

P2P energy networks

A win-win-situation to be monetized

These days, distributed energy solutions are very much discussed from a technical angle. They however have the potential to be the foundation for new business models and to take commercial customer relationships to new levels. We might see a closer integration of the energy industry with the financial services industry. For every market participant, there are significant potential gains in this development. It needs to be seen who will take the lead – incumbents, new entrants, investors or regulators.



The energy market is still in a crisis mode. However, investments into distributed energy generation are expected to be in the range of USD 200-300 BN per annum in the coming years. Until now a centralized energy landscape has prevailed. Going forward, a more decentralized energy system might be a way out of today's energy dilemma.

Different stakeholders would benefit from this development and some arguments will be presented why this would be the case.

- **Customers:** Attractive, stable energy costs and a sustainable energy supply
- **Utilities:** New solution business with attractive margin potential for incumbents as well as new entrants
- **Investors:** New infrastructure like investment opportunities
- **Regulators:** A more stable energy supply system

A more favourable market environment for decentralised energy solutions ...

Decentralized energy solutions do exist for quite a while. In some markets e.g. Germany solar has become a quite sizable segment. New business models are evolving attracting significant investments e.g. Tesla, Northvolt, Vattenfall/ BMW i3 batteries ...

This time, there are several reasons why decentralized energy solutions might take off and scale.

- **Grid parity has been reached** as several renewable technologies have industrialized and are competitive from a cost perspective
- **Price spreads have narrowed significantly erasing fundamental margin potential for conventional centralized generation** in wholesale markets (spark & dark spreads, location spreads, base/peak spreads)
- **Traditional generation has aged**, is phasing out or is already scheduled for phase out (nuclear)
- **Large scale renewables projects** or regulated midstream investment opportunities are less available

Additionally, new technologies are maturing and are becoming financially relevant.

... and an accelerated technology development

From a centralized perspective, efforts have been underway to flex the energy system (e.g. gas-to-power). Flexibility in wholesale contracts has been

very much exploited. Demand side management in retail markets has however not been very effective.

In the last few years' efficient energy technologies have become commercially available also to end users (e.g. heating, CHP, solar). Additionally, communication interfaces are being deployed through SMART meters enabling customer specific communication and pricing.

Sufficient electricity storage capacity is still missing which would allow the balancing of increasing volatility from renewables (esp. wind but also solar). As battery prices are coming down also due to the evolution of e-mobility, more efficient decentralized energy solutions will become available to SME's and retail customers. In 2017 an accelerated cost down of battery costs of another 35-40% driven by Chinese manufacturers is expected.

e.g. stronger operating expertise, financing, payment systems and/or peer-to-peer energy networks (P2P). The latter aims to balance deviating supply and demand patterns across the system. Settlement of imbalances might happen physically or financially. This constitutes decentralized market design.

Through technology, energy P2P networks might integrate with other P2P markets as well as with centrally organized wholesale markets. Each arrangement or structure will fulfil certain roles e.g. identification of market participants, administration of contracts, price discovery, settlement.

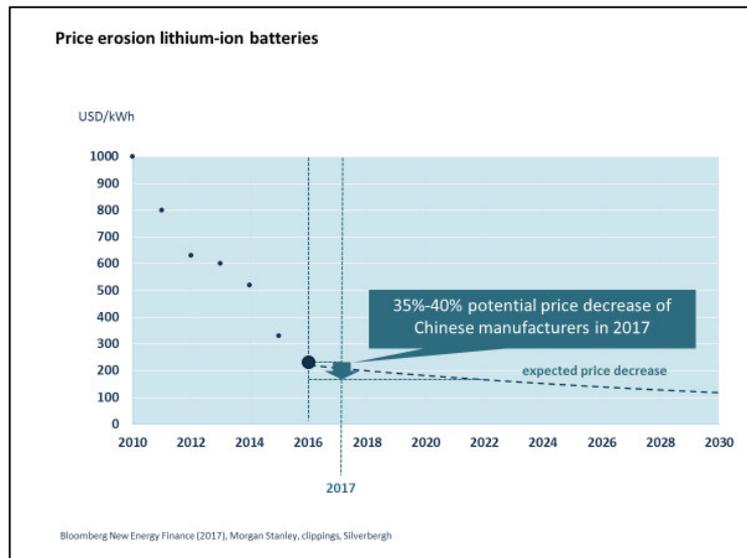
Decentralized market design evolves across different sectors

In wholesale energy markets as in capital markets, market operators and exchanges are consolidating. Major drivers are economies of scale and characteristics of natural monopolies. In some of these markets, market operators have started to experiment with technologies allowing them to identify market participants better and to administer trades more effectively and efficiently. Blockchain is being tested as a lever to improve effectiveness and efficiency and as one element of a future P2P energy solution.

In payments, also blockchain based

approaches have been established.

