The Hydrogen Energy Summit
26 January 2018 at Phi Suea House, Thailand

Presentation of Arno A. Evers via Skype:

"Off the Grid – Unveiling new ways for our Energy supply"

www.aaevers.com/phisueahouse

Greetings

I would like to thank Sebastian-Justus Schmidt for inviting me to attend the Hydrogen Energy Summit at Phi Suea House - 26 Jan 2018.

My humble presentation has the title:
Off the Grid – Unveiling new ways for our Energy supply

I hope that this way of conveying information can serve everyone. At the same time, I would like to refer to my two websites:
www.aaevers.com and
www.hydrogenambassadors.com

There you will find further information.

Please let me explain, first of all, that I am particularly impressed by what I have seen and understood from the Phi Suea House so far. You are doing well and I would like to do my share, to further update your efforts. With giving you some brief background insights and explaining my proposals later.

Title

Content

Content

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Hydrogen Energy Summit at Phi Suea House - 26 Jan 18
Off the Grid – Unveiling new ways for our Energy supply

Background

I started my career in 1965 with the British Decca Radar and Navigator Ltd. company in Europe and the Middle East, later joining the German aircraft industry. I was involved from 1969 through 1985 in implementing the European Airbus Program, bringing their A300 – A380 series to the international market from their Hamburg plant. My last position was Deputy Spokesman at the Munich-based Messerschmitt-Boelkow-Blohm GmbH (MBB) where I served a total of 23 years.I then started my own company in Munich, Germany with the goal of simplify trade fair participations for exhibitors. Subsequently, I organized several conferences and symposia on computer and communication technology, the environment, as well as on hydrogen and fuel cells technologies.

I founded the Group Exhibit Hydrogen + Fuel Cells at the annual HANNOVER FAIR in Germany in 1995 to serve as a bridge for moving this technology from laboratories to practical applications. I led the entire organization of the Group Exhibit which developed into Europe's largest industry and research gathering, while introducing and refining my full service package for exhibitors. In 2006 I transferred my ownership to the Deutsche Messe AG, who is the owner of the worldwide biggest fairground in Hannover, Germany.

Till then I attended numerous H2/FC conferences and trade shows worldwide to promote the Group Exhibit, as well as to provide unique internet documentation about the events and other informative areas on-site. I have published more than 300 information graphics (Energy Images) and 50 newsletter contributions (Arno's Energy Ideas) on alternative energy, and now serve as a hydrogen ambassador. This is all summed up in my book:

The Hydrogen Society More Than Just a Vision? by Arno A. Evers,
Preface of T. Nejat Veziroglu, IAHE-President
ISBN 978-3-937863-33-7, published on April 19th, 2010 during the annual Hannover Fair. Download for free (25 MB pdf): http://www.hydrogenambassadors.com/the-hydrogen-society-more-than-just-a-vision.html

The spectrum of "my" annual exhibition was later enlarged to include batteries and there is an US American off-shot for the H2/FC part since 2017 which I also visited: https://www.linkedin.com/feed/update/urn:li:activity:6313896466809266176

Background I: CV Arno A. Evers

Expertise in Electric/Electronic Systems
- Working on Navigational and Radar equipment in Europe and Persian/Arabic Gulf for seven years ...

Expertise in Press and Public Relations
- 23 years active engagement for promoting the European Airbus Program from the beginning ...

Expertise in Event Management
- Founder (1995) of the Group Exhibit Hydrogen and Fuel Cells at the annual Hannover Fair ...
- Meeting Point Renewable Energies China incl. Hydrogen + Fuel Cells ...
- Group Exhibitions on Aviation, Education and Novel Technologies

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Background II: CV Arno A. Evers

Expertise in Conference Management

- International Energy Summits at the annual HANNOVER FAIR in Germany ...
- International Exchange & Cooperative Seminar / Conference in Shanghai, P.R. China ...
- Realization of a worldwide unique Full-Service-Package ...

The Power of Information

- 100+ objective and unbiased visual aids, backed up by attending international conferences ...
- Interviews, visits and organized workshops all over the world ...
- Author of the book: The Hydrogen Society … more than just a Vision? ...

