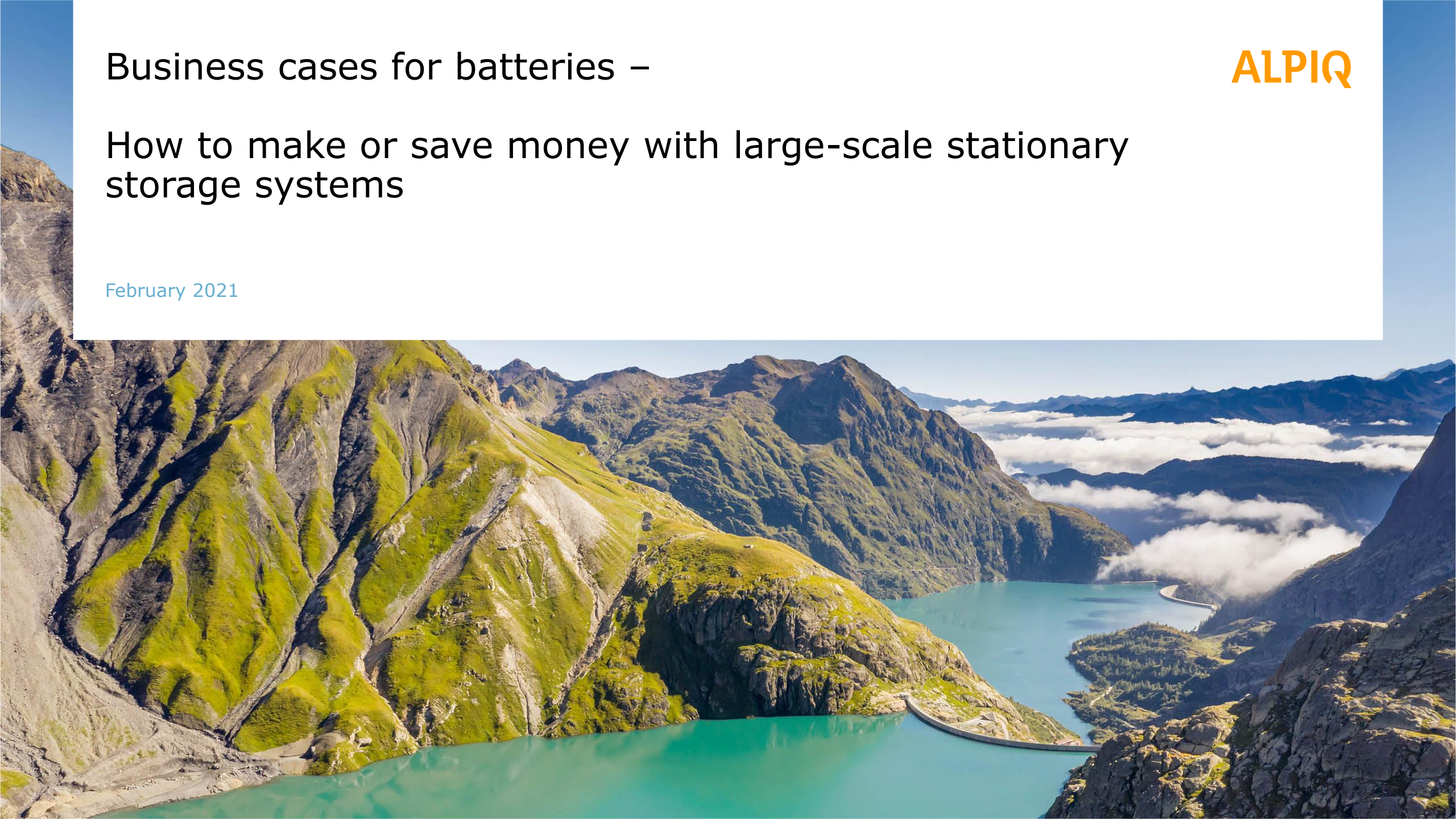


Business cases for batteries –

ALPIQ

How to make or save money with large-scale stationary storage systems

February 2021



Alpiq in brief

- Active in 30 countries throughout Europe
- Key figures 2019: CHF 4.1 billion net turnover and EBITDA before exceptional items of CHF 106 million
- Approximately 1,250 employees
- Headquarters of the company in Lausanne (Switzerland)



With approximately 4,300 GWh of electricity from hydropower per year, Alpiq is one of Switzerland's largest electricity producers. Hydropower is renewable, carbon-free, domestic and highly flexible.





In Switzerland, Alpiq is a major electricity producer and operator of

- Run-of-river power plants
- Storage power plants
- Pumped storage power plants
- Small hydropower plants
- Photovoltaic systems and wind farms as well as a shareholder of two nuclear power plants

"Why do you need a battery?"

