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ELECTROLYSIS IN DISTRIBUTION GRIDS

A Regulatory Valuation on Grid-Supportive Operation

NEFI Conference 2024

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Das Projekt ‚SETHub' wird unterstützt im Rahmen der 3. FFG Ausschreibung Energie.Frei.Raum

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SITUATION & KEY QUESTION

SITUATION

- **Massive deployment of renewable electricity** generation technologies is envisaged in the coming years/decades
  - Leading to a tightening situation in the distribution grid
  - Requiring significant electricity grid expansion/enforcement measures
- **Electrolysis, operated in a grid-supportive manner**, may provide an efficient alternative to conventional grid enforcement measures
- **Distribution System Operators (DSOs) are not allowed to own and operate** generation or storage assets, however, exemptions are given

KEY QUESTIONS

- **Under what circumstances are DSOs allowed to own and operate Electrolysis?**
- **What combinations of ownership and operation are feasible according to the**
  - The existing regulatory framework **(ElWOG)**
  - The envisaged **ElWG-draft** (10/01/2024)

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OPERATING STRATEGIES

We can distinguish between grid-friendly and market-based operation

Grid supportive
related to the grid-situation

rule-based

Compensation of RES-production peaks to maintain secure network operation

On the basis of gird simulation and technical limits

Minimal required operation of the electrolyser from grid perspective to maintain secure network operation

Market based
related to the electricity/hydrogen price

optimised

Profit maximising operation on the basis of exogenous prices for electricity and hydrogen

On the basis of optimisation against price signals

Ideal operation on the basis of market prices. Can be determined by optimisation against exogenous prices for electricty/hydrogen

OPERATING VARIANTS AND OPERATORS

In principle, four combinations of operating strategies and operating actors are conceivable (no legal assessment here)

Combinations to be analyzed	Operator	Operating strategy
1a **Operated exclusively by the DSO**, grid supportive only	DSO	Grid supportive
1b **Operated exclusively by the DSO**, grid supportive and market based	DSO	Grid supportive Market based
2 **Operated by DSO and a market player**, grid supportive / market based, respectively	DSO Market player	Grid supportive Market based
3 **Operated by a market player**, grid supportive and market based	Market player	Grid supportive Market based

Variant 1a

- Grid supportive operation to compensate RES-peaks

Variant 1b

- Grid supportive operation to compensate RES-peaks
- Market based operation depending on electricity/H_2 prices

Variant 2

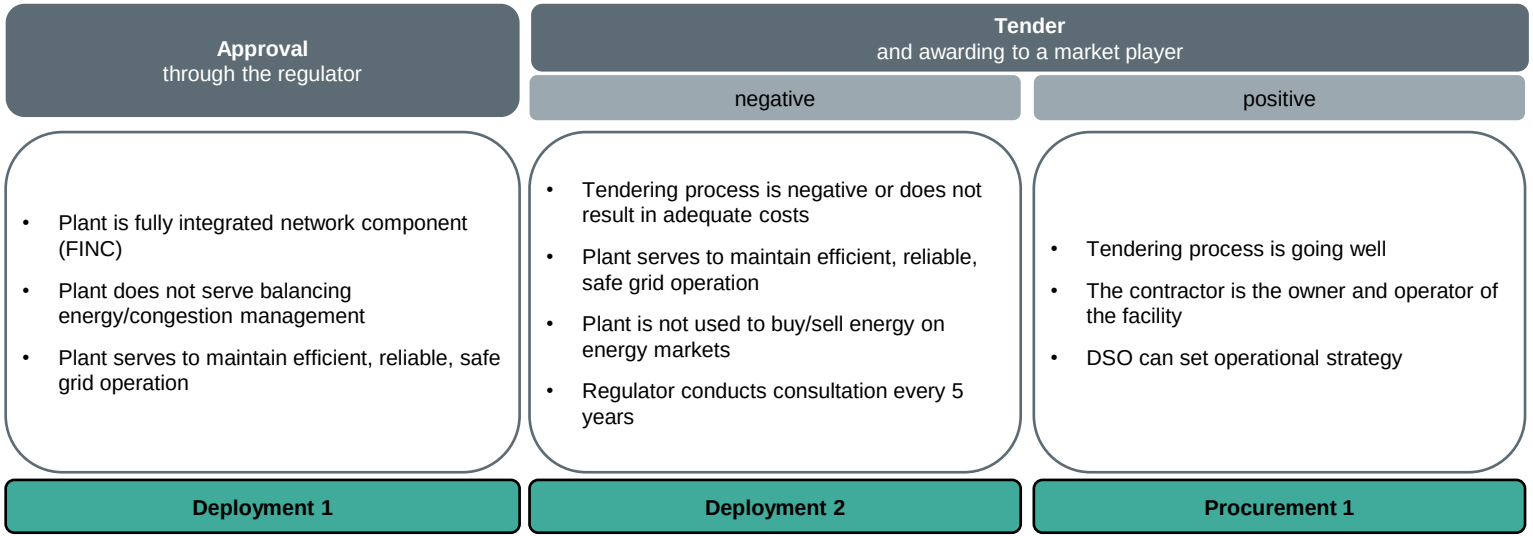
- Grid supportive operation to compensate RES-peaks
- Market based operation depending on electricity/H_2 prices
- Costs and revenues of the respective operating strategy need to be comprehensible and assignable