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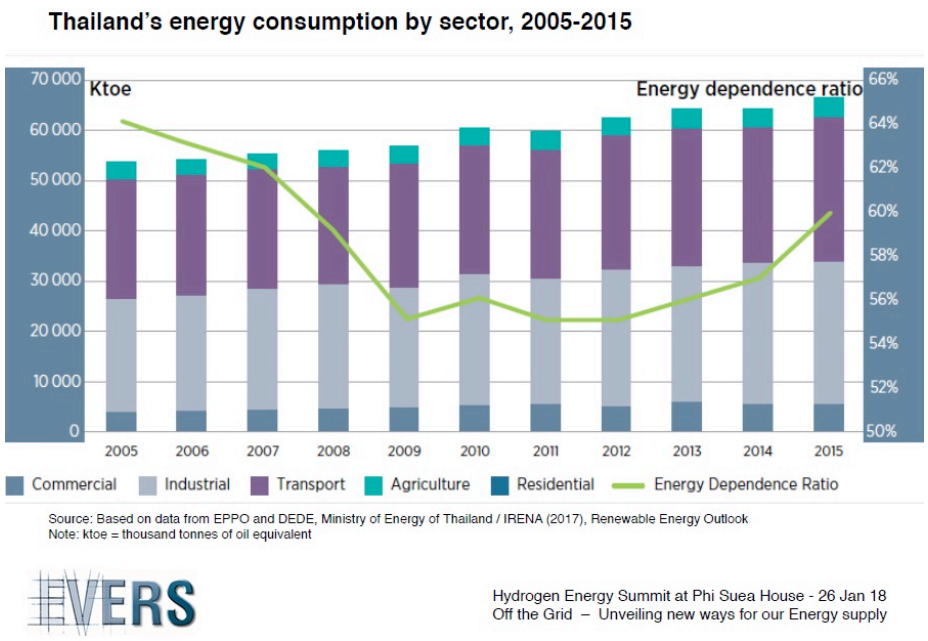
Thailand’s energy consumption by sector, 2005-2015

This graphic informs us about Thailand's Energy dependence ratio. Since 2009, after the world`s economic recession starting in the USA, Thailand is getting more dependable on energy, which the country has to import. (= green line) This is now over 60% of all the energy needed. The overall usage of energy is also rising since 2005. Today most energy is used in the industrial (light blue column) or in the transport sectors (violet column). Only little energy is needed in residential or agriculture areas.

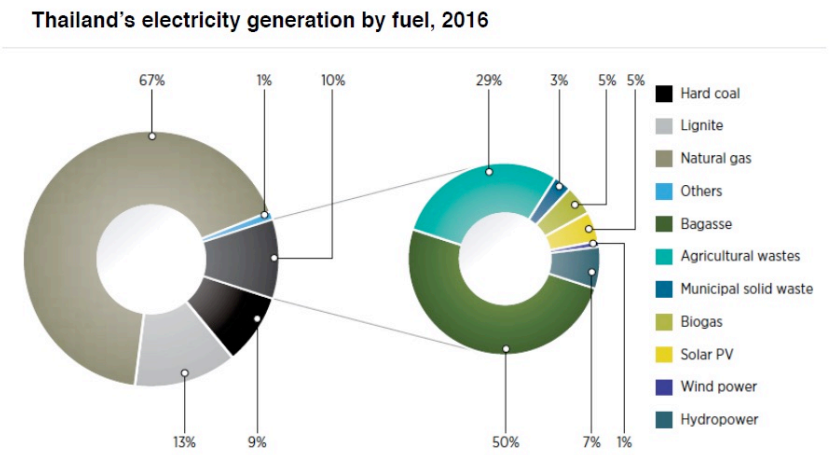
Source:
Based on data from EPPO and DEDE, Ministry of Energy of Thailand / IRENA (2017) Renewable Energy Outlook



