# Renewable oil

2021. június 21., hétfő 4:17

They call information the oil of the 21st century. And I call cryptography technologies the oil in renewable energy penetration. Why? There are a bunch of problems with renewables, three of which I'm aware of, and the first two needs properly secured communication:
1. electricity storage
2. existing power grids' throughput
3. problems with grid stability
All these issues hinder the spreading of renewables and although there may be some temporary solutions, my ideas may not be the easiest to get through with. Yet here they are:
At first let's look at electricity storage! Battery capacities are increasing and prices are dropping sharp yet enough battery for half of humanity - idk but - may need more lithium than that there is at all it being a rare earth metal. So what could be done is *aligning power consumption to production* as much as possible. This would need electricity to be sold to households proportional to stock market prices, as well as an intelligent power meter and some intelligent switches in every home that can be programmed under which price the owner wishes to boil water for the evening bath or turn on a washing machine. Naturally this would mean a bit of inconvenience for housewives and -man but in return it would decrease the time renewable sources need to shut off resulting in a *higher return on investment* and thus faster penetration. Some consumers that could operate with such an alignment:
• dish washers
• washing machines
• water boilers
• home heating
• battery based short range vehicles
• hydrolysis for long range, cargo, heavy duty vehicles
• urban farming's lighting
• water towers
And if perfect matching between consumers and providers can't be achieved, water power plants are still a fully green solution that could care for the rest of consumption fluctuations fast enough where applicable. Finally weekly or even slower demand rise and fall may already be tolerable for nuclear plants too.
The second factor hindering penetration is the capacity of the existing grid: the existing grid can't tolerate the power that it is going to have to pass through it if everyone charges their cars at home, and perhaps starts to heat with electricity too. Basically... but there is a trick! *That trick is microgrids*. If you imagine like Budapest's mesh as a spider web, separated by the Danube, and let's say all solar panel reside on the Buda hillsides while all consumers were in Pest, then the power that this mesh grid can transmit is proportional to all the wire cross sections that cross the river. Now if we distributred the solar panels evenly around the city, and made sure there is a price on distance too, people would draw power from the nearest production sites and the imaginary spider web was sliced up to tiny circles. *The more the tiny circles the larger the cross section* whose sum can carry immensely more power than originally although no physical wire upgrade had to be done to the grid, "just" switching and measurement.
So far however these first two problems need massive IT equipment, that is why I called IT security in this perspective the oil for renewables' penetration. My hopeful contribution to this process is going to be an IoT cryptography core that should be able to serve in tamper

proof measurement and intelligent control endpoints.
Addressing the last problem is really complex in alternating current systems, because nothing can be faster than the speed of light and as such the AC power peaks also travel with limited speed: practically in waves. When thinking of a mesh network like a city these waves have to be synchronous to one another at each junction as well as renewable sources also have to provde energy to the network in a synchronous manner. This makes it all very complicated and expensive in terms of actual hardware: but there would be a solution, *direct current* (DC) which however needs converters back to AC at every home, yet neighbouring homes' ACs don't need to be aligned to one another which makes such converters way less complex, and hopefully *cheaper*.