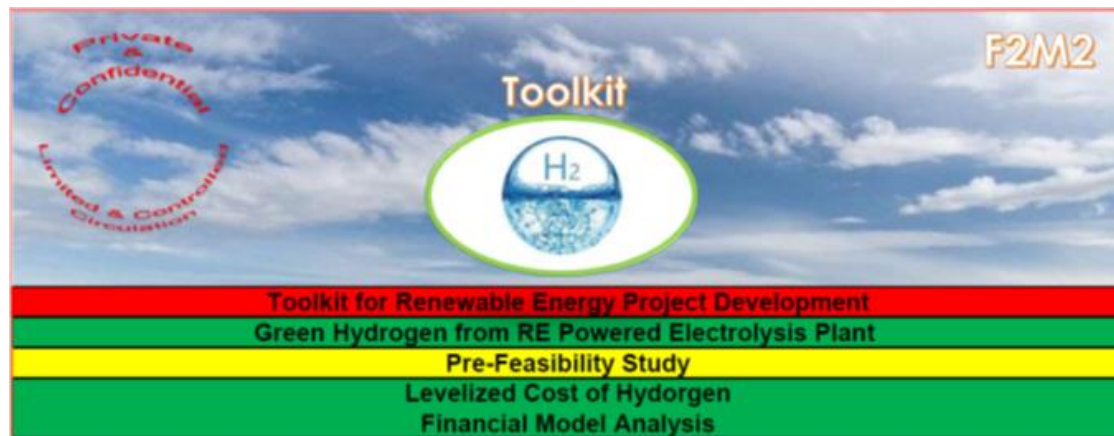


On the occasion of 10 years Dii, the German African Business Association published a **special report about the history of Dii, the different phases towards Desertec 3.0** including the recent revival, with interviews of Paul van Son and the President of the Association.

**Founded in 1934 and with over 600 members**, the *Afrikaverein der Deutschen Wirtschaft* is an influential organization in Germany and internationally.



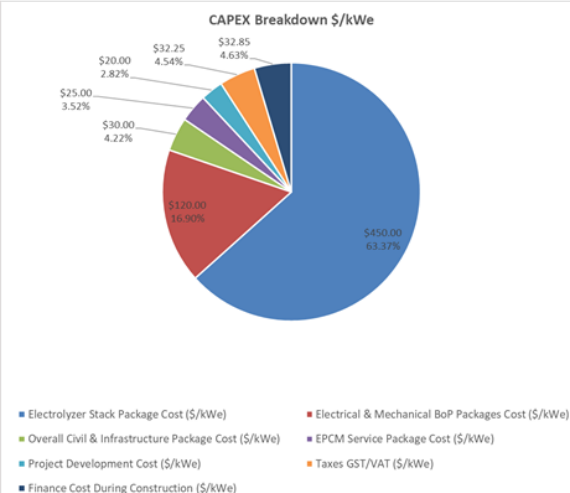
# New Dii LCoH model and tool kit appreciated by market and Dii partners



## GREEN HYDROGEN Innovative Financial Model Toolkit for Analyzing Levelized Costs (LCOH)

**Inputs Form**

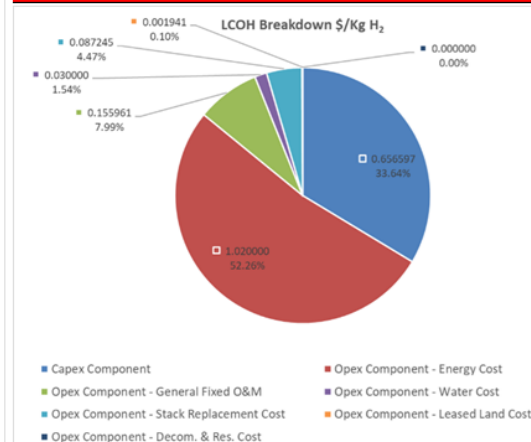
| Parameter  | Value  | Unit   |
|--|--------|--------|
| Electrolyzer Stack Package Cost (\$/kWe)             | 120.00 | \$/kWe |
| Overall Civil & Infrastructure Package Cost (\$/kWe) | 30.00  | \$/kWe |
| Project Development Cost (\$/kWe)                    | 25.00  | \$/kWe |
| Finance Cost During Construction (\$/kWe)            | 3.52%  | %      |
| Electrical & Mechanical BoP Packages Cost (\$/kWe)   | 32.25  | \$/kWe |
| EPCM Service Package Cost (\$/kWe)                   | 32.85  | \$/kWe |
| Taxes GST/VAT (\$/kWe)                               | 4.63%  | %      |