Thailand’s electricity generation by fuel, 2016

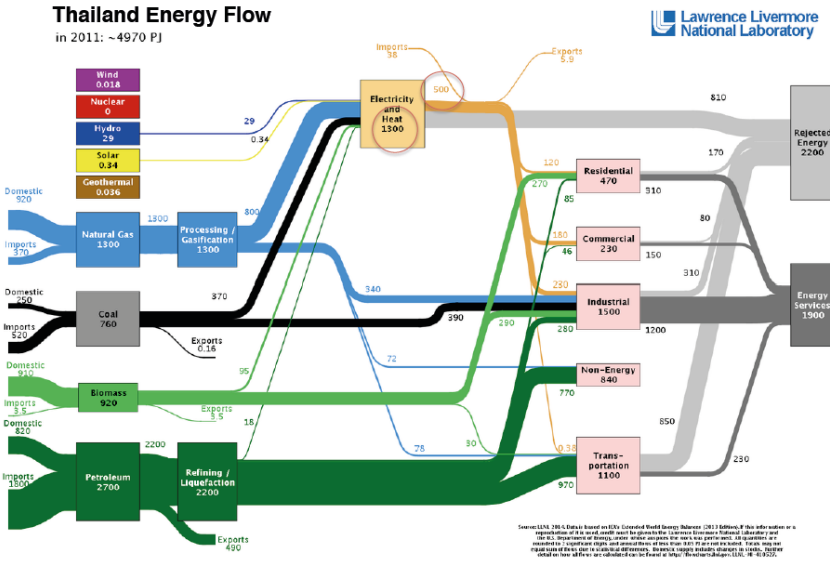
When coming to electricity, most of it is made from natural gas (67%). Just 10% of Thailand`s electricity is made from renewables, of which bagasse is holding the biggest share with 50%. Electrical power plants will convert biomass - including bagasse (which is a fibrous residue resulting from the sugar extraction from cane), the cane leaves and trash - into electricity. Solar (with 5% of renewables of 10% total = 0.5 of total electricity) and wind power (with 1% of renewables = 0,1% of total electricity) both still have a reasonably small amount of the electricity production in Thailand.

Source:
Based on data from EGAT / IRENA (2017) Renewable Energy Outlook



Thailand Energy Flow in 2011

These are latest available figures, compiled by the Lawrence Livermore National Laboratory (LLNL) in the USA.They give us a complete overview of the Energy Flow in Thailand. It reads from left to right. The figures are in: Petajoule – PJ = 1 Petajoule = 1015 J = 1.000 Terajoule; 1 PJ ≈ 278 GWh. The energy supply on the left is the energy, which has to be paid for, either in Thailand itself or which has to be imported from different countries.The converting stages need a lot of energy, which cannot be used again with today's technologies. This is "politely" called rejected energy by LLNL, with a total of 2200 PJ in Thailand.These losses occur mainly in making electricity (810 PJ) and inside the internal combustion engines (ICE) of vehicles (850 PJ). The losses in making and distributing electricity are 1.7 times bigger as all the energy which is needed for residential usage (470 PJ). In Germany: 1.5 times bigger. Now let us compare these figures with the German ones.



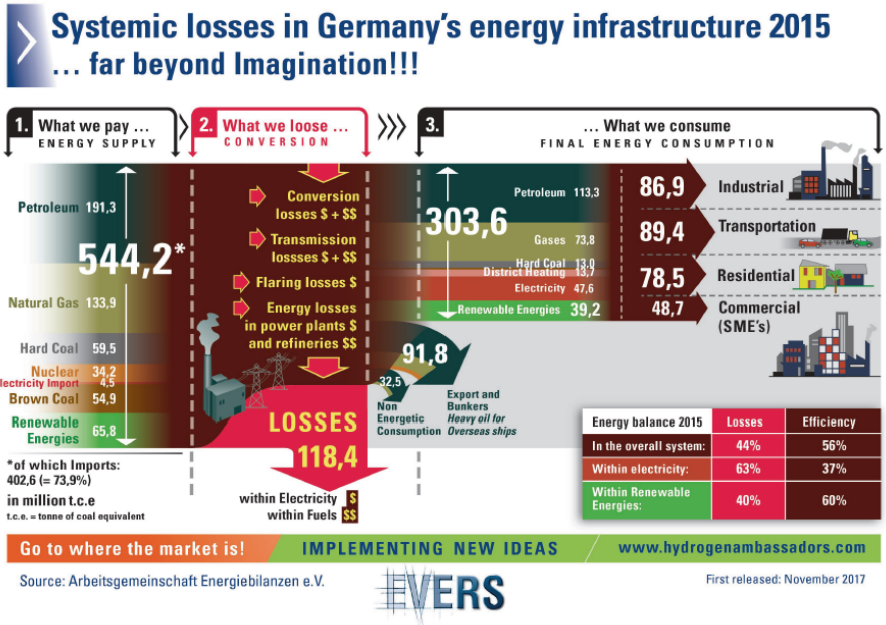
Energy infrastructure in Germany 2015 / Comparison 2011 – 2015

