



Unleashing the Potential of Solar & Storage

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UNLEASHING THE POTENTIAL OF SOLAR & STORAGE

While solar covers around 5% of the European electricity demand today, its contribution could easily increase up to 15% by 2030, it would only take around 20 GW of newly installed PV capacity per year. A major trend linked to the deployment of solar is its co-location with battery storage. Storage adds flexibility and allows increasing system integration of solar PV. European examples can be found in the UK, where the first subsidy free utility solar & storage installations are being developed. Or in Germany, where around 50% of all residential solar installations in 2016/2017 were coupled to battery storage.

From an energy system perspective, storage represents an important flexibility tool since it

- injects and absorbs electricity very fast and with very high accuracy;
- smoothens short-term variability;
- eliminates production and load peaks;
- makes solar fully dispatchable.

In addition, Solar & Storage bring economic advantages: Storing solar electricity when prices are low and using it when prices are high allows stabilizing energy prices to reduce future network upgrades, and expansion cost.

Finally, Solar & Storage bring social benefits such as

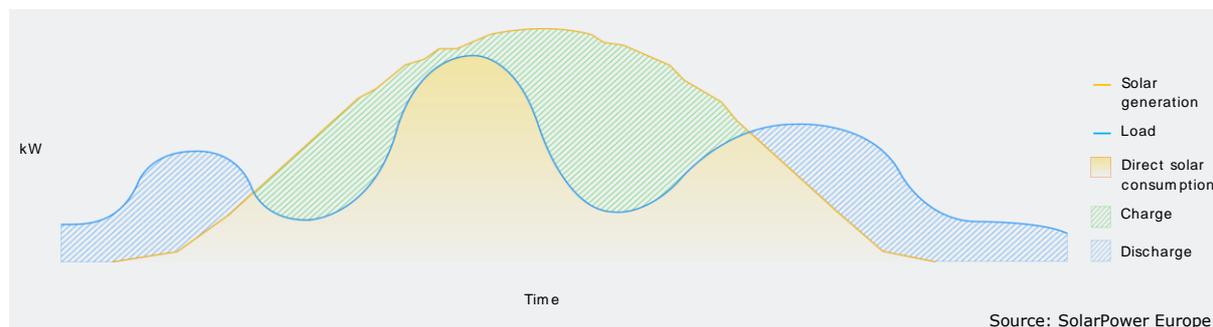
- local job creation;
- avoided CO2 emissions;
- true consumer empowerment.

To capture the full potential of Solar & Storage in the future, policies must set the right conditions now. SolarPower Europe's Task Force on Solar & Storage, which represents more than 25 leading companies in this field, is calling on the European policymakers to ensure that the following policy asks are strengthened and fully reflected:

Policy Ask	Explanation	Market Design	
		Directive	Regulation
 "Free movement of kilowatt-hours"	Grid fees should only be levied once on every kWh fed into the grid		Art. 16
 "Storage can absorb and release electricity when required"	As storage can both absorb and release energy, typical taxes, surcharges, fees, licensing requirements etc. usually levied on consumption and or generation should not apply	Art. 2 Art. 7	
 "Stacking of services"	Provision of several services simultaneously, e.g. self-consumption and ancillary services, are beneficial to the system and should be allowed	Art. 13 Art. 15 Art. 17	Art. 3 Art. 53
 "Right to self-generate and store electricity" "Right to grid connection"	Every household should be allowed to install and connect Solar & Storage systems without any burden	Art. 15	
 "Maximum asset monetization"	Solar & Storage should have access to all markets, especially those for flexibility and ancillary services, with products that value fast and accurate services	Art. 17	Chpt. II
 "Fair consumer metering costs"	Consumers should not bear unreasonable costs for metering or billing services from DSOs and TSOs	Art. 18 Art. 19 Art. 21 Chpt. IV & V	
 "Solar & storage is a new flexibility tool"	Storage should be considered as a viable alternative to traditional grid expansion	Chpt. IV & V	
 "Green cannot turn grey"		Chpt. IV & V	Art. 57 Art. 59