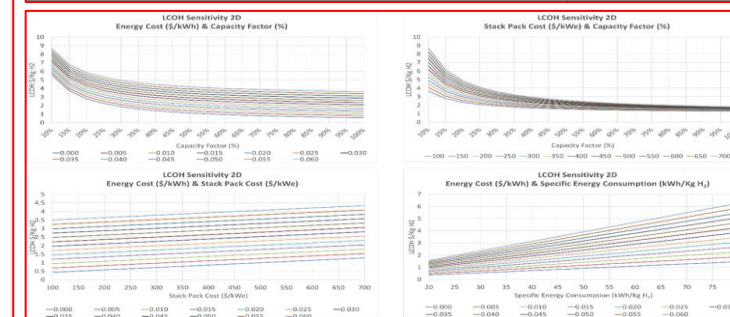
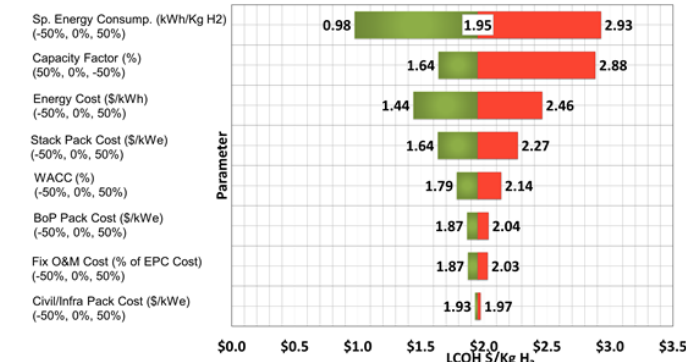
**OUTPUTS - 20 Years**

| LCOH Component                          | Component \$/Kg H <sub>2</sub> | Component Percentage |
|---|--------------------------------|----------------------|
| Capex Component                         | 0.656597                       | 33.64%               |
| Opex Component - Energy Cost            | 1.020000                       | 52.26%               |
| Opex Component - General Fixed O&M      | 0.155961                       | 7.99%                |
| Opex Component - Water Cost             | 0.030000                       | 1.54%                |
| Opex Component - Stack Replacement Cost | 0.087245                       | 4.47%                |
| Opex Component - Leased Land Cost       | 0.001941                       | 0.10%                |
| Opex Component - Decom. & Res. Cost     | 0.000000                       | 0.00%                |
| <b>Total Percentage Check</b>           | <b>100.00%</b>                 |                      |

**LCOH (\$/Kg H<sub>2</sub>) \$1.951743**  
**LCOH (AED/Kg H<sub>2</sub>) 7.172656**



### Tornado Chart - LCOH \$/Kg H<sub>2</sub>



# Planning 2021: overview main topics

- **Desertec3.0** related content development and related presentations, including **new Dii reports** on hydrogen, grid interconnections, cooling and selected hurdles in the market
  - Further **expanding associated partner network** (need to replace a number of companies exiting for different reasons, mainly cost containment), **also targeting one new Shareholder**
  - Dii as knowledge partner at top industry events and webinars under current conditions
  - Popular and French versions of the Book on 'Emission free Energy from the Deserts'
- **Conferences, social media and communication**

We regard the current challenging global situation as an impulse for more awareness of the need for a swift global energy transition. Our focus: MENA to become an emission free Powerhouse
- **11<sup>th</sup> Dii Desert Energy Leadership Summit**: back to MENA – but currently only possible online
- Launch of Dii Desert Energy **Green Transition Fund**



# Planning Q1 2021: details

## **Content: working groups, reports, studies**

- New working group on future energy systems, with focus on district cooling's and electric vehicle's role in energy system as a battery, balancer etc.
- Interest of KfW, EBRD etc. on financing structure, instruments and potential support schemes for green molecule projects
- Further development of LCoH model and Dii tool kit on green molecules
- Report with Roland Berger on localization, job creation etc. of green hydrogen, incl. transfer of ideas of European *Hydrogen Valleys*
- Partnering on new reports for green molecules and Desertec 3.0 in MENA (on some of the topics outlined under MENA Hydrogen Alliance)

# Building International Partnerships by Sharing Knowledge and Connecting People



## Desertec 3.0

### Vision

Increased competitiveness of renewables shall swiftly lead to economic growth and secure 100% energy supply without harmful emissions or waste



### Strategy

Focus on practical conditions along the free-emission energy value chain leading to tangible and profitable projects and other benefits for local and international stakeholders



### Mission

Towards a fully emission free energy supply in MENA before 2050 and making MENA a 'powerhouse' for the global energy markets offering benefits to the region



## A 'Network of Networks'



### Advisory & Market Intelligence

Dii has built a reputation as a think-tank and neutral advisor to public and private sector with a track record of 10 years of successfully working in MENA and beyond



### Advocacy

As the only industry-led organization pushing the agenda for the MENA region to adopt emission free energy supply, looking at green electrons and molecules from a holistic point of view across the entire value chain



### Networking & Business Development

We provide a platform for thought leadership, networking and business development for key stakeholders in the energy market in the MENA region



# Cooperation of Dii Desert Energy with organizations and institutions globally



Maintaining a network of associations, industrial initiatives, development banks & NGOs

# Raising awareness and promoting emission-free energy from the desert



- Restructuring LinkedIn in corporate page with description and strategy
- Content alignment with 'green molecules' and 'green electrons'
- Improvements in traffic in the past 6 months
- Win-win partnership and partners achievements announcement
- Exclusive market announcement and market intelligence in the Dii Newsletter

## *League of Arab States: Insights on Regional Transition Strategies*

Most Arab countries have announced ambitious energy transition strategies axed principally on the diversification of energy resources to secure and sustain energy supply and the increase of the share of renewable energy generation. Besides, the adopted strategies take into consideration economic, social and environmental challenges as the sustainable energy industry is more labor-intensive and will contribute to increasing the local added value and in creating new and innovative job opportunities.