The systemic losses in "our" German energy infrastructure are far greater than most people can imagine or want to know. For decades, Germany's autonomy has been put at risk through its dependence on other countries for its primary energy supply. In 2015, almost 74 percent of Germany's primary energy was imported compared with 47 percent for Thailand in 2011 with increasing rate. Germany is, like many other countries, importing coal, crude oil, natural gas and uranium for nuclear energy. Coal is still by far the most used primary energy for the production of electricity in power plants.

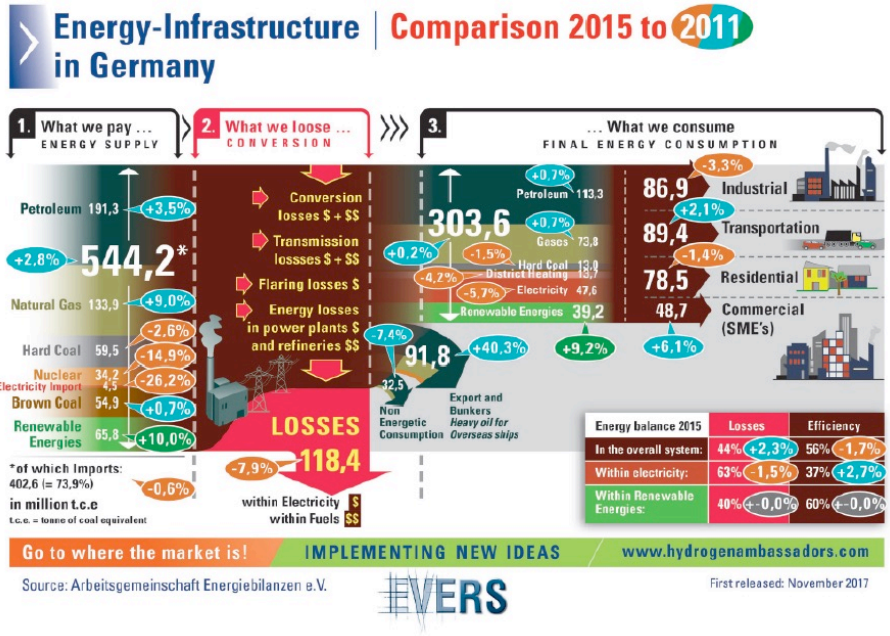
Comparing Germany's energy infrastructure from 2011 to 2015 provides interesting insight. 118,4 million (m) tones of coal equivalent (t.c.e.) of flaring and transmission losses can be identified. This might sound insignificant, but this represents almost the annual energy use of all German households plus everything that the trade, business and services (SMEs) sector needs.

So what has changed through the seemingly ever evolving, energy-efficient energy technology installed in Germany from 2011 until 2015? The rather disappointing result is: not much. Despite all political assurances about fighting climate change and saving energy, the opposite is occurring. Energy supply, consumption, CO2 and other greenhouse gas pollution values in Germany are increasing while losses are decreasing only slightly.

Domestic renewable sources such as hydro, wind, biomass, solar and geothermal power are heavily supported by the feed-in-tariffs (FITs). They have to be paid by all household electricity users for each kWh used. SMEs and German industry pay less to nothing... Unfortunately with the disadvantage that nearly all electricity made by renewable energies (RE) is fed into the grid. This is not necessarily clever, as the conversion and transport losses for RE are thereby drastically increased. If the renewable energies would be fed in near or better at the point of usage, the system would be much more efficient.



Now, let us have a look, what happens in Germany, when we compare 2011 to 2015. These are the latest available figures for the last recorded four years...



The good news is: the share of renewables in the total energy supply went up 10%. However we have to observe, that this is in the "input" of the infrastructure, so at the final energy consumption, it is just an increase of 9.2%, more or less 2% per year. The total energy supply – what has to be paid for by Germans – went up 2.8% in the four years. Imports remain the same. Nuclear fell by more than a quarter.
What is interesting to observe is the rise of 40.3% in the section: "Exports and Bunkers", which means heavy oil for overseas ships. These are the container and cruise vessels. Normal ships are listed under: transportation.

