

V2G Revenue in Denmark

Nuvve was asked at the VGI Working Group meeting November 14th, 2017 to provide some background information on the revenue realized for V2G in Denmark.

Denmark Frequency Regulation Market

- Energinet (Danish TSO) has an open market for Frequency Regulation
- Bidding market together with Sweden
- Symmetric up and down bid
- +/-100 mHz band around 50 Hz, no dead band, continuous operation

Commercial Customer

- Nuvve has installed the world's first commercial V2G system at Frederiksberg Forsyning (a Danish utility) in Copenhagen.
- It was put in operation September 6, 2016 and has operated 14+ months under commercial market conditions

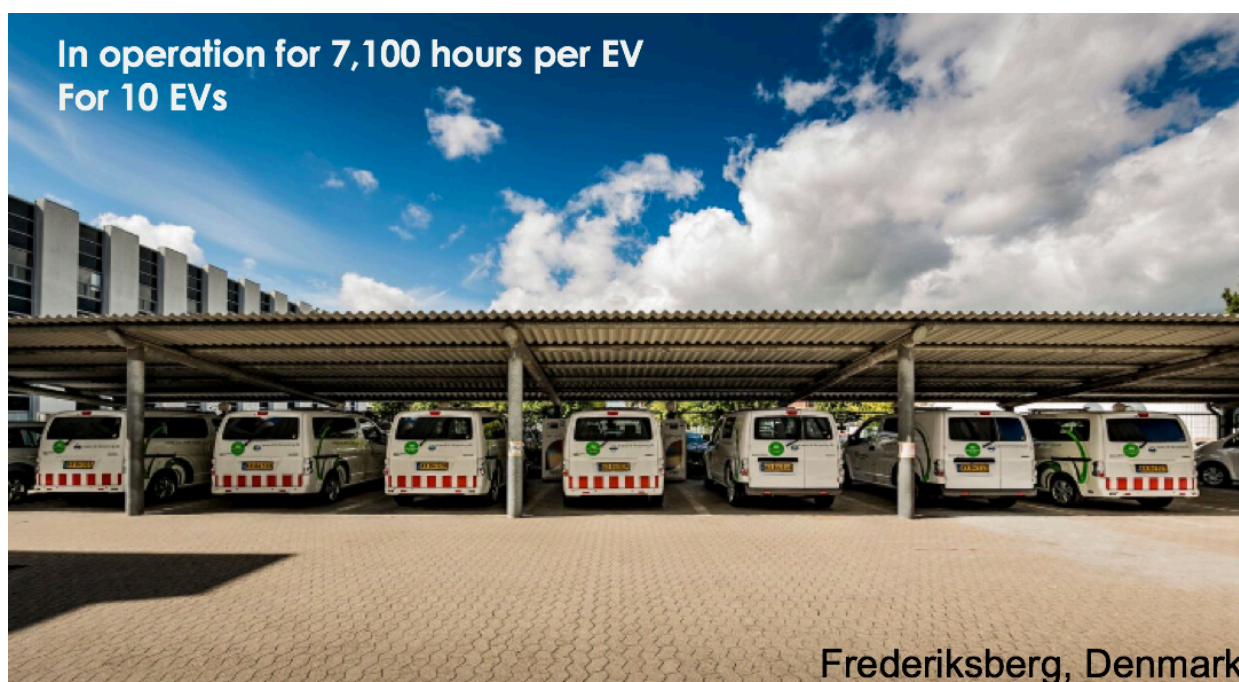


Figure 1 – Frederiksberg Forsyning V2G commercial operation in Denmark

Frederiksberg Forsyning Fleet Model

- 10 Nissan ENV-200 electric vehicles (Figure 1)
- 10 Enel V2G bi-directional CHAdeMO charging stations at nominal +/-10 kW
- Useable power +/-9.25 kW per EV (slightly lower than 10kW due to energy loss)
- 24 kWh EV batteries
- 16:00 – 06:00 week days (14 hours), 00:00-24:00 weekends (24 hours) = 6,150 hours/year

Danish Frequency Regulation availability prices¹

- Prices from Sep 6, 2016 to Sep 5, 2017 (Figure 2)
- €26.55 average price per MW-h

Realized revenues from Frequency Regulation

- 6,150 hours per year participation per EV
- Realized revenues for Frequency Regulation participation per car per year ~€1,400 @+9.25 kW (maximum potential revenue is €1,510 but we made reserves to account for situations where car not being available)

¹ Prices for DK2 area – East Denmark as part of the Nordic grid

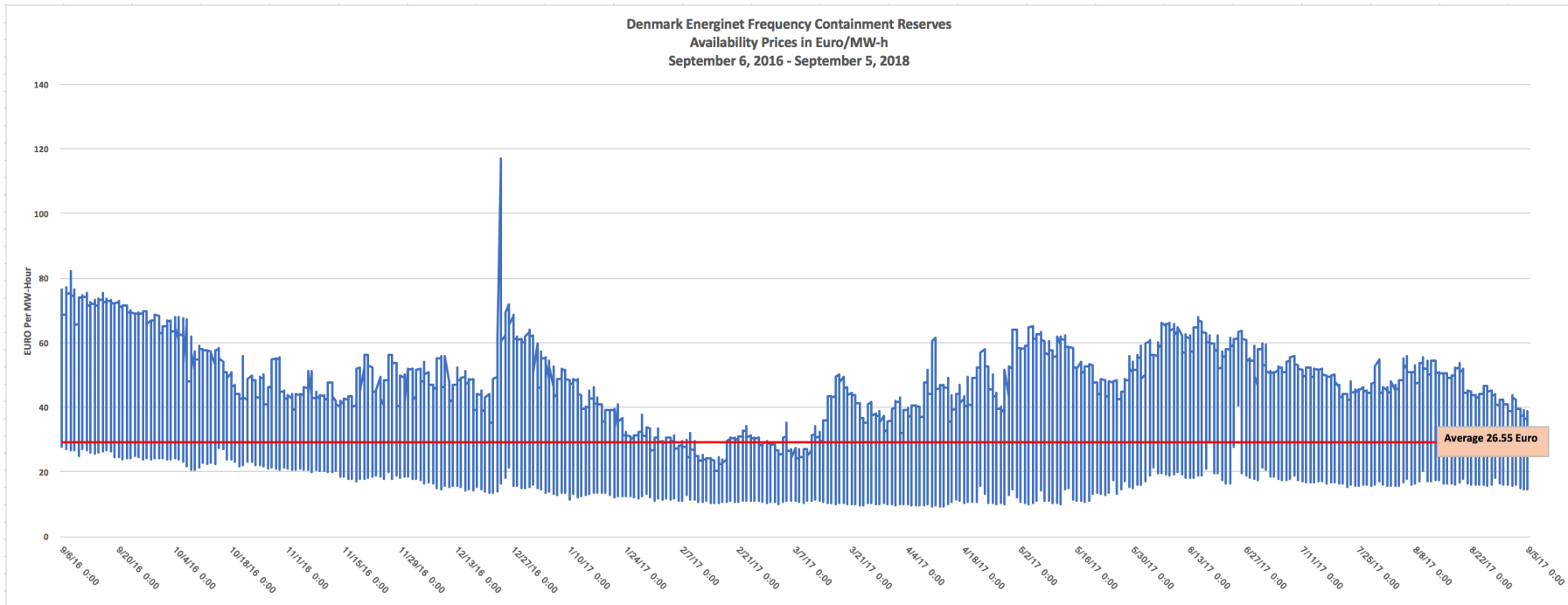


Figure 2 – DK2 Frequency Regulation availability price September 2016 – September 2017