[Click here](#) to read the full keynote letter from Nouri Alkishriwi, Energy Advisor, League of Arab States






# A Fresh Look for Dii website



## Green Electrons and Green Molecules

**MENA to become a 'Powerhouse'  
for green electrons and molecules  
for the world energy market**

Learn More 

### Our Journey Desertec 3.0



We believe the Arab nations will transform their energy systems toward a 'Powerhouse' serving their own population. Eventually, they will become a major supplier of 'green electrons and molecules' to the world energy markets.

[Read more](#)

### Our Team Dii 'Grand' Team



More than 30 years of experience in power system management, regulation and investment banking. Headquarter in Dubai, Directors are based all across Europe and MENA.

[Read more](#)

### Our Activities Our Mission: no Emission!



Market intelligence, business development, research & advocacy and networking to change the entire energy system all in the spirit of our mission: energy without harmful emissions!

[Read more](#)



### Advisory Board Joining Forces for the Energy Transition

The Advisory Board's main function is to advise the management of Dii Desert Energy on their mission and strategy as well as private and public sector contacts and funding.

Top industry captains join forces to accelerate regional development, to fast track emission free energy projects and to join forces towards the full renewable supply of green electrons and green molecules, transportation, storage and flexible demand in MENA.

[Read more](#)

# Building on long term partnerships to develop local and export markets for green energy



## Green Electrons



BERLIN  
ENERGY  
TRANSITION  
DIALOGUE

Energiewende - A Global Green Deal

Berlin Energy Transition Dialogue, 16-17 March 2021

[Registration](#) | [Website](#)



Intersolar Europe, 9-11 June 2021

[Agenda](#) | [Website](#)

## Green Molecules



World Hydrogen  
Congress

World Hydrogen Congress, 20-22 September 2021

[Agenda](#) | [Website](#)

Launching event:

**World Hydrogen MENA**  
**21<sup>st</sup> April**



**MENA Hydrogen Alliance**  
An initiative of Dii Desert Energy





# Events and Communication: presence of Dii Desert Energy since June 2020



- **AEF Webinar with Chairman of KenGen** 1<sup>st</sup> July: country focus Kenya and storage
- **World Hydrogen and Solar Conference**, 29<sup>th</sup> July, speech by MENA Hydrogen Alliance
- **ATA Insights**, 1<sup>st</sup> September: Green Hydrogen, a new catalyst for Renewables in the MENA region
- **Global Alliance Power Fuels**: Annual Conference: Financing Powerfuels Pathways: 9<sup>th</sup> September 2020, keynote speech alongside Head of DENA
- **GEIDCO**, 16<sup>th</sup> September: Launching Ceremony of the MENA Committee: MENA Renewable Energy Evaluation and Deployment
- **Solarquarter**: webinar, alongside Andrea Lovato, VP, ACWA Power on 22<sup>nd</sup> September
- **World Hydrogen Congress**, 22<sup>nd</sup> – 23<sup>rd</sup> September
- **GIZ and AHK Tunis**, 29<sup>th</sup> September: Workshop on Power to X, keynote by Dii
- **Gulf Intelligence**: Webinar, 1<sup>st</sup> October

# Events and Communication: continuous strong presence, but physical contact missing!



Dii is typically in the steering committee, helping to structure the program, give a speech and providing impartial market analysis:

- **MENA Energy Meet, Oman**, 2-3 November, fully online
- **World Power to X, Marrakech**, 1-3 December, including a special session of the MENA Hydrogen Alliance, fully online
- **Africa Energy Forum**, 20 October - 13 November, fully online
- **WETEX**, 26 – 28 October incl. *Green Week*, fully online
- **Intersolar ME (with ME Energy)**, 26 January, online



# Events and Communication: continuous strong presence, but physical contact missing!



- **IRENA's** General Assembly, 8-21 January 2021, and coalition for action working group 2021 on Guarantees of origin/renewable energy certificates for green hydrogen
- **Abu Dhabi Sustainability Week**, 19 January 2021, online
- **Future Investment Initiative**, 27-28 January 2021, hybrid