E-mobility markets will be at the interface between mobility, energy and financial services. Payment solutions are required to also charge cars and to determine the identity of the user. As electric cars will not only withdraw electricity from the grid but also feedback into the grid at a later stage, SMART grid capabilities will evolve. In this new environment, the market rationale will transition from a technically dominated perspective of supply sources and demand sinks towards a user/customer centric perspective. Contributing to a balance/ imbalance in the system will be associated with a price and the customer will



2nd generation decentralized solutions providers will reach profitability

The 1st generation of decentralized solutions providers was very much hardware driven. With further technology development, their business case will become more compelling.

A 2nd generation of decentralized solutions providers has entered the scene. Beyond the hardware aspect they include other elements into their business model

be priced/ rewarded accordingly. Today, some of the commercial mechanisms rely on statistical patterns (e.g. standardized load curves). In the future, grid interactions will be individualized in line with specific demand/supply patterns.

Some implementation hurdles remain

As we are still in the early stages of the development, some implementation hurdles remain but are being addressed already.

- **Strategic ambition of incumbents:** Incumbents are on their way to determine how to best balance legacy and new businesses. Some new businesses are not as profitable as the legacy business which leads to discussions whether new business models should be pursued.
- **Grid tariffs:** Traditional grid tariff designs have not been developed with the idea that P2P balancing would be possible or that individual demand/supply patterns might matter. Depending on which grid levels are being used, grid costs are still substantial. Grid operators and regulators are aware of the issue and investigate options to potentially amend grid codes. Further decreasing hardware prices might compensate this cost disadvantage.
- **Payments:** A common standard would be favourable – currently, this is being driven by the e-mobility sector. Once established, it could also be utilized in stationary energy solutions.
- **Risk exposures:** As more sizable implementation schemes have not been defined yet (given some of the implementation hurdles), risk exposures of such schemes have not been formalized. Once risks are identified, evaluated and formalized the investment case can be matched with a financing structure. If investor expectations are met, capital will be attracted.

As implementation hurdles are being removed, new value pools can be monetized.

Benefits for supply side market participants

- **Incumbents: There is the opportunity to transform the customer relationship** if a

standard supply contract is being replaced by a solutions contract.

- **There will be several margin components** e.g. for hardware, financing, operations contract, backup power, broadband services ...
- **The customer relationships will be more sticky** as short notice contract cancellations will be less likely to happen
- **Upsell potentials for additional services might be investigated** which are more dependent on customer insight, communication and financing offerings than just the supply of kWh or Joules.
- **Entering the market with decentralized energy solutions and scaling these can also be viewed as a defensive move** prohibiting new entrants to break into the traditional supply business and to gain market share.
- **New entrants: A new business might be established as incumbents move slowly.** Financing of the build out should be available if structured appropriately. In the past, hardware and ecosystem were significant entry barriers. Today, hardware is commercially available and competitiveness depends much more on which services are structured around the hardware. Experience from other sectors is therefore helpful to establish a customer value proposition e.g. telecom, finance, consumer goods.
- **Investors: New infrastructure like investments** in a more competitive infrastructure market are available. Utility balance sheets are constrained and do not allow sizable funding. Record high capital inflow into today's infrastructure market leads to reducing expected returns on investment. Therefore, this might be a new and attractive segment. Why is this the case?
 - **It is in line with regulator ambitions** to stimulate renewables build out.
 - **It is more attractive than competing projects** with funding needs. E.g. charging stations for e-cars exhibit more complexity. Technical standards are not clear yet (type of battery system and age of battery), uncertain adoption of new infrastructure, strategic risk of competing infrastructure, vandalism, ...). For decentralized (P2P) energy solutions, several risk and value drivers can be determined upfront. The hardware (e.g.

PV with battery) is a cash generating asset (if there is a lease or a loan). Electricity prices can be defined upfront and hence there is no or limited outright or spread energy price exposure. Counterparty/ credit risk is highly diversified and in case there is a default the hardware could potentially be recovered.

- **Regulators:** This is a fully privately financed scheme which allows to replace some centralized generation capacity. Countries with aged or obsolete infrastructure would benefit most from adopting these schemes e.g. if there are high shares of old conventional generation (fossil and nuclear) or weak and congested grids.

The regulators might want to consider to which degree a new energy landscape is more stable and instrumental for the redistribution of externalities. Centralized generation (also renewables) exhibit some negative externalities (environmental damages, emissions, downstream infrastructure build out ...). With the roll-out of decentralized units several externalities are being internalized. Also, the shut down costs would be cost neutral for the public. The question is whether this should be reflected in the regulatory framework resp. in an amended grid code providing more favourable conditions to decentralized units and/or decentralized (P2P) energy solutions.

Ambitions for a future market position need to be clarified

Now is the time to review the position each stakeholder aspires and will most likely have in the future energy landscape. Actions should be defined accordingly and aligned with the strategic and financial plan.

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