

**Grid-scale electricity storage**  
enabling renewables to power grids  
affordably, reliably and resiliently



## Consultations for New Electricity System Restoration Standard Storelectric Response

Storelectric's response to the two Consultations for New Electricity System Restoration Standard:

- ◆ [ESRS Implementation Consultation](#)
- ◆ [Assurance Framework Consultation](#)

### Technical Issues

These consultations lack many essential things such as:

- ◆ Grid-forming capability;
- ◆ How much, beyond the unit itself, the ReStart unit can start up within the same grid section;
- ◆ Ability to re-start neighbouring grid sections;
- ◆ Ability to re-start neighbouring voltage-levels of the grid, both upwards and downwards in voltage;
- ◆ Duration of the start-up requirements, which has further echoes (for storage) in how much capacity/duration needs to be reserved so that the storage is not exhausted when called upon –
  - ◇ Durations should not be excessive, or all storage would be excluded,
  - ◇ Nor should they be insufficient to start up neighbouring grid sections and achieve stability;
- ◆ Inertia / ability to take the electric "jolts" from re-starting neighbouring installations;
- ◆ Linked re-start cascades, e.g. plant 1 can start from scratch and re-start plants 2 and 3 which can then re-start the rest of the grid section, etc. - these should be tendered and contracted as a single "re-start collective unit" when the "collective unit" can deliver the requirements listed above but individual parts of it cannot.

Please refer to my analysis ([Re-Starting Net Zero Grids](#)) of an earlier Distributed ReStart technical evaluation document. This shows how to put in what is lacking, and how the emphasis needs changing.

### Trading Issues

The contracts need also to reflect the range of services being provided by the Black Start plant: the more services, the higher the value of the contract, because other contracts are not needed for those other services, and because other plants do not have to be started in order to provide them. These should be wrapped into a single Black Start contract.

Where a single plant cannot provide all the required services (e.g. the full range of grid stability services), other plants that can provide these missing services should be included in a "re-start collective unit" in order to provide the full requirement. Such a unit should lose its contract (after warnings, if appropriate) if any capability is lost, i.e. a service can no longer be provided by the unit.

### **Commercial Issues**

Then there are the commercial issues. It is good that National Grid and Ofgem are looking to open out the process for new providers. However this initiative will not encourage the construction of appropriate new Black Start capacity unless contracts are awarded for it prior to construction and even (with an enforceable Letter of Intent) prior to planning. This is because of the considerable investment (in 7 or 8 figures) that is needed even in the early stages of developing such plants on the higher-voltage levels of the grid – and plants are indeed needed on these parts of the grid because the report analysed above proves that lower-voltage grid sections cannot, of their very nature, re-start higher-voltage grid sections because they lack the requisite capacity (power and duration) and inertia.

Such Letters of Intent and early contracts would, of course, carry conditions that require sufficient progress to be made in order not to lose the contractual assurance. Such progress is likely to be a subjective judgement because different aspects proceed at different speeds in different projects, even when such projects are based on very similar designs. This would both ensure progress and prevent some businesses “hogging” contracted capacity. The letters of intent would be sufficiently strong for private-sector investors to consider them to be assured revenues and, for new plants, would have to have contract durations of at least half the expected amortisation life of the plant. They may be linked to the value of Black start services offered on the market at the time of commissioning, so as not to be considered a subsidy, but any variability in the price would increase the cost of money (by increasing the commercial risk) for the plant, in turn raising the price at which it would sell its services; so the value of such indexation should be carefully considered against its costs, both direct and indirect.

The Letters of Intent and early contracts would need to have sufficient lead time to start of provision of the service for the plant to be designed, permitted, built and commissioned. It must include the required time for grid connection; should grid connection time extend, then the developer must not be penalised for such extension. It would be best if the grid operator were to guarantee a full grid connection before the plant is scheduled for commissioning; otherwise commissioning would be delayed and additional costs incurred by the developer for reasons outside their control and without any balancing revenues. Failure to provide such lead times and connection guarantees would make the contracts more expensive by increasing the development / construction schedule risk.

The consultations are about the next few years only. Ofgem and grid operators must stop thinking in such short terms that make the construction of larger-scale inertial plants impossible.