When summing it ALL up, the total losses increased by 2.3%, the efficiency declined by 1.7%. The actual losses are still very high, with 118.4 million t.c.e., they are 1.5 times ALL of the energy needed in residential usage in Germany. Compared to 1.7 times higher in Thailand, which is not bad in comparison.

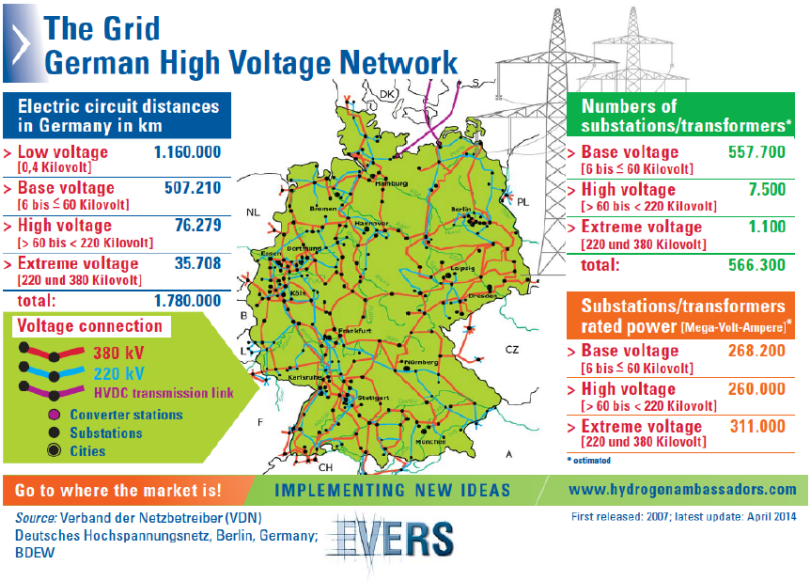
Let us now evaluate the reasons for that by looking at the German electricity grid.

The Grid – German High Voltage Network

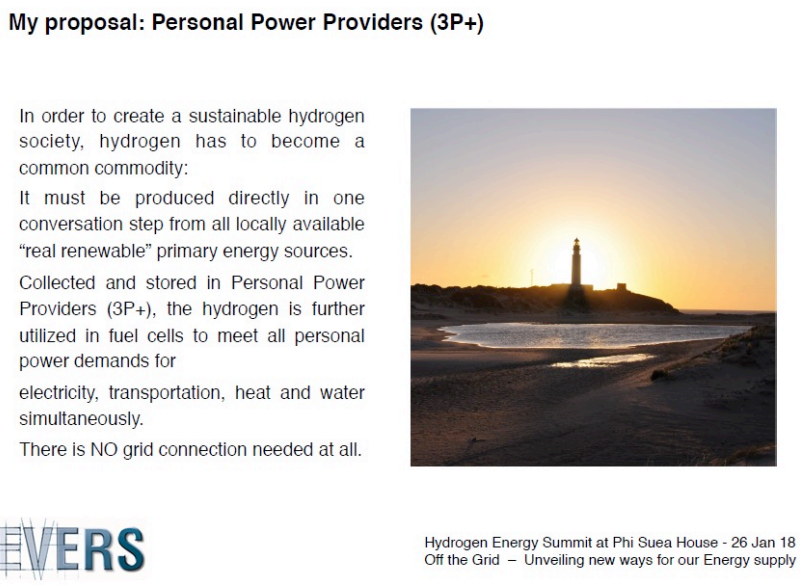
The German power grid has a total length of almost 1.8 million kilometers. This corresponds to 4.67 times the distance from the earth to the moon, or 45 times around the equator. It consists of four levels. At the top level, the supra-regional transmission grids, the electricity with a maximum voltage of 380 or 220 kilovolts is transmitted by the large power plants over long distances to the consumption centers - also to the European neighbors. This transmission network is around 35,000 km long; it is owned and operated by four private companies. They also manage the revenues and expenses of the renewable energy law in Germany.