To create revenues?

- Ancillary services: Primary and/or Secondary Frequency Control
- Arbitrage: day-ahead and/or intra-day market

To save money?

- Peak shaving: high grid costs and/or e-mobility (fast chargers)
- Reactive power
- Self consumption in combination with PV

To gain experience with this “new” technology?

Or just for marketing reasons?

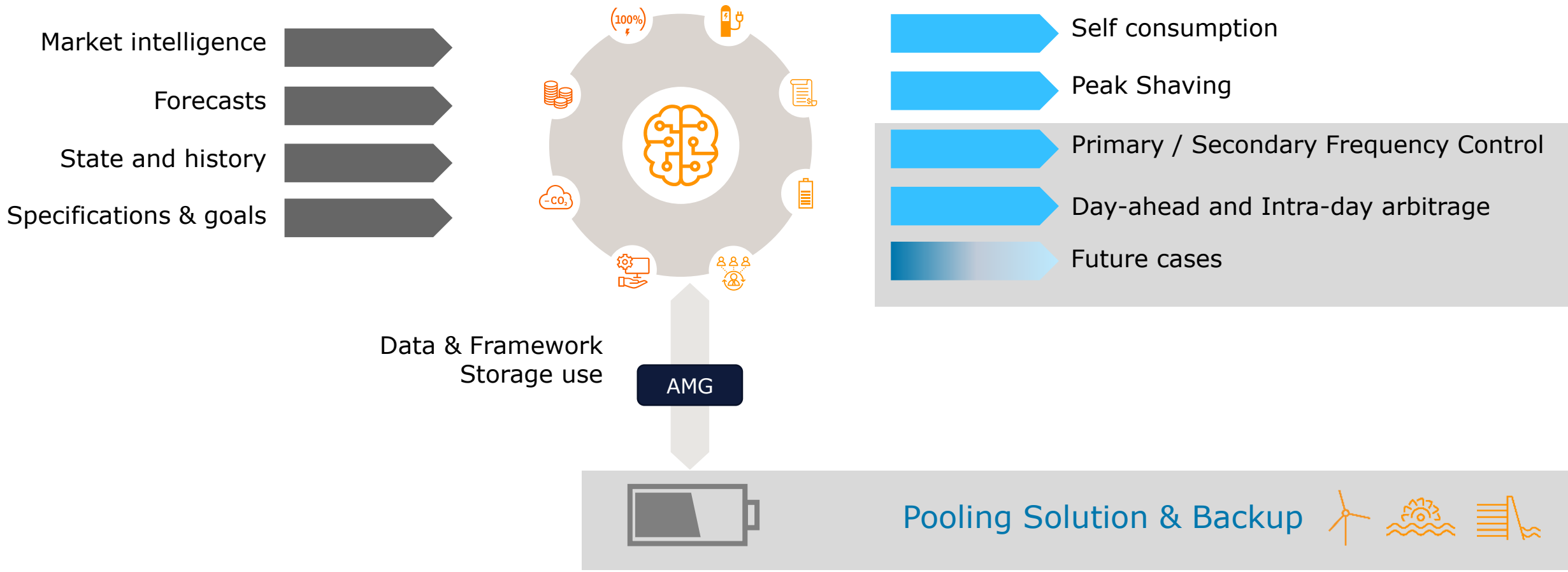
The combination of some business cases is difficult, i.e.

- if your bid is accepted for ancillary services you cannot use the same power for intra-day arbitrage
- if you want to do peak shaving, the battery needs to be (almost) fully charged
- ...

-
- Combination of different business cases
 - Strategy: definition and prioritisation of business cases
 - Connection to Alpiq AI platform
 - Algorithms automatically implement the selected strategy
 - Future?

→ Always open for new business cases but the battery must be able to handle them! (c-rate)

Operating battery storage profitably



Optimization goals: Revenue maximization through ideal combination of services

20 MW BESS in Brunnen (SZ)

Alpiq operates the biggest battery in Switzerland



Goal: Revenue maximization

Services provided by Alpiq:

- **Secondary Frequency Control** (in combination with our Alpiq's hydro assets)
- Primary Frequency Control

EW Maienfeld: A small utility with many fast chargers

... and a 1.25 MW BESS



Characteristics of the Maienfeld electricity grid:

Household customers:	2000
Large customers (>100'000 kWh):	30
Distribution consumption:	18 GWh
Own production:	< 1 GWh
14 Tesla Superchargers à 120 kW:	1680 kW
4 Ionity charging stations à 350 kW:	1400 kW

Services provided by Alpiq:

- **Peak Shaving**
- **Secondary Frequency Control** (in combination with Alpiq's hydro assets)
- Primary Frequency Control



Thank you.

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