

Lessons learned from Germany for the ASEAN energy infrastructure Arno A. Evers, Starnberg, Germany arno@aaevers.com INDONE

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I.I.I Final Energy Consumption, by Fuel between 2000 - 2030 in the Philippines

Petroleum products will continue to account for the bulk of TFEC, with an average share of 45.8 percent in the demand mix. With the easing of oil prices in the international market, demand for petroleum products will increase by an average of 3.9 percent per year from 2015 to 2030.

Diesel and gasoline will continue to be the most widely-used petroleum products, with the average shares of 50.5 percent and 28.4 percent in the total oil demand, respectively.

Transport will remain as the major petroleum consuming sector with an average share of 72.I percent in the total oil demand for the entire planning period.

Source: Philippine Energy Plan 2016 – 2030, Department of Energy, Republic of the Philippines

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I.2.I Arno's thoughts on the past energy situation in the Philippines:

According to the Lawrence Livermore National Laboratory, the Philippines in 2011 (Sorry, these are the last available numbers from LLNL) altogether used approx. I,680 Peta Joule (PJ) of which: 895.2 PJ were imported from other countries. In total, just 530 PJ could really be used. For Residential use (250 PJ); Commercial (IIO PJ); Industrial (290 PJ); Non-Energy (9.2 PJ); and Transportation (390 PJ). The remaining rest, which accumulates to I.IO0 PJ (= 65.5%) were lost inside the system in conversion and distribution.

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2.2.I Arno's thoughts on the energy situation in Thailand: According to the Lawrence Livermore National Laboratory, in Thailand in 2011 (Sorry, these are the last available numbers from LLNL) altogether used approx. 4.970 Peta Joule (PJ) of which: 2.693.5 PJ were imported from other countries. In total just 1.900 PJ could really being used. For Residential use (470 PJ); Commercial (230 PJ); Industrial (1.500 PJ); Non-Energy (8402 PJ); and Transportation (1.100 PJ) The remaining rest, which accumulates to 2.200 PJ (= 44.3%) were lost inside the system in conversion and distribution.

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Source: Vietnam Energy Outlook Report 2017, Danish Energy Agency

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3.1.1 Progress of primary energy supply between 2000 - 2015 in Vietnam

As estimated, the non-commercial biomass energy has gradually been replaced by other commercial energy sources. The shift to fossil energy has been a key reason for the increase in greenhouse gas (GHG) emissions. In the past decade, Vietnam has had the highest GHG emissions in the ASEAN region.

The total GHG emissions per capita have increased nearly 3 times in a IO year period, while the carbon intensity per GDP increased by 48%.

Crude oil, coal, gas, hydro power and non-commercial energy are the energy sources exploited within the country. The total exploited energy in recent years intends to remain stable, mainly due to no large fluctuation in the exploitation volume of commercial energy products.

Source: Vietnam Energy Outlook Report 2017, Danish Energy Agency

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3.2.I Arno`s thoughts on the past energy situation in Vietnam According to the Lawrence Livermore National Laboratory, in Vietnam in 2011 (Sorry, these are the last available numbers from LLNL) used approx. 2.570 Peta Joule (PJ) of which: 607 PJ were imported from other countries. And 490 PJ were exported to other countries. In total just I.200 PJ could really be used. For Residential use (440 PJ); Commercial (51 PJ); Industrial (630 PJ); Non-Energy (I30 PJ); and Transportation (II0 PJ). The remaining rest, which accumulates to also I.200 PJ (= 50 %) were lost inside the system in conversion and distribution.

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4.I.I The German Power Grid

The German power grid has a total length of more than 1.8 million kilometers. This corresponds to 4.78 times the distance from the earth to the moon, or 45.8 times around the equator. It consists of four voltage levels.

The transmission network (220 kV to 380 kV) is nearly 37.000 km long, it is owned and operated by four private companies, which have divided Germany in four independent areas (= monopolist structures). They manage the revenues and expenses of the renewable energy law in Germany.

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 1.190.000 kilometres.

The various voltage levels are interconnected by 566,300 substations. Here, the voltage is converted 24/7 to a higher and lower voltage. In this process, the substations emit huge amounts of conversion heat.

The German electricity grid in its present form is based on historical developments of the past centuries. It was and 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.