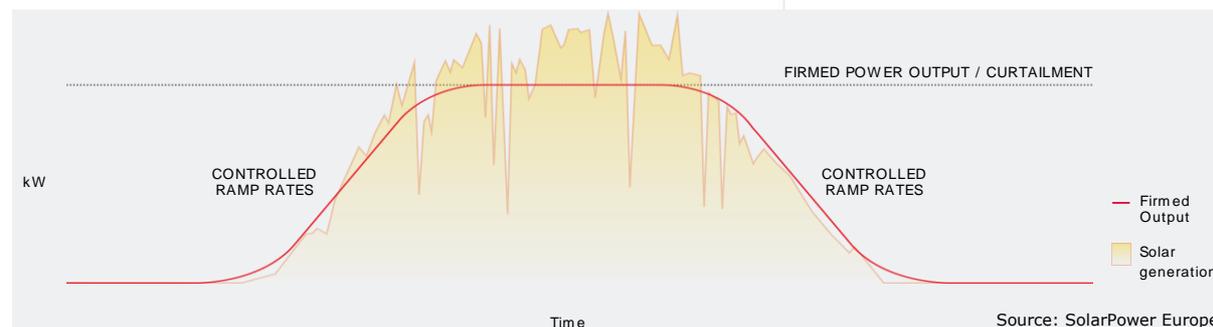
SOLAR & STORAGE BENEFITS EXPLAINED

Storage optimizes solar supply



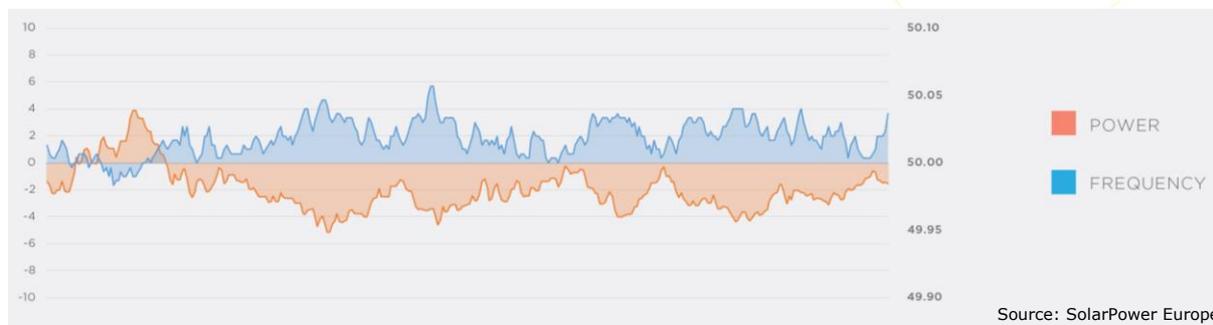
The solar supply curve (yellow) is variable and coincides only partially with the typical electricity demand curve (blue). Combining Solar & Storage allows to absorb the surplus generation (green area) and inject the stored solar electricity back into grid when demand is high (blue area). These capabilities make it possible for Solar & Storage to operate with the functional equivalence to fossil-based generators. **To make the maximum use of its technical potential, storage should be considered neither as a consumer or generator.**

Storage firms solar output



Firming means that a PV system's output does not increase or decrease too quickly. The advantage of having a solar & battery system working in synergy is that short-term supply and demand variations can be stabilized. Storage can even make the PV system's output completely dispatchable, i.e. available on demand. **Solar & Storage must be recognized as a new flexibility tool that makes solar fully dispatchable.**

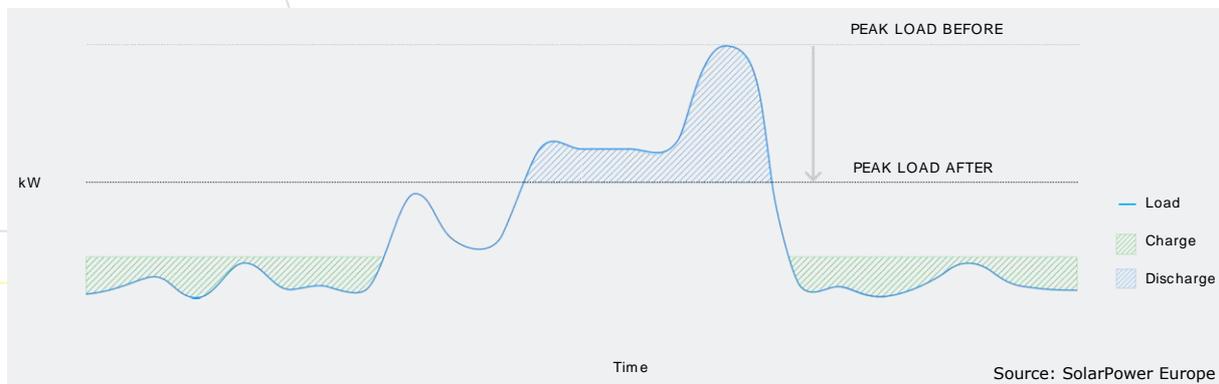
Storage provides ancillary services



Ancillary services allow the energy system to cope with variability up to an hour. To provide such services, generators must respond quickly to signals to help correcting fluctuations in frequency. The high flexibility of Solar & Storage allows to provide much faster and more accurate services to TSOs

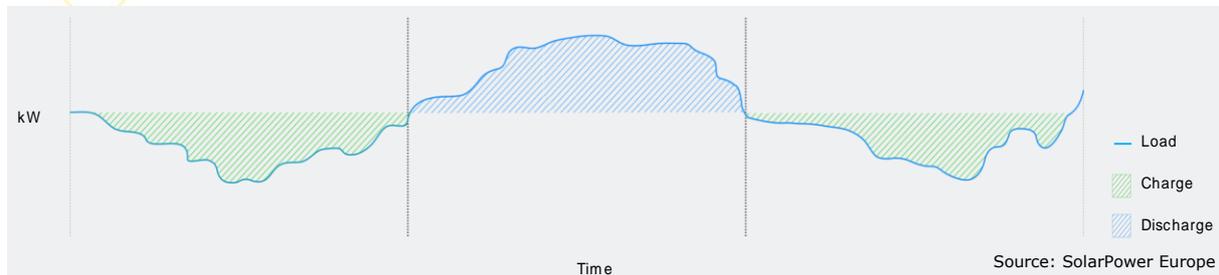
and DSOs than other flexibility sources. **Solar & Storage must be recognized as a new flexibility tool that can stack services and access all markets for maximum asset monetization.**

