



# Global Energy Solutions

## For Prosperity and Climate Neutrality

### Dii Leadership Conference

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Since its foundation in 2009, "Desertec" has made the world of energy supply from the world's deserts hopeful: what seemed utopian at the time is now reality in many cases: using the intense solar radiation in the sunny deserts for a low-cost electricity supply. At the 11th Dii Desert Energy Leadership Forum on 10 and 11 November 2021 in Dubai, many solar projects were recently awarded for an electricity price of just over 1 ct/kWh: a price unthinkable years ago. The current increases in the cost of raw materials are still dampening the euphoria of those involved: many a winning bid will not be executed because of this and the winners would rather accept the loss of their bid bonds than the potentially higher losses in the execution of tightly calculated projects. Nevertheless, the participants are confident: after it was proven how cheap renewables can be - also in the combination of solar and wind - the participants expect a significant project growth in the coming decade: there is no cheaper electricity anywhere.

Further positive developments are only logical: thyssenkrupp (through TK Industrial Solutions) has become a new shareholder for the first time since 2012, and the steel and plant construction group is now Dii's third shareholder, along with Acwa Power, the South Asian project developer, and SGCC (State Grid Corporation of China), the Chinese grid operator. In addition, numerous companions of the initiative are again involved as associate partners, including E.ON, Shell and TÜV Süd.

The situation regarding hydrogen derivatives as an energy carrier for transporting cheap solar electricity to Europe is still sobering: although there are numerous promising projects for green ammonia (Neom, Saudi Arabia, 4 GW electrolysis in the medium term; DEME, Oman and

Egypt, 500 MW each, corresponding to 330.000 t of ammonia per year; all in the combination of solar and wind, whereby the shares of the two renewables are company secrets so that the economic assumptions underlying the plans do not become transparent), but one does not yet find projects that use CO<sub>2</sub>, as EU legislation does not yet provide a basis for importing synthetic fuels such as e-methanol or e-methane. The market is eagerly awaiting to see how the first projects of ammonia production based on electricity and electrolysis will compete with the classical route via natural gas. Ammonia production costs of around \$450/t currently seem achievable for the electrolysis route. For a project to materialise, product offtake is key: Air Products and Uniper have so far excelled in ammonia offtake, with applications for marine engines and power plants.

Yet another problem became apparent in Dubai: how can the hydrogen that can potentially be produced cheaply in the MENA region find its way to the emerging markets in Europe: both thyssenkrupp for its steel business and Daimler for its truck business have presented that a medium-term demand in the order of several 100,000 t of hydrogen is currently still without a secure supply. However, since ammonia-based green hydrogen is not a solution for this demand due to the lack of back splitting and the CO<sub>2</sub>-containing derivatives are not allowed to be imported into the EU, it is currently still completely open how this demand will be solved. It is to be feared that, similar to the situation with the EEG, supply will be sought via expensive European renewables at the expense of consumers.

It was heard in several places that it seems very unlikely that the future demand for hydrogen will be met solely by electrolysis-based solutions, also because the necessary quantities of electrolysis plants cannot be procured quickly enough. Nevertheless, in order to secure the future hydrogen demand, Prof. Ad van Wijk from the

Faculty of Energy Technology at Delft University outlined the chances of methane pyrolysis: fossil natural gas is split into solid carbon and hydrogen near the borehole and today's natural gas grid becomes a pure hydrogen grid in the medium term. The solid carbon is easier to dispose of than gaseous CO<sub>2</sub>. Unfortunately, despite numerous research projects for methane pyrolysis, large-scale realisation of these ideas is not expected before 2030.

Dii itself ("Our Mission: no emissions") will continue to focus on project developers in the MENA region and their requirements and is trying to win additional off-takers and port operators as members, so that solutions can

also be shown for transport logistics to Europe in the future. For GES and Dii, there are interesting points of contact for future cooperation: Development of a certification system of hydrogen for proof of origin and its climate neutrality, CO<sub>2</sub> balancing of the different production methods of hydrogen (green, blue, turquoise, pink) as well as the cost structure of hydrogen or hydrogen derivative transport.

Overall, the conference had a very optimistic tone with about 50 participants on the first internal conference day and about 200 participants on the second day, which suggests a strong project growth in the next decade.

**Global Energy Solutions e.V.** develops worldwide solutions and business models for energy, climate and development issues. Our goal is a climate-neutral energy system - with the following elements: green electricity, green hydrogen, biological as well as technical CO<sub>2</sub> recycling, climate-neutral energy sources and fuels - including methanol. During production, CO<sub>2</sub> is used materially and thus becomes an interesting economic good. Together with industrial and scientific partners, we are developing technical, entrepreneurial and administrative foundations for significant investments in this field of the future. Investments that pay off.

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