These four companies generated revenues and network charges of € 5.234 billion in 2017, which will increase by 12% in 2018 to € 5.886 billion.
The second level covers the distribution networks of regional electricity companies. They distribute the electricity at a voltage of 110 kilovolts (high voltage) in a larger area and supply the large-scale industry. Level three are the local networks (medium voltage less than 110 kilovolts) that supply industry and commerce. The lowest voltage level (low voltage of less than 1 kilovolt) is responsible for supplying households and smaller businesses. It has a total length of 1.160.000 km. The various voltage levels are interconnected by 566,300 substations. Here, the voltage is converted 24/7 to a higher and lower voltage. Also emitting huge amounts of conversion heat.

The German electricity grid in its present form is a construct of the historical development of the past centuries. It is not physically intended to feed fluctuating voltages and frequencies, as they come from so-called renewable energies.
The German power grid is characterized by large transmission and transport losses.



My proposal: Personal Power Providers (3P+)

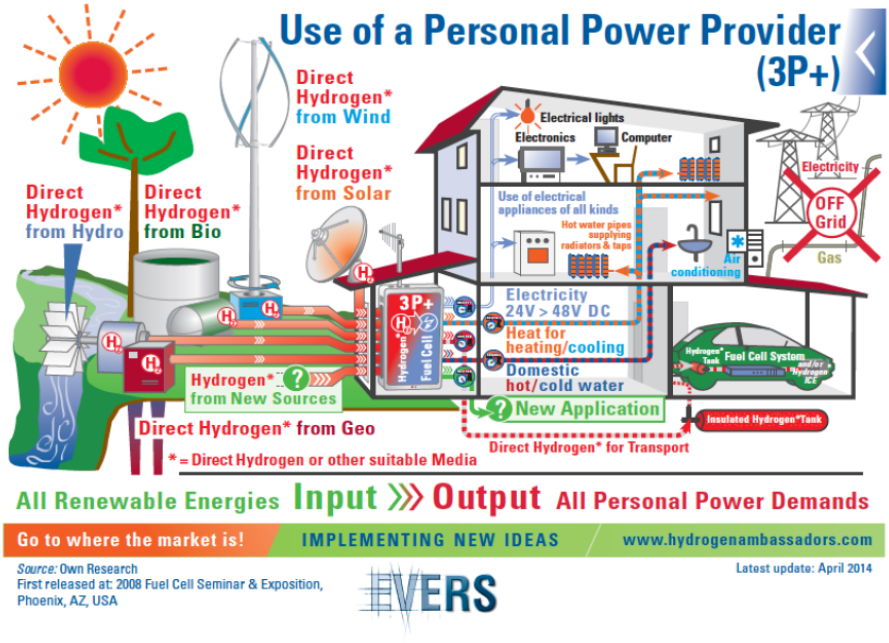


Use of Personal Power Providers (3P+)

The sun is actually providing much more than enough energy to supply all needs of mankind. However, it is not shining 24/7 even here in Thailand.

And if we want to fulfill the needs of power to the people, we have to use – in addition to photovoltaics (PV) - ALL locally available renewables like wind, geothermal, running water and also solar-thermal.

When using them smartly, the needs for storage will become much smaller as with former, conventional solutions. All personal power demands for electricity, transportation, heat and hot and cold water can easily be pleased simultaneously. And this has to be done without being dependent on grids. And with using low voltage DC Power supply inside the houses and offices.