## Upcoming events:

- **World Future Energy Summit**, 5-7 April 2021, online
- **World MENA Hydrogen**: 13-14 April 2021, co-hosted by Dii and the MENA Hydrogen Alliance, online
- **Berlin Energy Transition Dialogue**, 16-17 March 2021, online
- **Intersolar Europe**, 9-10 June 2021, online
- **World Hydrogen Congress**, 20-22 September 2021, online

# Maghreb Relations – Dii as Bridge between Europe and MENA

## Morocco

*First mover for both green electrons and molecules*

- Key partners: Ministry of Energy, Mines and Environment, Masen, NAREVA, IRESEN
- Participation of the Kingdom in the CertyfHy3 Hydrogen Guarantee of Origin (GO) Scheme
- Advisory and communication outreach on the national green H2 strategy via MENA H2 Alliance, policy papers (e.g. FES) and public online event (aef: green hydrogen panel with the MoE, Masen, ACWA)
- Cooperation for the upgrade and translation of the book

## Algeria

*Great potential but slow player due to political challenges*

- Key partners: Sonelgaz, KfW
- Implementation of the MOU in progress in a context of political leadership adjustment
- Official communication to the new Minister of Energy
- Interview with Algerian Center for Diplomatic Economy to highlight Dii's role as market enabler
- Sonelgaz's support in principle as 'in-kind' partner for the translation of the book
- Cooperation with KfW on studies for the power system, transmission and logistics

## Tunisia

*Huge potential and first steps acknowledged for RE IPPs and H2 development*

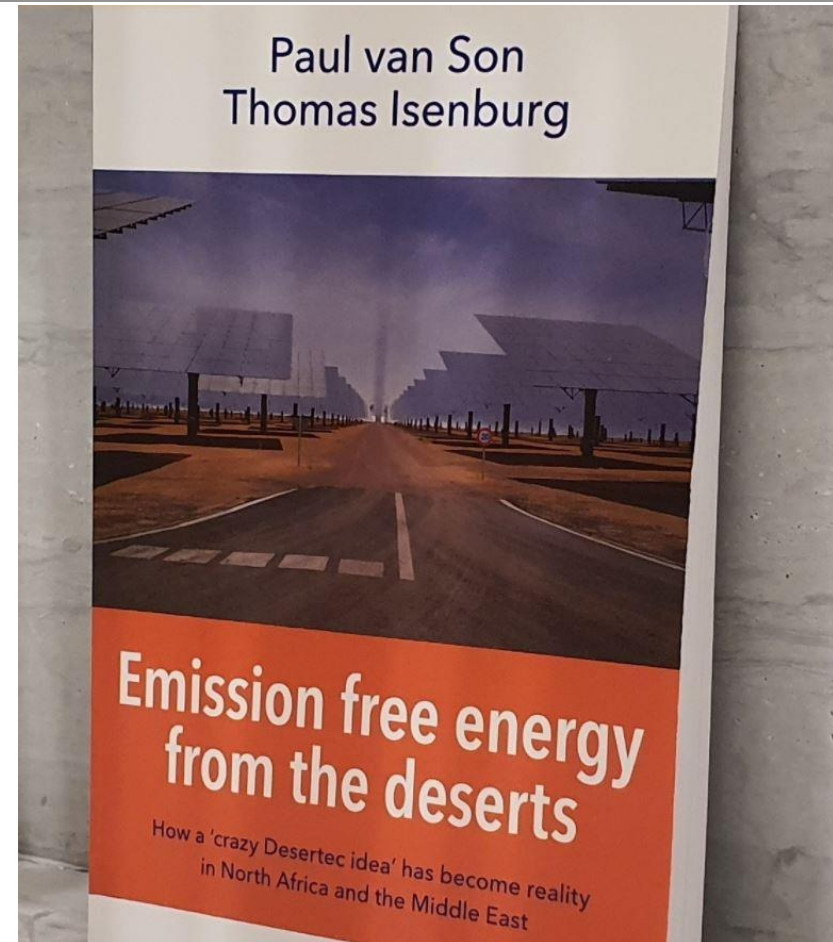
- Key partners: GIZ, KfW, former Minister of Energy and Industry
- Keynote speech at GIZ and AHK Tunis and presented Desertec 3.0.
- Submission of project proposals via GIZ Tunis
- Interaction with IFC on development of latest PV projects
- Involvement in the translation of the book thanks to Abdelaziz Rassaa



