

Regulatory Framework hybrid-VPP4DSO

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Tara Esterl

Manuel Froschauer, Johanna Spreitzhofer, Werner Friedl

AIT Austrian Institute of Technology

Agenda

- **How does the regulatory framework look like for the analysed use cases?**
- **What are possible remuneration schemes for grid-oriented use cases?**
- **(How) can a hybrid-VPP be implemented in the current regulatory framework (coordination models)?**

Regulatory framework of Use Cases

Overview about the use cases

■ Market (VPP) driven use cases

(1a) Participation in Flexibility markets

(1b) Participation in Flexibility markets considering restrictions from distr. grid

(1c) Optimization of demand profiles to minimize costs of supply from energy only-markets (intraday, day ahead ...)

2a

2b

Customer driven use cases

(2a) Minimization of grid connection costs for new generators

(2b) Minimization of grid connection costs for new consumers

3a

3c

Grid (DSO) driven use cases

(3a) Optimization of grid investments of DSO

(3c) Support of DSO during maintenance and special switching states under a quality regulation scheme

2a Use Cases – Minimization of grid connection costs of 2b new producers

- General connection requirement of the DSO (in Austria § 5(1)Z2 ElWOG)
- Detailed regulation for grid connection is defined in connection guideline from grid operator:
 - Connection at technically feasible point (reasonable for DSO)
 - Economic interests from grid user have to be considered
 - User has no legal entitlement for most economical grid connection point
- According to TOR D4 (Austrian grid connection code: parallel operation of producers with distribution grid) it is possible to implement a production management (active power management based on frequency/reactive power/operation based).

3a Use Cases – Optimization of grid investment

- DSO has to build and preserve grid infrastructure (§ 5(1)Z3 ElWOG)
 - § 45 Z22: DSO shall use demand and supply side management from decentralized units to reduce grid enhancement costs.
- DSO can use hybrid-VPP to reduce grid enhancement costs.
- DSO has to create cost-benefit analysis to show economic benefits in comparison to grid investment.

3c

Use Cases – Support of DSO during maintenance and special switching states under a quality regulation scheme

- According to 21 (1) EIWOG can grid connection refused without compensation in case of:
 - Exceptional grid conditions;
 - Lack of network capacities;
- In the Regulation System for the “Third Regulation Period of the Power Distribution Network Operators” in Austria, there are still no quality elements according to § 59 (1) in conjunction with § 19 EIWOG

Conclusion: How does the regulatory framework for these use cases look like?

- Minimization of grid connection costs:
General connection requirement
Benefit for network users possible but no legal claim

- Optimization of grid investment costs:
Sufficient network infrastructure
Existing benefits of a hybrid-VPP

- Maintenance and special switching states:
exceptional grid state
No real incentive for hybrid-VPP



2a
2b

Use Cases – Minimierung der Netzanschlusskosten

- Allgemeine Anschlusspflicht für DSO (§5(1)Z2 EIWOG)
- Detaillierte Regelungen für den Netzanschluss ergeben sich aus den ABs:
 - Anschluss am technisch geeigneten Punkt (muss für DSO zumutbar sein)
 - Wirtschaftliche Interessen des Nutzer sind zu berücksichtigen
 - Keine Rechtsanspruch auf für Netzkunden wirtschaftlich günstigsten Anschlusspunkt
- Gemäß TOR D4 kann im Rahmen der Anschlussbeurteilung im Netzzugangsvertrag ein Erzeugungsmanagement (Wirkleistungsanpassung) vereinbart werden (Frequenz-/Spannungsgesteuert/Betriebsbedingt)



3a

Use Cases – Optimierung der Netzausbaukosten

- Errichtung und Erhaltung ausreichender Netzinfrastruktur (§5(1)Z3 EIWOG)
 - §45 Z22: Berücksichtigung von Nachfragesteuerung und dezentralen Erzeugungsanlagen durch die sich Nachrüstung erübrigen könnte.
- Der DSO kann also ein Hybrid-VPP nutzen um Netzausbau zu substituieren
- In einer Investitionsrechnung wird er die Möglichkeiten ökonomisch bewerten.

