



INTRENEX

International Renewable Energy Exchange

A funding proposal:

Renewable energy faces one severe problem that somewhat slows down the fast adoption. Due to weather patterns, large regions can become offline in case there is unfavourable weather. This problem can only be overcome, when the installations to harvest wind or sun are spread over a distance of more than 3000 km. In this case it is obvious that electricity generation for Europe includes the northern African and middle-eastern region. A transmission system should be built to facilitate the transport of vast amounts of electrical energy harvested at very good locations in that region.

Intrenex aims at building the energy harvesting installations as well as the transmission system, called International Renewable Energy Exchange.

Key facts:

- The Intrenex electrical power system is based on a scientific study using a numerical computational optimisation strategy based on weather- and consumption-patterns for a region with 69 countries and 1,1 Billion inhabitants created by Dr. Gregor Czisch.
- The Intrenex power-system provides a 100% year-on-year power supply with 100% renewable energy for the whole region.
- Energy transmission is provided by a redundant system of HVDC-lines (High-Voltage Direct-Current) which is a proven technology that is also being applied in Germany from north to south and from Germany to Norway via sea-link.
- HVDC lines have a very low loss below 3% per 1000 km.
- The HVDC grid can supply 100% of the required energy without the need for additional battery storage, H₂-electrolyse, demand-management or micro-grid-management.
- The Intrenex grid structure does not require to have all nodes during the build-up phase. It can connect some countries in the northern African region first to reduce costs for fossil-based energy generation in these countries and the need for FOREX to buy these fuels on the world market.
- It does not matter where the emissions of greenhouse gases are reduced first. A start can be made in any country of the world.
- From the climate budget models of the IPCC we see that the later we start reducing emissions, the more we have to reduce in a shorter time-span. A build-up of the Intrenex power-system could take as long as 30 years, so it will only become more difficult, the later we start.
- It seems plausible to use solar power in desert regions of northern Africa but the study Intrenex uses has clearly shown that using mainly wind power is much more effective, thus leading to a much lower end-price for electricity.
- One country in northern Africa alone has the wind energy potential to power the entire region four times. Of course the Intrenex system will be redundant and energy generating

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installations as well as the grid are designed in a way that a failure in one area does not affect the 100% reliability of the entire system.

- To sell electrical energy to the European continent does not need to be the first priority. When a significant amount of energy can be exchanged across north African and middle-eastern countries, a connection to the European grid can be established, when policy makers and customers in the European region are ready to accept relying on foreign energy supply (what they do with fossil fuels already since a very long time and what worked pretty well for this time).
- The Intrenex grid was created for the European market but there exists a north-african and middle-eastern market as well and a connection to India or China could be envisioned without too great difficulties.
- Installation costs are around 1000 €/KW for wind power and around 250 €/kW*km for the transmission lines. Wind generators can last for 20 years, the grid for more than 100 years.
- The whole Intrenex region currently consumes about 3000 TWh of electrical energy in one year.
- Electricity costs for a 100% renewable energy supply have been found to be below 5 €ct/kWh.
- It may be possible that policies will change drastically if the emissions of greenhouse gases can not be cut significantly in the next years. That poses quite a substantial risk of stranded assets. An anticipatory transition of the existing energy supply should be high priority for countries relying on the sale of fossil fuels.
- Germany has the highest rate of renewable power in Europe and pays a very high price for it. As of 2016 greenhouse gas emissions by Germany even rose by 0,5% but Germany already has the highest electricity price in Europe (30 €ct/kWh)
- Intrenex is based in Europe but it is not legally bound to any industrial corporation, any financial organisation or to any political party or person. Intrenex can decide freely which supplier it will chose for a certain region for a certain technology. Including manufacturers from China and India.
- The Intrenex model can be applied to all continents from the USA to south-east Asia. When certain structures exist, a true global energy exchange can be established between the continents.
- The Intrenex model is centred upon the European region because many people live there on a reasonable small area of land. The model also applies for regions south of the Sahara desert but the effect on greenhouse gasses will be most significant in industrialised countries. Of course many countries want development and Intrenex can help here but the focus must stay at maximum reduction of greenhouse gas emissions as soon as possible.
- It must be understood that Intrenex is neither a job-wonder nor a wealth-machine. The goal is to deliver the cheapest price possible for the lowest amount of demand thus resulting in the

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smallest installation size possible. Some 10.000 people may find a job there but it can not solve a chronic unemployment problem. Nor will Intrenex promote to use ever more energy. The best energy is one that does not need to be created in the first place.

- Financing the Intrenex system will not work well on a share-based basis. Shareholders tend to want higher profits every year thus resulting in increasing price per unit or more units sold. There might be applicable some sort of a green fund/bond for the system. When some stakeholders come together about that, a solution will be found that suits all participants.
- There is no need for more research and development. The study by Dr. G Czisch has a long record of being unquestioned and many other research centres have done similar research that was of lesser quality than the original work of Dr. G Czisch in all cases. Also for the hardware part of the system all components exist and have a long record of reliability and a well established cost decrease curve over the last years.
- Whether you like it or not, Photovoltaics (PV) are not economical and will not be so in the foreseeable future. PV is very popular because it consists of quite simple parts of hardware. Unfortunately it makes not much sense from the overall system point of view.

What is the actual Plan for Intrenex ?