# Dii's Book on Emission Free Energy from MENA

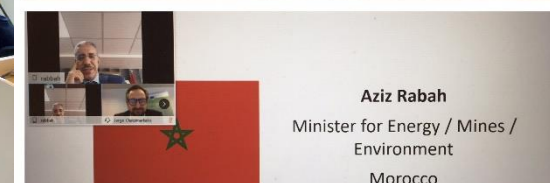
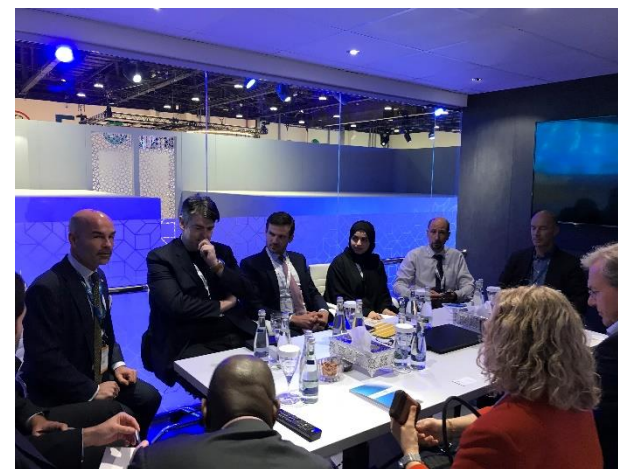


- Published in 2019, German and English
- How a 'Crazy Desertec' idea has become **reality** in the sense of expanding renewable energy in North Africa and the Middle East and potential for massive export of green electrons and molecules
- **Update and translation into French to 'zoom' into the perspective of 'green electrons and molecules' in Maghreb (2021)**



# MENA Hydrogen Alliance: quick ramp up from January 2020 with tangible impact

- **First two physical** meetings at WFES, January 2020 hosted by Masdar and March 2020 at InterSolar
- Presentation of 2x40 GW initiative to EVP Timmermanns
- Numerous **bilateral talks** with Minister of Energy in Morocco, Masen, Nareva, IRESEN, AMEE, CEO of Sonelgaz, STEG Tunisia, League of Arab States
- **Global e-convention 21st April**
- Online Meeting with all stakeholders in **Jordan** with Edama
- **First online (public) meeting** mid-May to discuss next activities and priorities: almost 500 participants (50 countries)
- **Launch event** for new report with Friedrich Ebert Foundation
- Invited to **government committees** for hydrogen