Tenders for provision of Black Start services will be run periodically, relating to each area in which they are needed. Where no contract is awarded, then following closure of the tender the grid operator should be permitted to enter into such contracts and letters of intent bilaterally and without further commercial tender. This is because the developers, in making the proposal to the grid operator, will be incurring significant cost and providing significant knowhow; there would be no incentive for them to do so if the grid operator were then to open up the opportunities to others who will not have borne such costs or provided such knowhow.

# Grid-scale electricity storage

enabling renewables to power grids affordably, reliably and resiliently

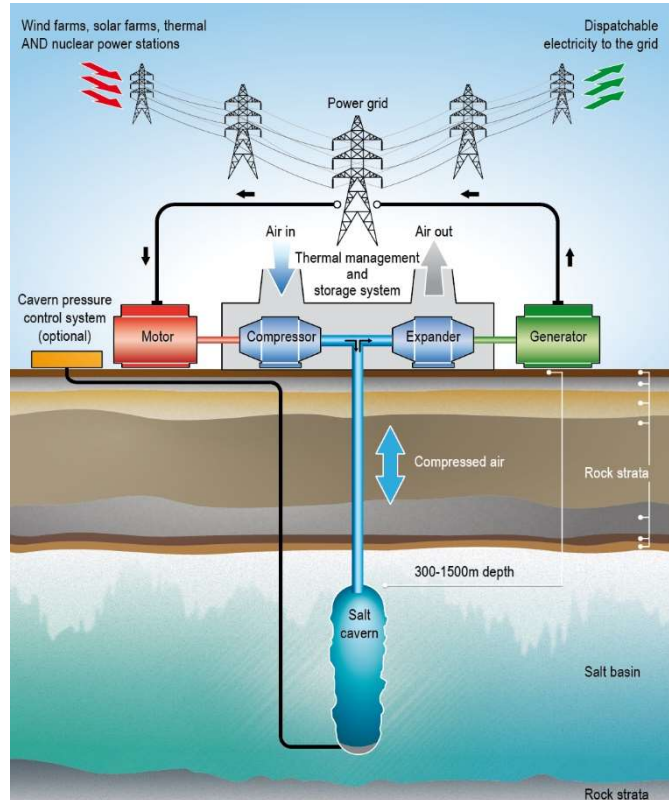


## About Storelectric

Storelectric ([www.storelectric.com](http://www.storelectric.com)) is developing transmission and distribution grid-scale energy storage to enable renewables to power grids reliably and cost-effectively: the world's most cost-effective and widely implementable large-scale energy storage technology, turning locally generated renewable energy into dispatchable electricity, so... **enabling renewables to power grids cheaply, efficiently, reliably and resiliently.**

- ◆ Innovative adiabatic Compressed Air Energy Storage (Green CAES) will have zero / low emissions, operate at 68-70% round trip efficiency, levelised cost significantly below that of gas-fired peaking plants, and use existing, off-the-shelf equipment.
- ◆ Hydrogen CAES technology converts & gives new economic life to gas-fired power stations, reducing emissions and adding storage revenues; hydrogen compatible.

Both technologies will operate at scales of 20MW to multi-GW and durations from 4 hours to multi-day. With the potential to store the entire continent's energy requirements for over a week, global potential is greater still. In the future, Storelectric will further develop both these and hybrid technologies, and other geologies for CAES, all of which will greatly improve storage cost, duration, efficiency and global potential.



## About the Author



Mark Howitt is Chief Technical Officer, a founding director of Storelectric. He is also a United Nations expert advisor in energy transition technologies, economics, regulation and politics – [invitation here](#).

A graduate in Physics with Electronics, he has 12 years' management and innovation consultancy experience world-wide. In a rail multinational, Mark transformed processes and developed 3 profitable and successful businesses: in commercialising a non-destructive technology he had innovated, in logistics (innovating services) and in equipment overhaul. In electronics manufacturing, he developed and introduced to the markets 5 product ranges and helped 2 businesses expand into new markets.

*Disclaimer. This document represents the intentions of Storelectric Ltd at the time of writing, which may change for various reasons including (but not limited to) technical, strategic, political, financial and the wishes of partners or investors. Any person or organisation considering investing in Storelectric does so at their own risk and is responsible for undertaking their own due diligence.*