Variant 3

- Grid supportive operation to compensate RES-peaks
- Market based operation depending on electricity/H_2 prices
- Costs and revenues of the respective operating strategy need to be comprehensible and assignable
- Grid supportive operation is paid by the DSO

OPTIONS ACCORDING TO § 22A ELWOG

According to **§ 22a ElWOG** there are two options, in which the DSO may be the operator of an electrolyseur and one option, in which the DSO may be the user



Definition FINC according to the EB-RL: exclusively serving to maintain efficient, reliable and safe grid operation

OPTIONS ACCORDING TO ELWG-DRAFT

According **§ 72 and § 73 EIWG** there are two options, in which the DSO is allowed to be the operator of an electrolysor (energy storage facility) and one option, in which the DSO may be the user

Approval
through the regulator

Tender
and awarding to a market player

§ 72 Abs 1 Z 1

§ 72 Abs 3 requires check of alteratives before the tendering process including flexibility-procurement according to § 120. Requirements according to § 120

- More cost efficient than grid expansion, improve efficiency in the operation and avoid delays
- DSO need to submit a proposal for a common procudure to the regulator
- Uniform procurement and products defined in a degree by the regulator

Plant is FINC (§ 6 Abs 1 Z 146)

- Integrated in the transmission-, distribution grid
- Plant serves to maintain efficient, reliable, safe grid operation
- Plant does not serve balancing energy/congestion management
- (Dis-) Charging times (..,) significantly below market intervall

§ 72 Abs 1 Z 2 Tendering: negative

§ 72 Abs 2 Z1

- Plant serves to maintain safe grid operation
- Plant is not used to buy/sell energy on energy markets
- Consultation by the regulator every 5 years

§ 72 Abs 2 Z 2 Tendering: positive

- Implementation of an open, transparent and non-discriminatory tender procedure
- Construction, management or ownership of the plant is in the hands of a third party
- Terms of the tender procedure are approved in advance by the regulatory authority