# Business Plan 2021: details

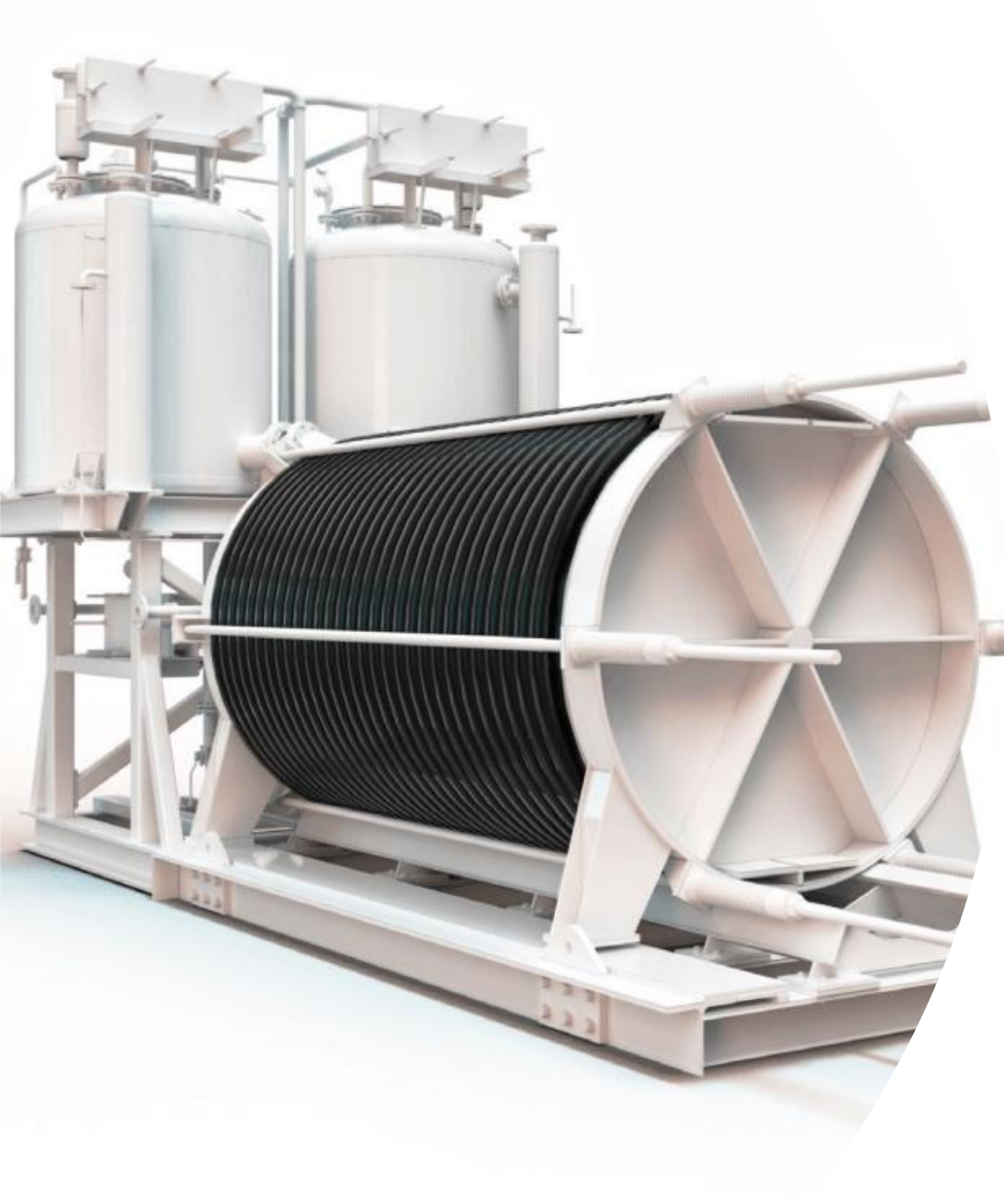


## Topics for MENA Hydrogen Alliance (1):

- Expand the alliance with select private and public sector/research partners
- MoUs: several MoUs lined up, e.g. Hydrogen Europe, GIZ, Iresen
- Boost international partnerships to push for concrete project development with cross continental deals.
- Analysis of demand side: who will be the buyers of green molecules?
- Creating and maintaining a project tracker for the entire H2 value chain
- Set up and maintain database on innovative start ups and growth companies in green molecules
- Start working on H2 standards and codes for the region: define key partners
- Monitor global policies and regulations, national H2 strategies etc. – educate policy makers in the MENA region on the opportunities (e.g. EUR 2bn by German Hydrogen Strategy for Int. Cooperation)