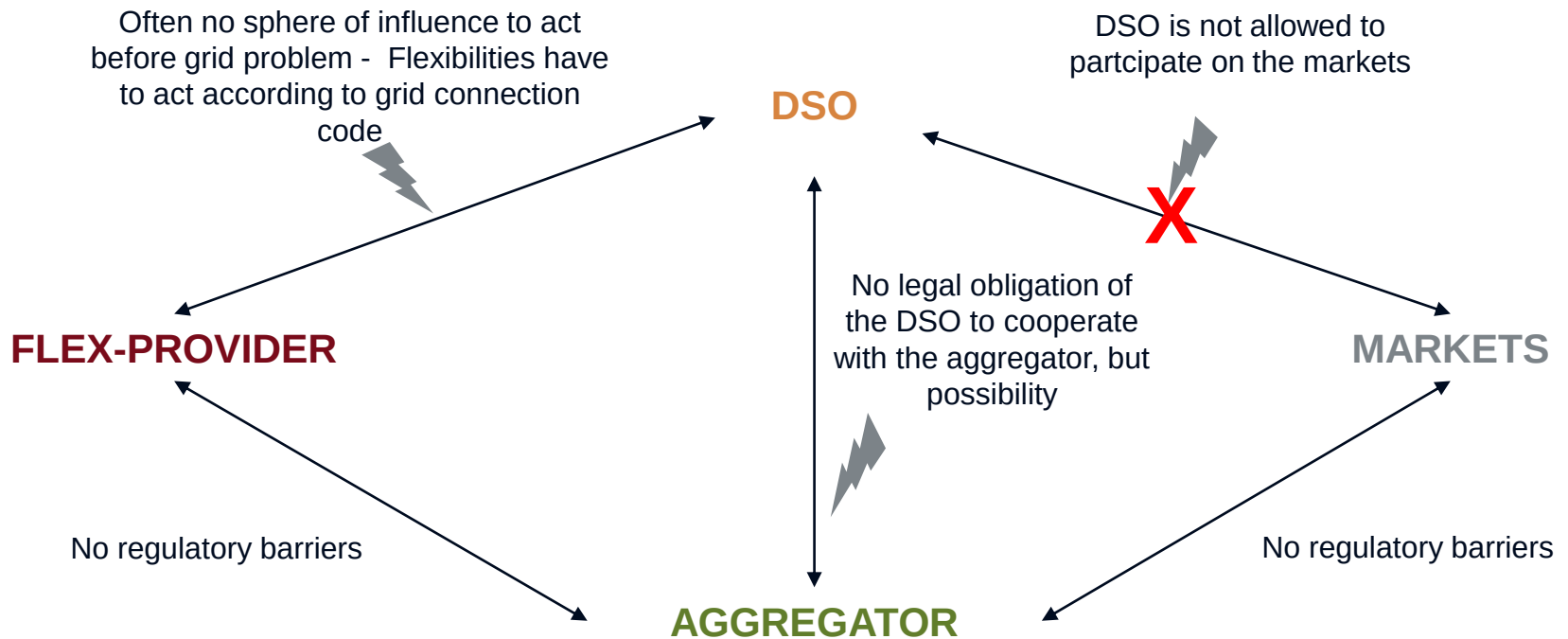


3b
3c

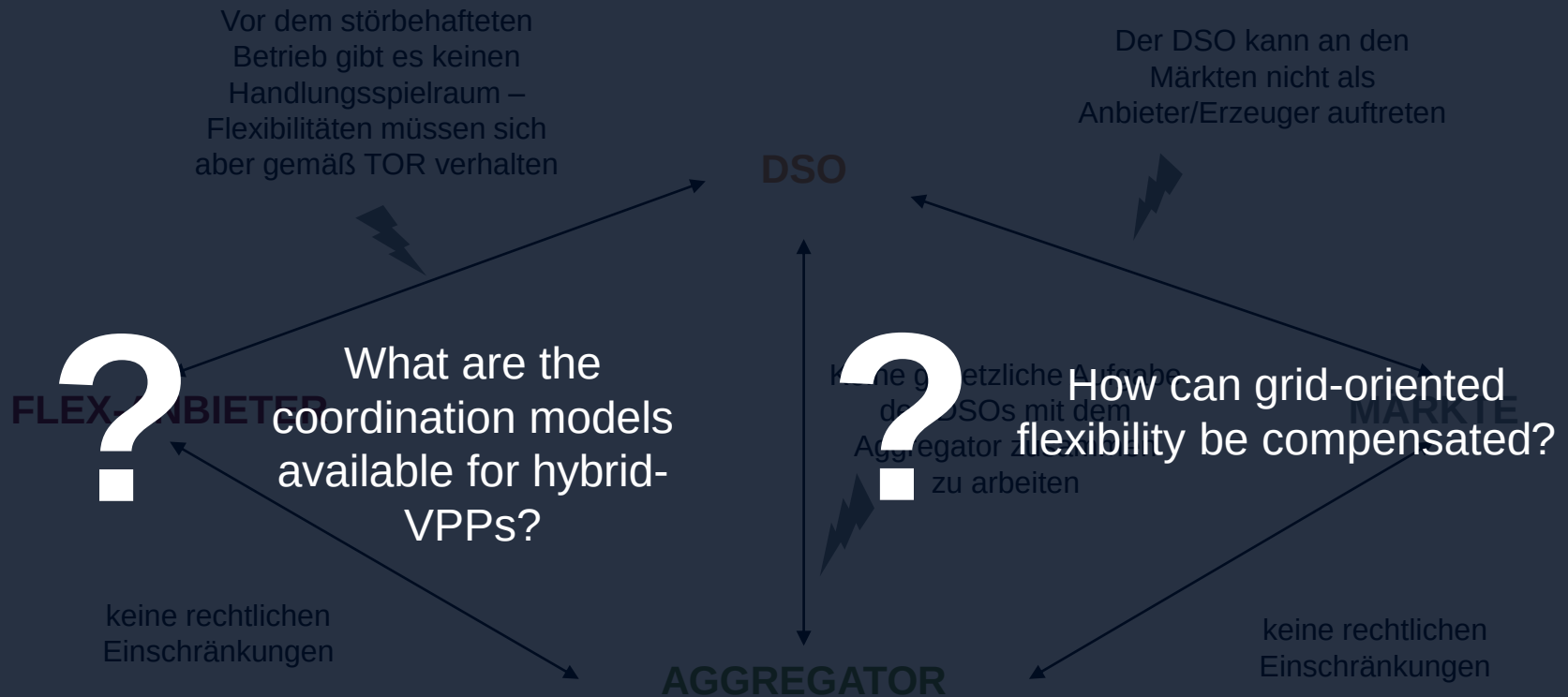
Use Cases – Unterstützung des Netzbetriebs bei Wartung und Sonderschaltung

- Nach §21 (1) EIWOG kann der Netzzugang schadensersatzlos verweigert werden bei:
 - Außergewöhnlichen Netzzuständen;
 - Mangelnden Netzkapazitäten;
- In der „Regulierungssystematik für die dritte Regulierungsperiode der Stromverteilernetzbetreiber“ finden sich noch keine Qualitätselemente gemäß §59 (1) iVm §19 EIWOG

