Microgrid market

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There are two key concepts that stem from physics and I have already addressed in my previouos article:

- The more energy comes from further away, the more expensive it should be, to motivate whoever can to install renewables, and thus increase the wire grid's cross-section altogether between production and consumption sites without actually having to extend the physical lines.
- The less the production and/or more the demand, the more expensive energy should be, generally to motivate people to consume when there is a surplus in energy, all this to need smaller and perhaps also fewer storage batteries.

The market opportunities consumers are at least going to need and probably the most they can apply in their everyday life are the three types of power purchase tokens: redeemable and returnable and enforcable.

- The redeemable or market priced token owner receives electricity at market price until it is surrendered: to run fixed-time flows such as washing, cooking, even computing.
- The returnable or fixed price one gets electricity at a predefined price specified by the consumer, as long as the electricity price is cheaper than that: this can be used for battery charging, cooling-heating, water heating, things that can wait.
- Enforcable would be the one where negatively priced electricity may arise, to balanace granularity issues that stem from production may not always being perfectly covered by consumption. This can be handled by specialized equipment being able to take arbitrary amounts of energy within certain limits. Typical examples can be filling water towers and pumping sewage, which then both may need bigger storage capacities, that on one hand may be funded by the negative power prices on the other hand are necessary publilc goods anyway.

A possible stock market algorithm could somehow look like this: microgrid clusters need to be specified in a logical manner, like in a city each street is a cluster where there is no price surplus based on distance, because they more or less share the very same cross section of wires. Yet there is a price surplus between neighbouring clusters, which is already based on the competition of how much other streets' habitants around are willing to pay for electricity. This excess price may also need to have a minimum due to physical wire cross sections, above which power can physically not be transmitted and only the highest bidders can get the electricity they need. Then clusters of clusters can also be defined incrementally like cities within eachother. At the same time consumers - or sub-clusters' - relationship to one another inside a certain cluster is based on the first two types of power drawing tokens: price should mainly be specified by the redeemable tokens where people with the highest bids get served first and as long as they wish then come the lower bidders. While the returnable token owners get served on this specified price. It should be noted, that the power needs specified by the returnable tokens first need to be subtracted from all the power being generated, and the rest of the production capacity would be used to determine the pricing based on how well this sells to the ever highest bidders on the market.

The entire process needs a two way communication: fixed price power drawers need to be able to announce to the local cluster's market how much power they wish to draw at

what price and also need to be able to cancel their needs once they've been fulfilled (like water has been heated, fridge hass been cooled, etc.). The same way redeemable power token buyers need to know the market price to be able to decide if they want to attach to the network and announce the power they wish to draw as well as returning the token when they are done. Since it may be possible that redeemables would consume all the power generated and the market price could then be unspecified, there must be a certain limit to redeemed power too. Maybe while returnable power drawers are served in order of the highest bidder, redeemables should be served in order based on the power they need, which the smaller it is the more likely it gets served. This may motivate consumers to compete in investing in ever higher efficiency machinery - or ever smaller ones which then may not be that efficient at all(!), thus a first come first served arbitration may also be applicable, or locals may choose how a particular neighbourhood should be handled.
Ultimately power producers just get the income based on the pricing specified by this above algorithm. As well as they have the right to switch off their assets, which is however hopefully not rational.