## Topics for MENA Hydrogen Alliance (2):

- Further analysis on ways of transport: gaseous and liquid hydrogen, ammonia, LOHC, methanol: compilation of technical, commercial and market information
- CertifHy project: targeting governments in MENA?
- Cooperation with European Commission to organize events in MENA to explain what the European Green Deal is. Include League of Arab States as well
- Calculate and propose some exemplary business cases, including transport to Europe – engage with logistics/commodity traders
- Electrolysis: - Maintain database/ monitor potential new technologies for green hydrogen production (e.g. SOE) and their technology readiness level (TRL) and costs
- Water/ammonia: Contact desalination plant and ammonia operators in the MENA region to analyse potential for providing water for GW scale electrolysis and produce green ammonia



# A Hydrogen Act for Europe

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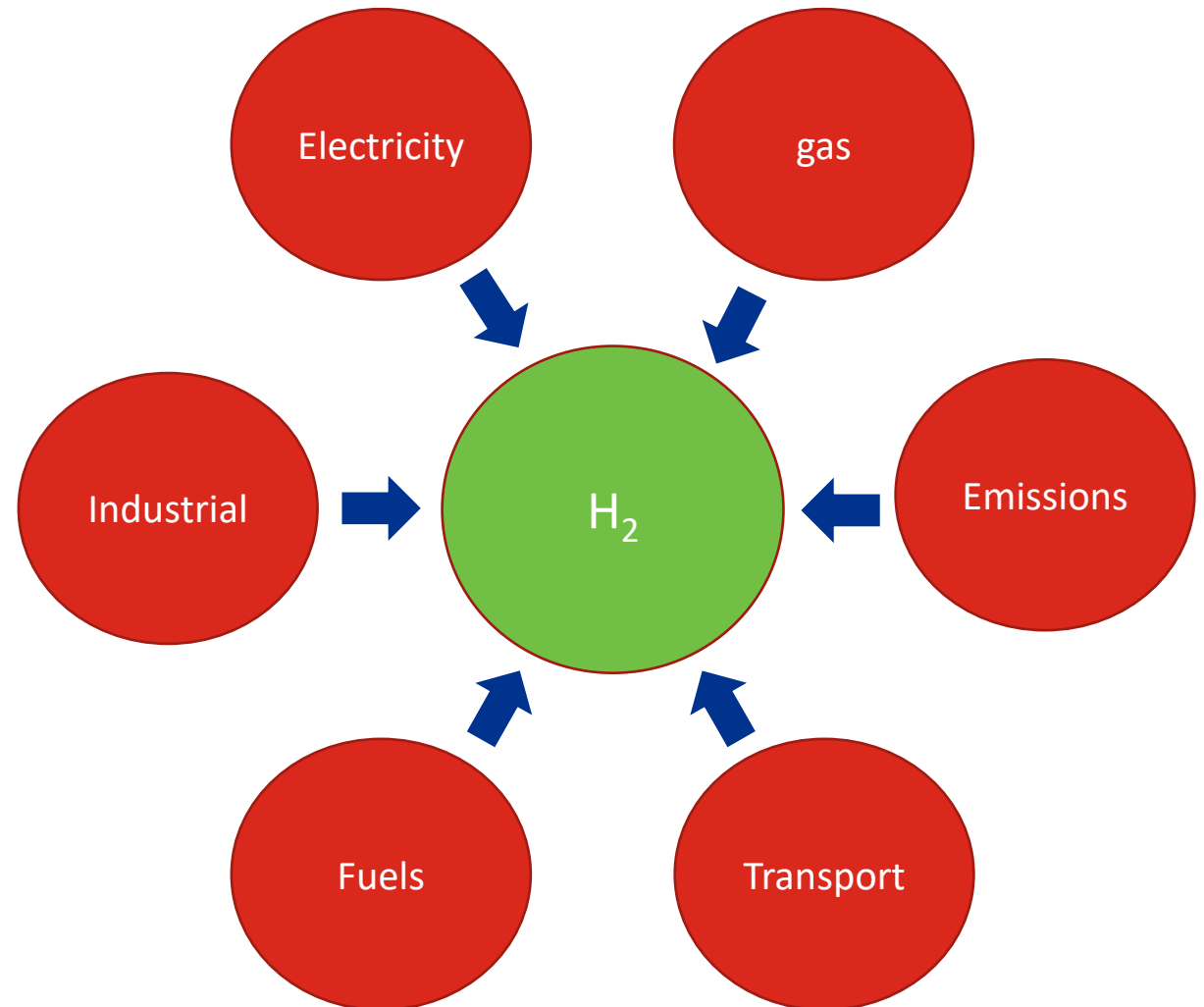
Frank Wouters