hybrid-VPP – regulatory limitations



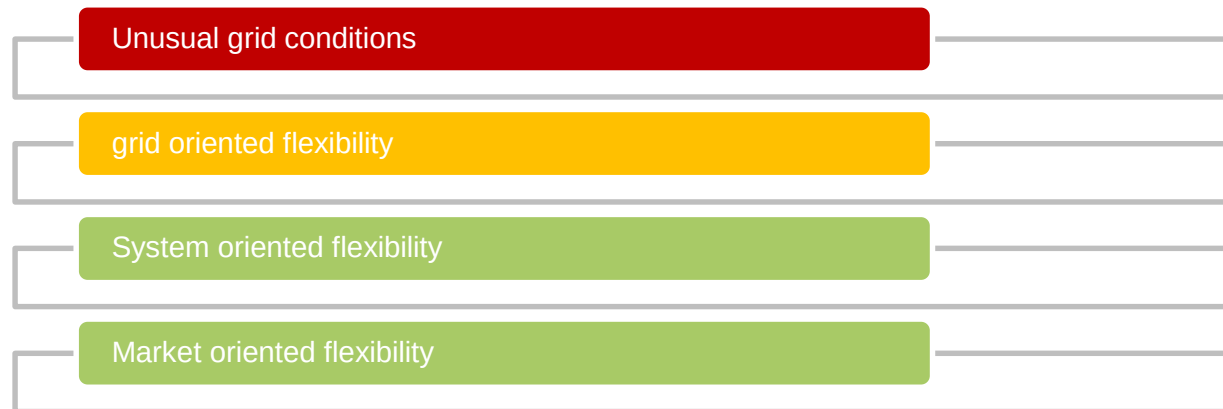
Hybrid-VPP – regulatory limitations



Compensation of grid-oriented flexibility

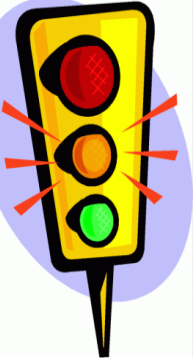
Traffic light concept - general

- Green: market phase. No critical grid conditions.
- Yellow (compensated): potential shortage. DSO procures grid-oriented flexibility. The remaining flexibilities stays on the market.
- Red (not compensated): actual shortage. DSO switches directly.