- ✓ Intrenex aims at establishing a regular office based in Vienna, Austria where work can be concentrated and meetings and workshops can be held.
- ✓ The Budget for the Intrenex Office should be sufficient to match for Dipl.-Ing.(FH) Marc Muncke and Dr. G. Czisch and a secretary and some travel expenses or detail studies. The budget does not need to exceed 1 Mio € in one year, a small sum compared to the mountains of capital that will have to be moved by Intrenex.
- ✓ An electric vehicle for the office to promote the work of the group in public.
- ✓ The Intrenex enterprise will not work well when there is not significant progress in a very short period of time. That is why Intrenex will cease it's operation on 31.12.2022 if such progress was not possible. That is a five year plan.
- ✓ The five year plan should establish at least a significant amount of wind power (5GW) and some connectivity to the European grid. 5 GW is roughly 1000 wind turbines. So we need to build only 0,5 in a day. In a later phase the build-up should establish something like 40 turbines in one single day.
- ✓ Every recipient of this document is invited to participate in the grand opening workshop in person or with a representative to be held in Vienna in February 2018. Please register with office@intrenex.com to get all the details.

Vienna, 10.10.2017

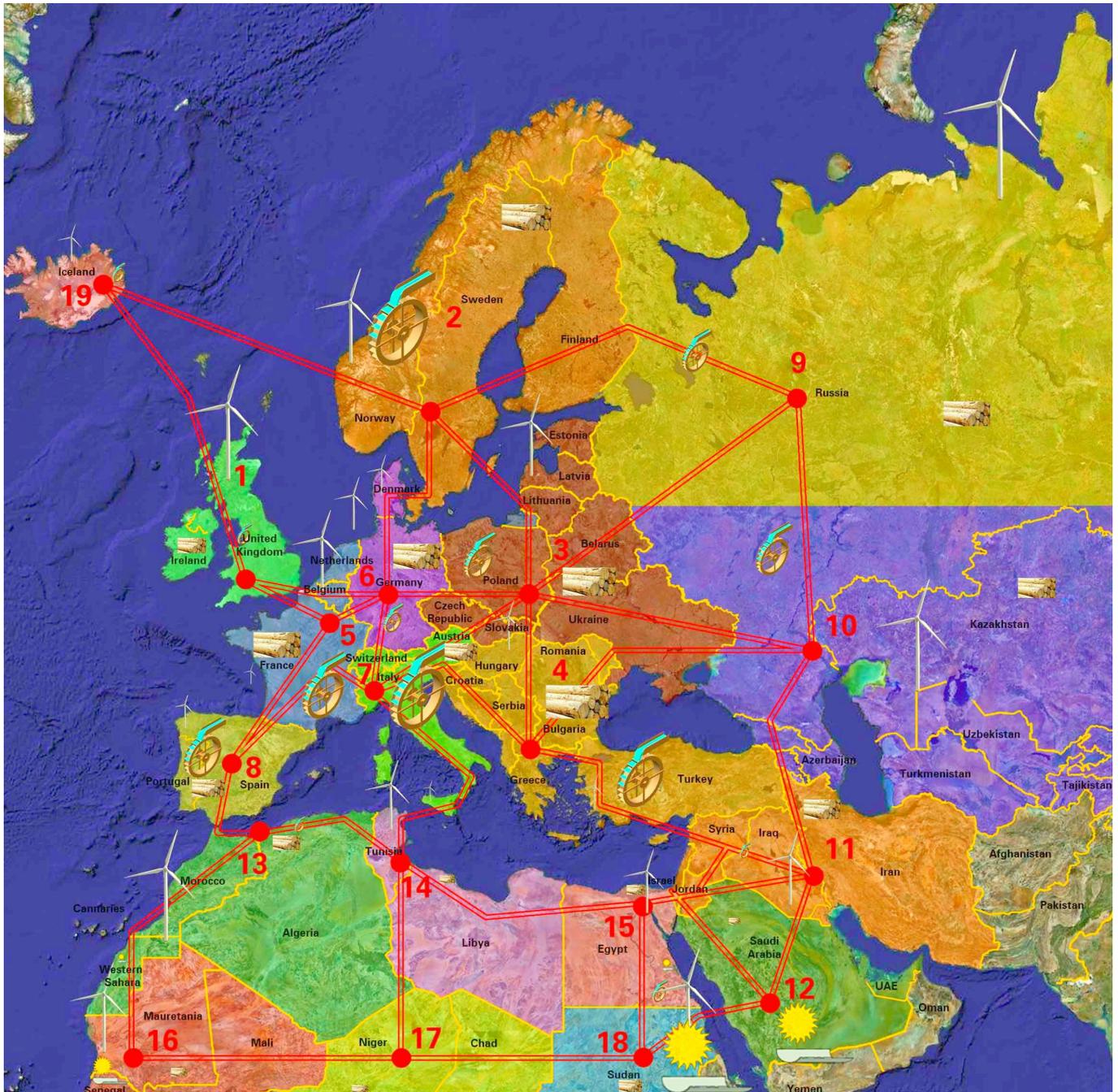
M.Muncke

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A possible layout of the European part of the Intrenex grid

(Please note that there exist numbered nodes that can operate independently)



(image by Dr. G. Czisch)

Legend:

- Wind turbine : possible location for wind energy
- Sun : possible location for solar energy
- Water Wheel : possible location for hydro-power
- Wood : possible location for biomass
- Icon Size resembles location profitability.

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Recommended reading:

A comprehensive two-part interview with Dr. G. Czisch about energy policy in Germany, Europe and beyond can be found here:

http://www.intrenex.com/?page_id=687