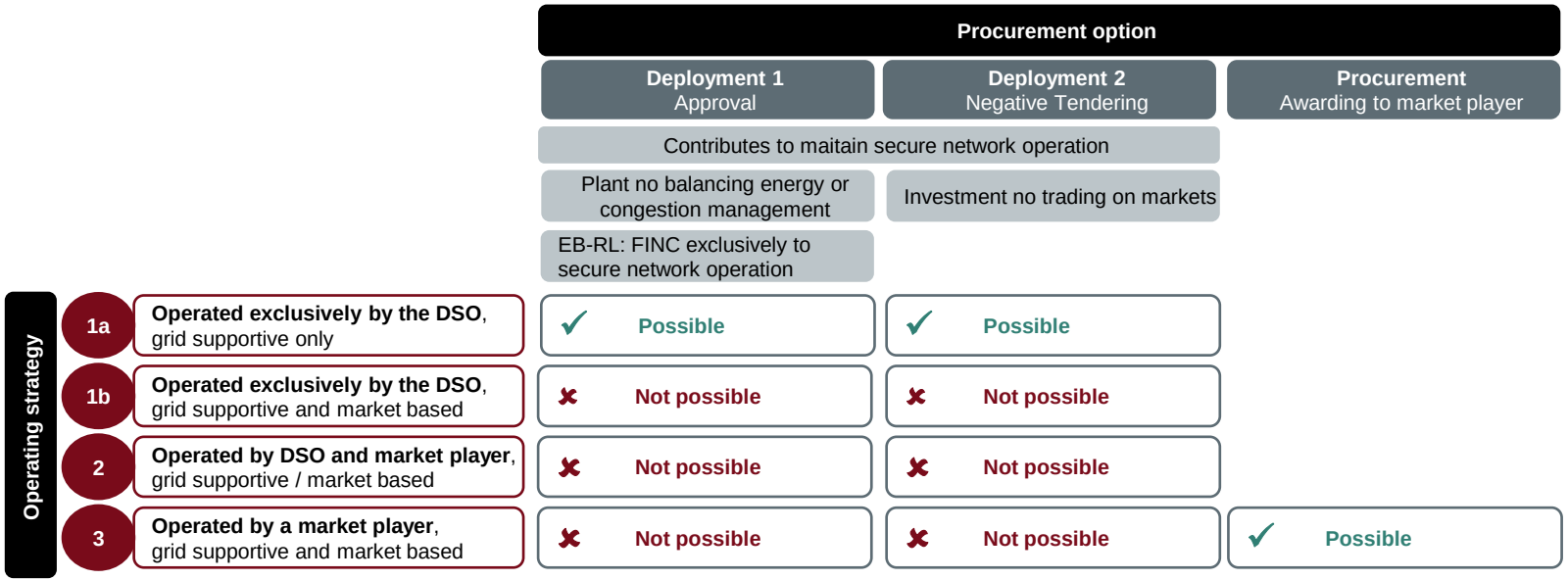
Deployment 1 | **Deployment 2** | **Procurement 1**

REGULATORY KEY QUESTION

Which combinations are regulatory feasible?

VALUATION ACCORDING TO § 22A ELWOG

According to the current legal situation and against the background of the EB-RL, a DSO may own/operate the electrolysis for grid supportive operation only. Any combination with other market based use cases is not feasible



VALUATION ACCORDING TO THE ELWG-DRAFT

According to the ElWG-Draft and against the background of EB-RL, DSOs may operate the electrolysor exclusively to grid supportive purposes and even this case is only allowed if the tendering option fails and flexibility procurement according to §120 fails

Operating strategy		Procurement option: Deployment 1 – Approval	Procurement option: Deployment 2 – Negative Tender	Procurement option: Procurement – Awarding to market player
		Serves exclusively secure network operation No system balancing or congestion management (Dis-) charging times significantly below market intervall	Serves secure network operation No (sale) of electricity on markets	More cost-efficient than grid expansion Improve operational efficiency Avoid delays in grid expansion
1a	**Operated exclusively by the DSO**, grid supportive only	✘ Not possible	✓ Possible	
1b	**Operated exclusively by the DSO**, grid supportive and market based	✘ Not possible	✘ Not possible	
2	**Operated by DSO and market player**, grid supportive / market based	✘ Not possible	✘ Not possible	
3	**Operated by a market player**, grid supportive and market based	✘ Not possible	✘ Not possible	✓ Possible

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CONCLUSIONS

LIMITATIONS IN ELWOG AND ELWG DRAFT

Ownership and operation of DSO according to **ElWOG**

- In case of FINC-definition probably feasible
- Probably feasible after negative tendering process
- In both cases, electrolysor is only allowed to operate in a grid-supportive way

Ownership and operation of DSO according to **ElWG-Entwurf**

- Only option for DSO-ownership is the failure of a tendering process
- Definition of FINC is strict (dis- charging times below market intervall)
- In both cases, electrolysor is only allowed to operate in a grid-supportive way

SIGNIFICANCE

- Ownership and operation of electrolysors by DSOs is limited to very specific cases
- More exemptions are defined in the ELWOG than in the ElWG
- If the criteria of market-intervall is dropped, ownership could become feasible

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