- in case of unusual distribution-grid conditions (red), DSO usage of flexibility has priority.
- BUT in case of unusual transmission-grid conditions (red), it is not 100% clear if DSO or TSO usage of flexibility has priority.

Traffic light system - legal implementation in DE

<i>Producer - DE</i>		Regulation	Compensation
 Grid oriented flexibility		- Red Phase: §13(2) EnWG	No compensation
		- Yellow and red Phase EEG-funded producers: §15(1) EEG iVm §13(4) und §13(2) EnWG	„Härtefallregelung“: 95% compensation up to 1% of yearly revenues - afterwards 100% compensation
		- Yellow (Forced-)Phase: §13(1a) EnWG	Appropriate (cost) compensation
		- Yellow (Market-)Phase: §13(1) EnWG	Contractual compensation
<i>Consumer - DE</i>		Regulation	Compensation
Grid oriented flexibility		- Red Phase: §13(2) EnWG	No compensation
		- Yellow Phase TSO: §13(4a) EnWG iVm AbLaV	Compensation according to auction prices
		- Yellow Phase DSO: §14a EnWG	Reduced grid payments

Traffic light system - legal implementation in AT



<i>Producer - AT</i>		Regulation	Compensation
 Grid oriented flexibility	- Red Phase: §21(1) ElWOG	No compensation	
	- Yellow Phase TSO: §23(2)Z5 or §23(9) iVm §66(1)Z7 ElWOG	Compensation for damages (economical disadvantage and costs).	
	- Yellow Phase DSO: no regulation	----	
<i>Consumer - AT</i>		Regulation	Compensation
Grid oriented flexibility	- Red Phase: §21(1) ElWOG	No compensation	
	- Yellow Phase: no regulation, but possible application interruptible grid tariffs (§3 Z7 SNE)	Reduced grid payments	

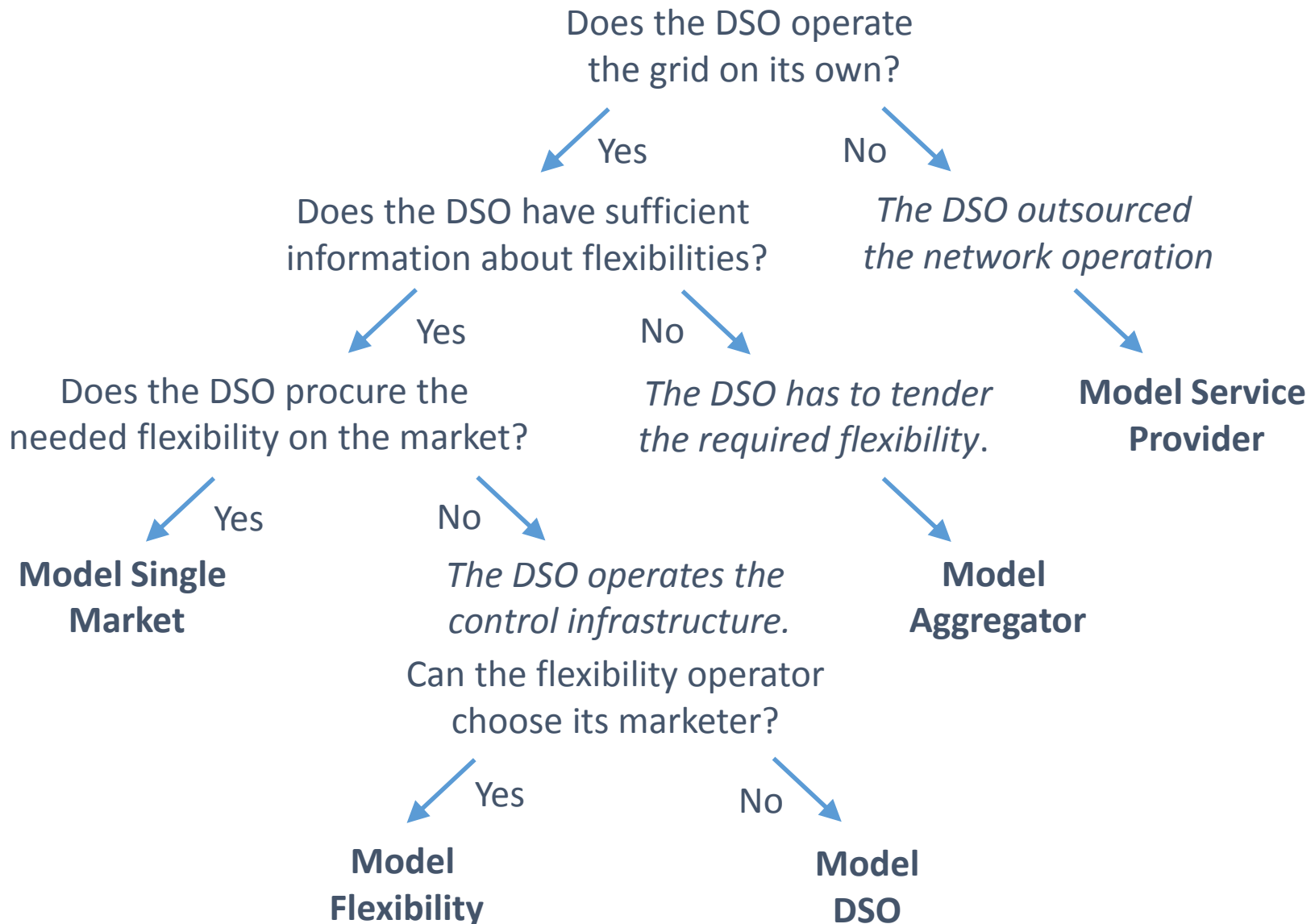
Grid oriented production management is implemented in grid code.