Storage reduces network cost



Historically grids are designed to only deal with demand peaks. However, with increasing variable generation grids face both: peaks in demand and peaks in generation. Solar & Storage systems allow to reduce peak generation significantly. In Germany, a market introduction program for residential storage systems limits the feed-in behaviour of PV systems to 40% of its maximum output. Due to this limitation, the feed-in during peak generation is reduced. Applying an optimized generation and storing strategy allows to increase the existing grid capacity for PV power. This allows to integrate more renewable electricity within the same grid design, avoiding network upgrades. **Solar & Storage shall have a right for grid connection and fair, consumer contract level metering costs.**

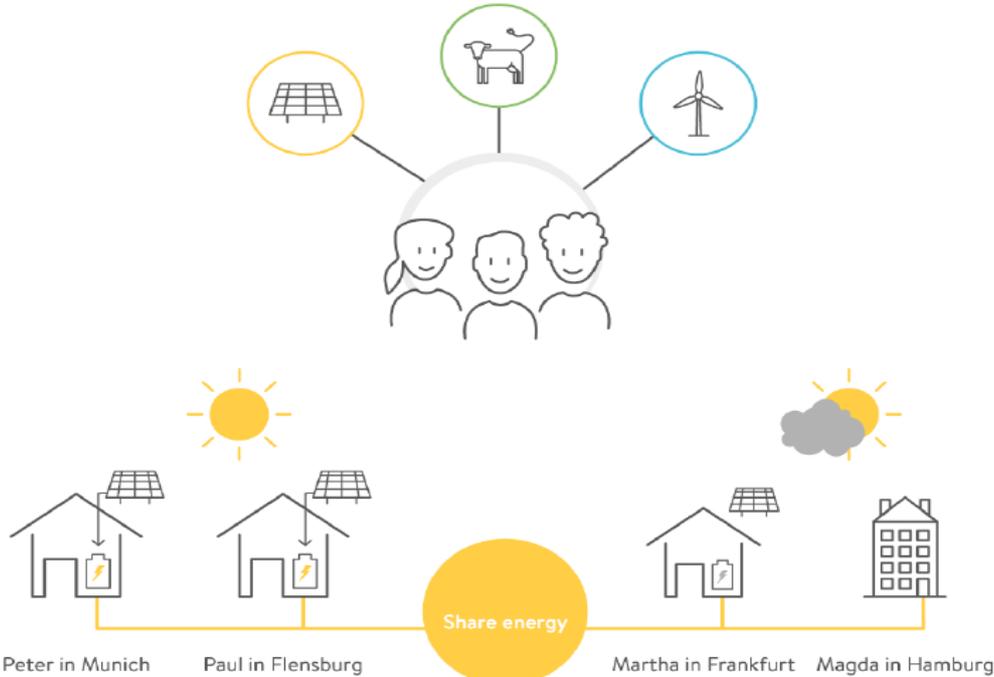
Solar & Storage provide more stable energy prices



Arbitrage can be provided with Solar & Storage systems by using storage systems to absorb power from the grid at times of overproduction and low power prices. By injecting this electricity back into the grid when prices are high, overall price fluctuations can be reduced while system reliability and operation are improved. This is feasible on system and residential level. Regarding the latter, different types of 'Time of Use' tariffs are applicable, e.g. i) fixed, depending on hours of the day or ii) variable, depending on intraday market developments. To make this a viable business case on its own, power prices must fluctuate more, but more **importantly, grid fees should only be levied once on every kWh fed into the grid.**

Solar & Storage empower consumers and businesses to actively participate in the energy transition while controlling their energy bills

Storage gives consumers more choices on how they use electricity. This provides opportunities for new business models throughout the energy industry. One example is the "Sonnen Community". Community Members that produce solar electricity can share it with others, in locations without sunshine or solar generation. If a community member generates electricity that he or she does not consume, this electricity is stored across thousands of battery units or fed into a virtual electricity pool, where it can be used by people who need energy at that moment. By combining thousands of distributed systems into a largescale virtual pool, members of the community contribute to the balancing markets, for example, stabilize the power grid in times of excess solar or wind power generation. The income from the electricity balancing market is made available to the community to guarantee stable electricity prices. **Solar & Storage customers do more than simply consume self-generated electricity – they provide valuable services that benefit the entire energy system and society.**



Source: SonnenBatterie



Digital Solar & Storage

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