- *Director - EU GCC Clean Energy Technology Network*
- *VP Clean Hydrogen - Worley*

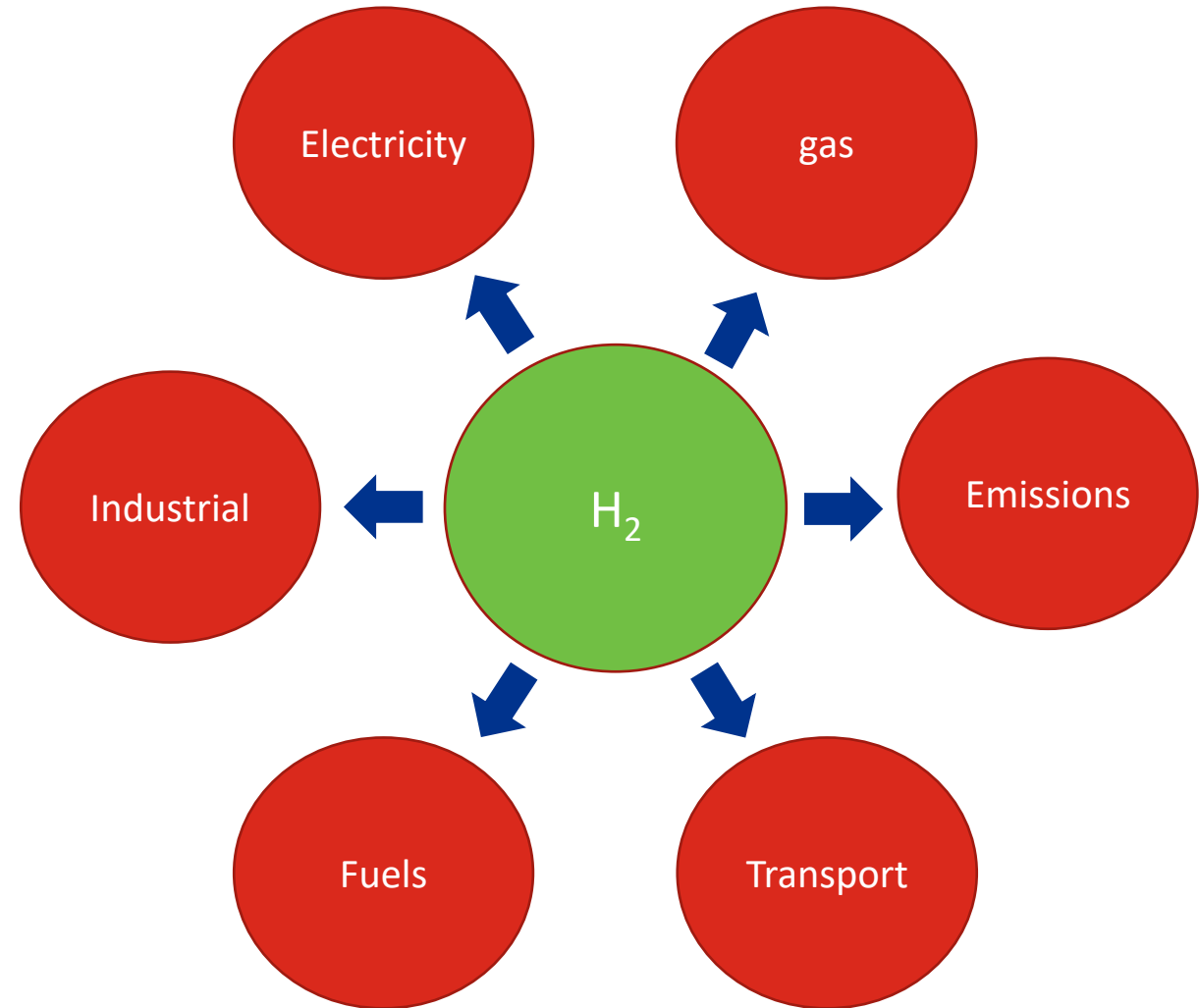
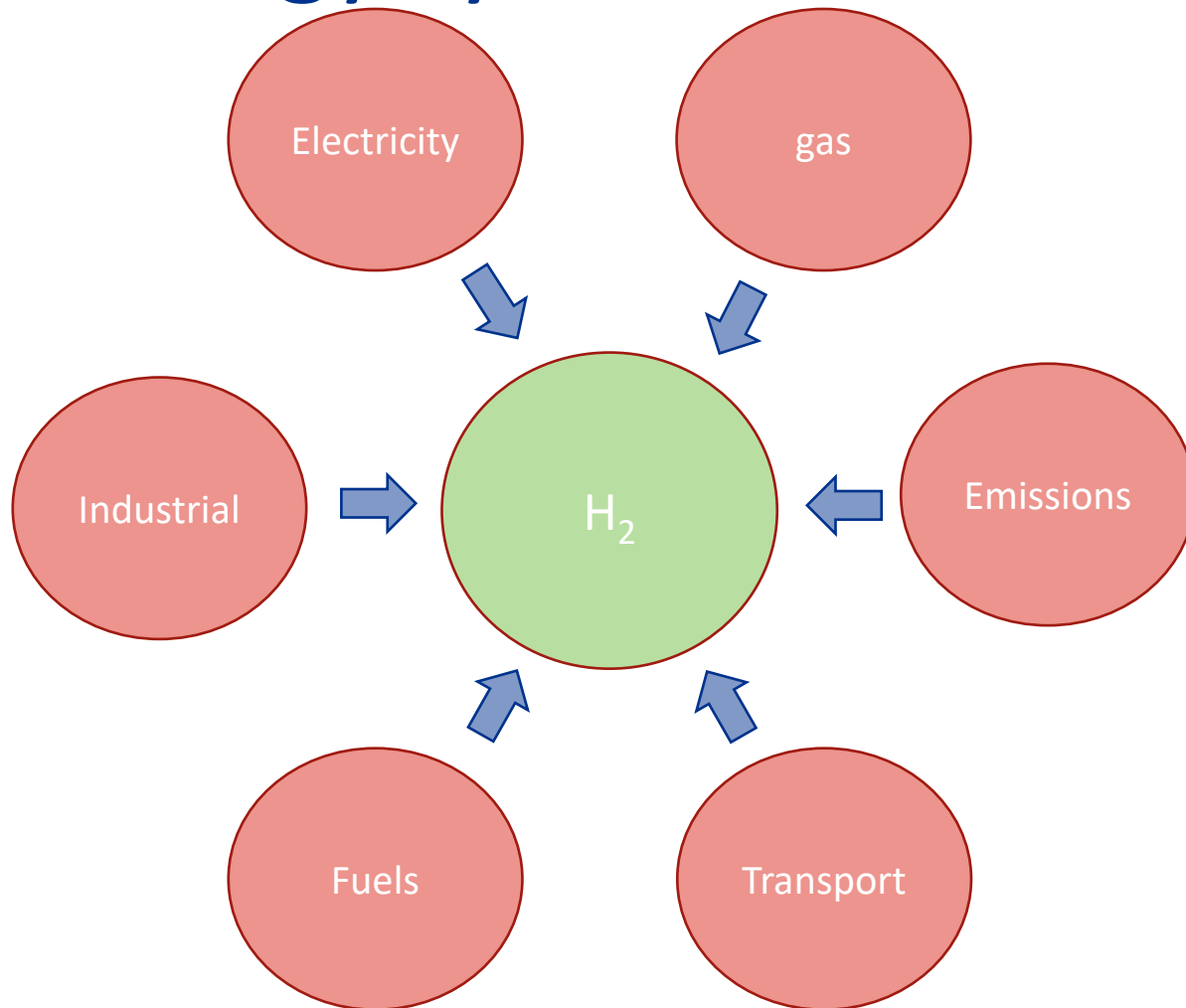


# Regulatory and legal aspects concerning clean hydrogen

- **Europe** is working towards a **net zero carbon economy** by 2050
- Europe imports most fossil fuels it consumes, hence a **switch** to clean hydrogen is **strategic** and the main thrust behind the hydrogen strategy
- The European Hydrogen Strategy is rich in ambition (with reference to a target of **24%** share of final energy), but poor in policy detail
- Current policy and regulatory elements of hydrogen are **distributed** over the gas, electricity, fuels, emissions and industrial frameworks
- Clean hydrogen needs a separate and dedicated legal regime: **A Hydrogen Act**



# From an afterthought to central pillar of the energy system



# Thank You For Your Attention!