Traffic light system legal implementation in SI

<i>Producers & consumers SI</i>	Regulation	Compensation
Grid oriented flexibility	- Red phase: Artikel 146 (1) and Artikel 146 (5) EZ	No compensation – system stability is more important than individual interests.
	- Yellow phase not defined	No compensation

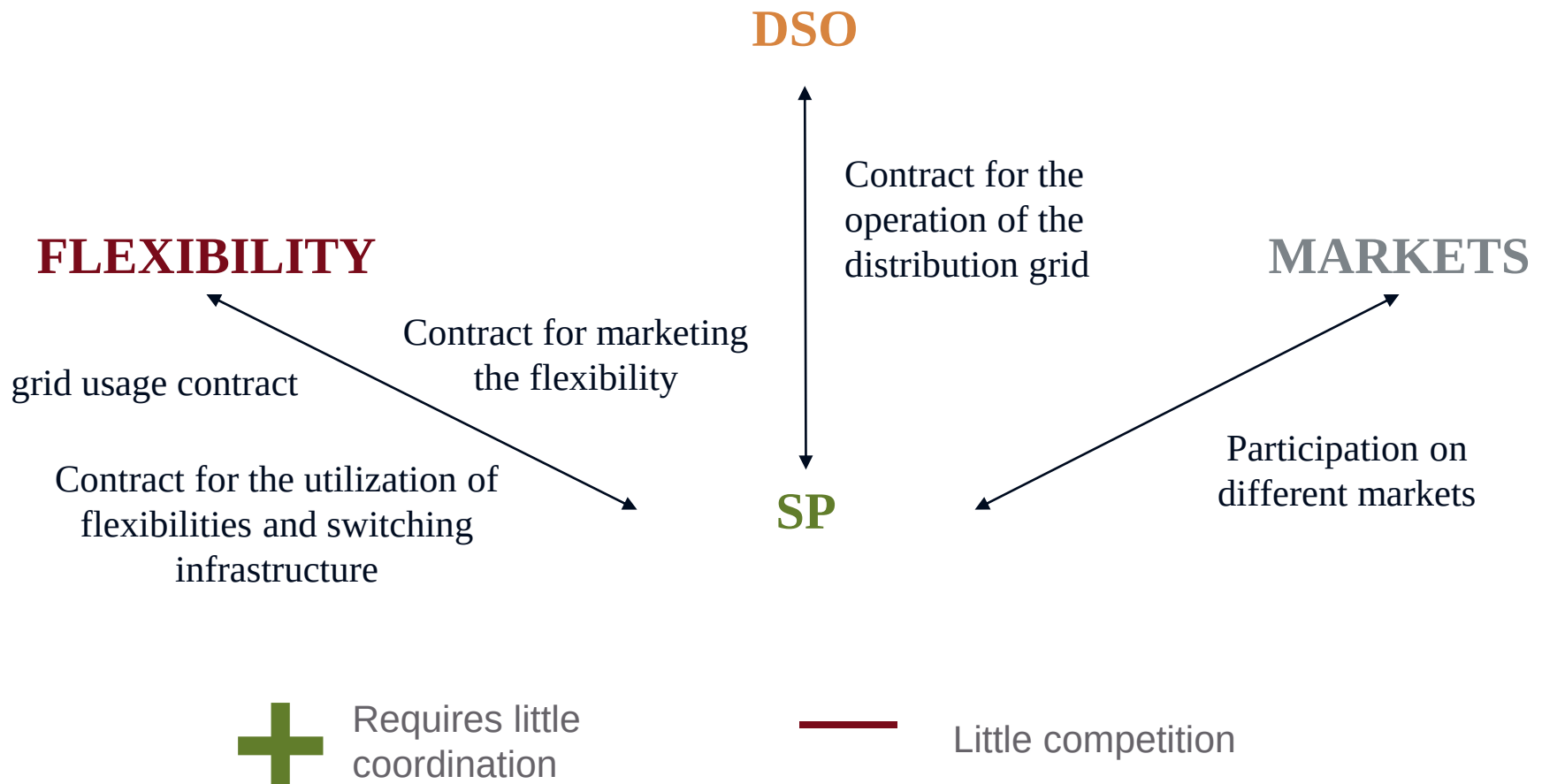
Coordination schemes of hybrid-VPP