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4.2

Systemic losses in the Energy Infrastructure of Germany 2018



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4.3

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Despite energy turnaround (Energiewende): Only few changes in the lossy energy infrastructure of Germany from 2003 to 2018



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5.I World Solar Impact

Essentially IOO% of the energy that fuels the earth with 5,6 • 10²⁴J comes from the sun. To maintain a constant global average temperature, all of the sun's radiation that enters Earth's atmosphere must eventually be sent back to space. This is achieved through Earth's energy balance. Our Graphic (Source: The State Climate Office of North Carolina, USA) depicts, how the energy from the sun is absorbed, reflected, and emitted by the earth.

The energy emitted in one hour by the sun is adequate to cover the energy needs fo the entire world's population for one year. 100% of the energy entering earth's atmosphere comes from the sun. ~50% of the incoming energy is absorbed by the earth's surface i.e. the land and oceans. ~30% is directly reflected back to space by clouds, the earth's surface and different gases and particles in the atmosphere ~20% is absorbed by the atmosphere and clouds.

The 70% of the sun's energy that is absorbed by the earth's surface, clouds, and atmosphere causes warming. Any object or gas that has a temperature emits radiation outward, and this is ultimately re-radiated back into space. This occurs 24 hours a day, and the energy is emitted as longwave radiation due to the characteristic temperatures of the earth and atmosphere. However, when the radiation reaches the Earth, most of it is reflected back to space by the atmosphere, some of it is absorbed by the atmosphere and at the Earth's surface etc. Only 0,005% of the 5,6 • 10²⁴J emitted by the sun per year is converted into mechanical energy by humans.

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Source: The State Climate Office of North Carolina, USA

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The advantages of New Thinking

In order to find the direction of our New Thinking, we have to come back to analyze needs of the people in the regions involved. They differ from continent to continent.,

Once knowing these needs, we can also call them **personal demands** and once they are analyzed carefully enough, it is 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 ASEAN, it is not too late, to make the start

now

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6.

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All Renewable Energies Input >>> Output All personal power demands

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6.I Arno's introduction of a Personal Power Provider (3P+)

Imagine the day when there are no power (electricity) bills anymore. Neither any bills for heating, cooling, and transport. That day has to come. The sooner, the better.

Today's production of electricity, as well as hydrogen, its distribution, storage and utilization are globally dependent upon conventional technologies from two centuries ago, which were never ecological feasible in the first place.

Also when producing electricity from renewable energies like wind or solar power and connect them to the grid, the overall efficiency for

producing and distributing goes down rapidly.

However, there are alternatives.

Globally, the ultimate target for future supply of the energy demand for mankind must be to use all existing locally renewable energies directly on-site with only one conversion step.

A combination of new photo-biological and photo-electrochemical 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 Personal Power Providers (3P+) can be used as collection and storage devices for ALL power needs including heating/cooling, a media for transportation and domestic hot and cold water.

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All Renewable Energies Input >>>> Output All Personal Power Demands

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6.2.I 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 the ASEAN countries. Nor does the wind blow 24/7.

If we want to fulfill the needs of power to the people, we have to use – in addition to photovoltaic (PV) - ALL locally available renewables like geothermal, running water and also solar-thermal. When using them smart and individually, different for each local site, the needs for storage will become much smaller as with former, conventional solutions.

All personal power demands, which are needed today for electricity, transportation, cooking, heat and hot and cold water can easily be pleased simultaneously.

And can with the Use of Personal Power Providers (3P+) be done without being dependent on ANY grids. Using low voltage DC Power supply inside the houses and offices.

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8. Arno A. Evers – The Man behind all

- 1968 DECCA Radar and Navigator Service Engineer the Middle East, based in Doha, Qatar
- 1985 Deputy press spokesman for Messerschmitt-Boelkow-Blohm GmbH in Hamburg and Munich
- 1990 Foundation of Arno A. Evers FAIR-PR in Munich, Germany Group Exhibits for the German Space and Aircraft Industry
- 1995 Founder of the annual Group Exhibit Hydrogen + Fuel Cells at Hannover Fair incl. Full Service Package now the biggest and most international of ist kind worldwide
- 2004 Conference and exhibiton: Renewable Energies China incl. Hydrogen + Fuel Cells for the Chinese Ministry of Science and Technology (MOST) in Shanghai, PR China
- 2006 Sale of Group Exhibit Hydrogen + Fuel Cells to Deutsche Messe AG
- 2010 Publication of the book "The Hydrogen Society More Than Just a Vision?"

since 2003 Participation at IIO + international conferences on energy related topics as speaker, presenter and/or visitor

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The future of our global energy situation can only be solved

when the same mistakes are not made again!

Let The Aseans be the first to start now.

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