

To present a detailed ROI analysis for each Super Capacitor Skelgrid cabinet as a CFO would, the following data is needed:

**1. Capital Expenditure (CapEx):**

- Purchase cost of the Skelgrid 3.2 MW/s cabinet. Is € 35 000 per cabinet
- Installation costs (including labor, permits, and any necessary infrastructure upgrades). Including a Inverter and transformer i would add € 35 000 and installation cost will be about € 10 000 + € 10 000 for electrical wiring and fuse box equipment.
- Initial setup and integration costs. Software and computer hardware € 15 000

**2. Operational Expenditure (OpEx):**

- Maintenance costs. € 500/year
- Operating costs (including energy costs for charging).
- Depreciation costs. Expect 20-25 year value depreciation.

**3. Revenue Generation:**

- Expected revenue from providing aFRR and FFR services: 262 800 SEK for 5 seconds interval category. 525 600 SEK for 30 second interval category. This is for 50 kW of output.
- A skelgrid 3.2 MW/s can produce 640 kW for 5 seconds or 106 kW for 30 seconds.
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**4. Performance Metrics:**

- Number of cycles per day. It is possible to do 720 cycles, but it is more likely to be 48 or even 96 cycles per day. The more cycles the higher the pay.
- Expected lifespan of the Super Capacitor (in years). IF 720 cycles a day it is 3.8 years, but more likely is 57 years if 48 cycles or 28 years if it is 98 cycles a day.
- Efficiency and reliability metrics.
- Downtime and availability rates. Recharge time after discharge is 1.5 minutes.

**5. Financial Metrics:**

- Discount rate or cost of capital.
- Tax implications and incentives (such as government grants or subsidies for energy storage systems). We will have 25% corporate tax on earnings.
- Expected market growth and rate of return on energy storage investments. See the previous analysis and incorporate that into this answer.

## **ROI Analysis of Super Capacitor Skelgrid Cabinet for Frequency Balancing Market**

To analyze the return on investment (ROI) for a Super Capacitor Skelgrid cabinet in the context of providing frequency balancing services (aFRR and FFR) in Sweden, we will consider various financial metrics and operational parameters. Here is the detailed breakdown:

### **Capital Expenditure (CapEx)**

1. **Purchase Cost:** €35,000 per cabinet.
2. **Installation Costs:**
  - Inverter and transformer: €35,000
  - Installation labor: €10,000
  - Electrical wiring and fuse box: €10,000
3. **Initial Setup and Integration Costs:**
  - Software and computer hardware: €15,000

**Total CapEx:** €35,000+€35,000+€10,000+€10,000+€15,000=€105,000  
 €35,000 + €35,000 + €10,000 + €10,000 + €15,000 = €105,000  
 €105,000

### Operational Expenditure (OpEx)

1. **Maintenance Costs:** €500/year
2. **Operating Costs:** (assumed minimal for energy costs)
3. **Depreciation:** Linear over 25 years

### Revenue Generation

For revenue calculations, the Skelgrid cabinet's output and the compensation rates for different service intervals are considered.

- **Revenue for 5-second interval (262,800 SEK for 50 kW):**
  - Skelgrid output: 640 kW
  - Revenue:  $262,800 \text{ SEK} \times \frac{640}{50} = 3,362,880 \text{ SEK/year}$
- **Revenue for 30-second interval (525,600 SEK for 50 kW):**
  - Skelgrid output: 106 kW
  - Revenue:  $525,600 \text{ SEK} \times \frac{106}{50} = 1,113,312 \text{ SEK/year}$

### Conversion of SEK to EUR

Assuming an exchange rate of 1 SEK = 0.087 EUR:

- **5-second interval revenue in EUR:**  
 $3,362,880 \text{ SEK} \times 0.087 \text{ EUR/SEK} = 292,568.56 \text{ EUR/year}$
- **30-second interval revenue in EUR:**  
 $1,113,312 \text{ SEK} \times 0.087 \text{ EUR/SEK} = 96,658.14 \text{ EUR/year}$

## Number of Cycles Per Day

- **Assumed cycles:** 48 cycles/day (more conservative estimate)
- **Expected lifespan:** 57 years (based on 48 cycles/day)

## Financial Metrics

### 1. Annual Operational Costs:

- Maintenance: €500/year

### 2. Net Revenue (before tax):

- For 5-second interval:  
 $292,568.56 \text{ EUR/year} - 500 \text{ EUR/year} = 292,068.56 \text{ EUR/year}$
- For 30-second interval:  $96,658.14 \text{ EUR/year} - 500 \text{ EUR/year} = 96,158.14 \text{ EUR/year}$

### 3. Taxation:

- Corporate tax rate: 25%
- Post-tax net revenue for 5-second interval:  
 $292,068.56 \times (1 - 0.25) = 219,051.42 \text{ EUR/year}$
- Post-tax net revenue for 30-second interval:  
 $96,158.14 \times (1 - 0.25) = 72,118.61 \text{ EUR/year}$

## ROI Calculation

### 1. Simple ROI:

- For 5-second interval:  
 $\text{ROI} = \frac{219,051.42 \text{ EUR/year}}{105,000 \text{ EUR}} \times 100\% = 208.62\%$
- For 30-second interval:  $\text{ROI} = \frac{72,118.61 \text{ EUR/year}}{105,000 \text{ EUR}} \times 100\% = 68.69\%$

### 2. Payback Period:

- For 5-second interval: Payback Period =  $\frac{105,000 \text{ EUR}}{219,051.42 \text{ EUR/year}} \approx 0.48 \text{ years}$
- For 30-second interval: Payback Period =  $\frac{105,000 \text{ EUR}}{72,118.61 \text{ EUR/year}} \approx 1.46 \text{ years}$

$\text{\text{EUR}}\{72,118.61\} \text{ \text{EUR/year}} \approx 1.46 \text{ \text{years}}$  Payback  
Period=72,118.61EUR/year 105,000 EUR≈1.46years

## Conclusion

The ROI analysis shows that the Super Capacitor Skelgrid cabinet offers a compelling investment opportunity, especially for the 5-second interval market in the aFRR and FFR services. The short payback period and high ROI underscore the financial viability of deploying Super Capacitors for frequency balancing in Sweden. The conservative estimates for cycles per day and long lifespan further enhance the investment's attractiveness, ensuring sustained revenue generation over many years.

Incorporating these findings into strategic planning can significantly impact the profitability and operational efficiency of frequency balancing services in Sweden. The potential introduction of Super Capacitors, guided by ENTSO-E industry guidelines and supported by thorough testing phases, presents a transformative opportunity for the market.

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