The advantages of New Thinking

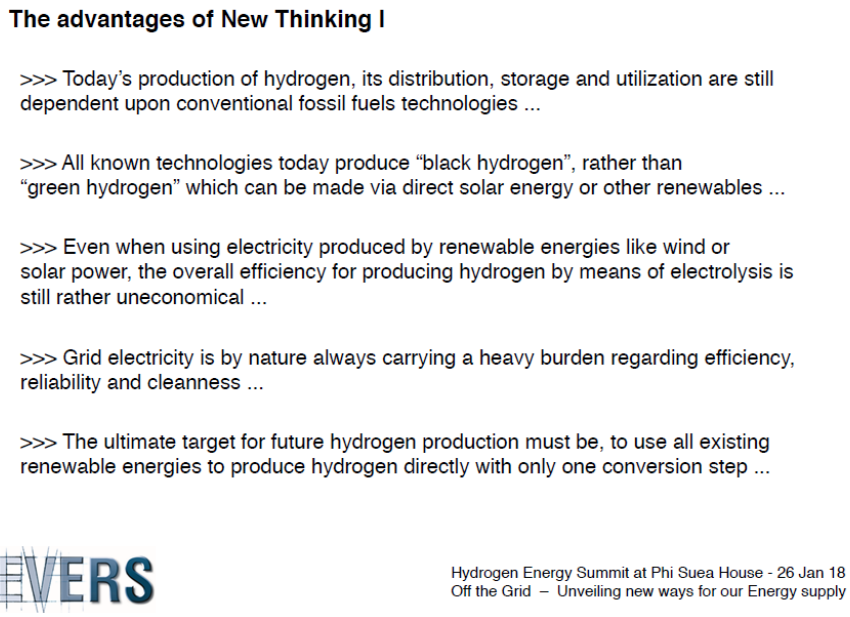
We have to be aware, that 99% of today's hydrogen, which is known since the 1930s as a technical gas, is made from fossil fuels. The origin of that hydrogen is natural gas or coal.

It can also be produced as a byproduct in refineries.

There are, however, other means to make hydrogen, like in processes direct from the sun (CSP = Concentrated Solar Power) or with the aid of special treated bacteria.

Even, when using either grid electricity or imminent renewables, like electricity from solar and wind, we still have to cope with immense loses at this time.

So we have to carry on, searching for THE right solutions. And there will be more than just one bullet shot ...



In order to find the direction of our New Thinking, we have to come back to analyze the needs of the people in the regions involved. The needs are different here to those for the German population. As the people in Hong Kong have other needs of those living in Anchorage, Alaska. And those in the deepest bushes in Africa need different "power" to those who are living in a dwelling in downtown New York City. But all needs can be individually fulfilled.

Once these needs – or personal demands – are analyzed carefully enough, it's easy to find the best individual solution(s) for any given location.

As a living "thinking model", let me please propose the 3P+ solution.
Here in the Phi Suea House, we already find an excellent example of this approach!

It should even be modified and uncompromising developed further. Without making too many confessions to conventional approaches and 100% OFF The Grid.

I am proud of all, who are involved in achieving this, until now and in future ...

The advantages of New Thinking II

>>> A combination of new photo-biological and photo-chemical processes has to be developed and combined with the implementation of a new system called Personal Power Provider (3P+). Scalable from mW to MW, the devices can be for collection and storage of hydrogen ...

>>> Utilizing fuel cells to produce low voltage DC electricity, which is used without needing inverters, and also can be used combined for heating/cooling/cooking ...

>>> Even the water produced in the process can be utilized ...

>>> The intelligent use of smart algorithms and the use of ALL on-site available renewables makes network (grid) connections no longer necessary ...

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•Phi Suea House is a great example, how sustainably energy systems can help societies and help people...

•It exemplarily shows, how the carbon footprint can be reduced, still needing less overall cost ...

•This step ahead gives us an excellent example of how to cope the future ...

•I am proud of all, who are involved in achieving this ...

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Contact

Thank you all for your kind attention. Thank you very much for this interview, Vaitea Cowan. And thanks for inviting me, to attend this Hydrogen Energy Summit at Phi Suea House on 26 Jan 2018, dear Sebastian-Justus Schmidt, you are, like me, a native Hamburger.

Thanks also to the fantastic team here. All the best to all of you!

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Thank you!

Sources

Sources

Arbeitsgemeinschaft Energiebilanzen AG: www.ag-energiebilanzen.de

Arno A. Evers FAIR-PR: www.hydrogenambassadors.com / www.aaevers.com

DEDE (Department of Alternative Energy Development and Efficiency): www.weben.dede.go.th

EPPO (Energy Policy and Planning Office): www.eppo.go.th

IRENA (2017), Renewable Energy Outlook: Thailand, International Renewable Energy Agency, Abu Dhabi: www.irena.org

Lawrence Livermore National Laboratory (LLNL) Energy Flow Charts: https://flowcharts.llnl.gov/
Phi Suea House: http://www.phisueahouse.com/

Verband der Netzbetreiber e. V. (VDN) – now Bundesverband der Energie- und Wasserwirtschaft e. V. (BDEW): www.bdew.de

Additional Information