Coordination schemes



hybrid-VPP Model Service Provider (SP)

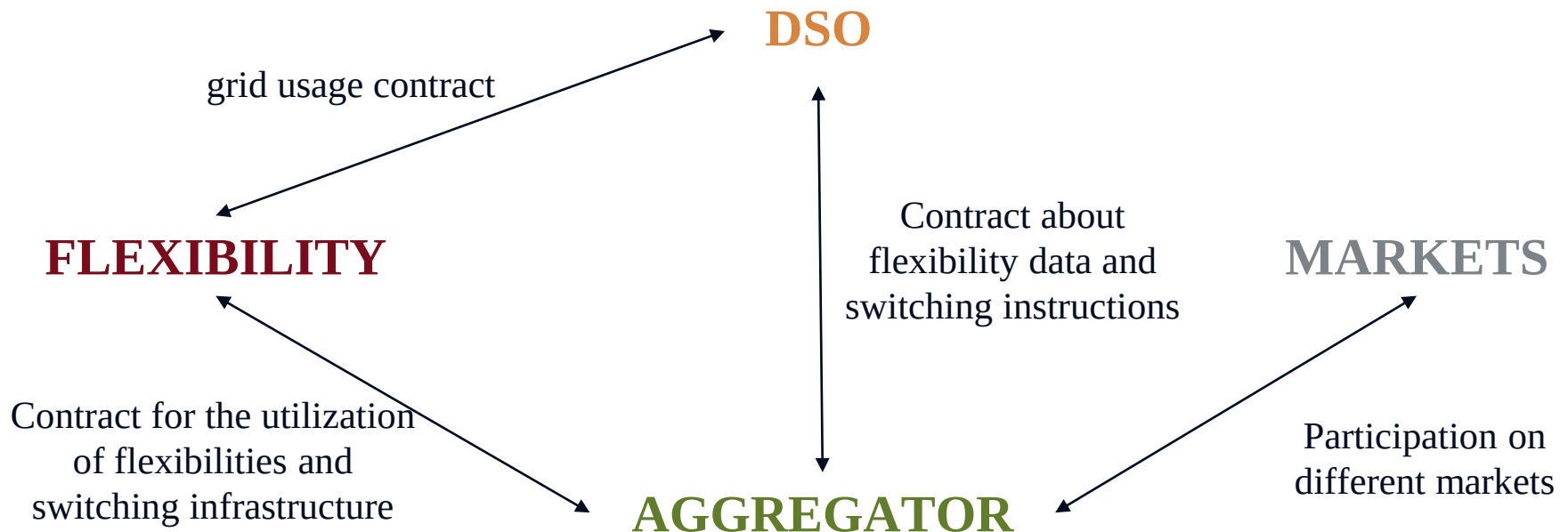
One party takes over all roles in the operation of a Hybrid-VPP



hybrid-VPP Model Aggregator

DSO is only communicating the grid conditions.

Aggregators run the switching infrastructure and are responsible for the dispatch of the flexibilities.

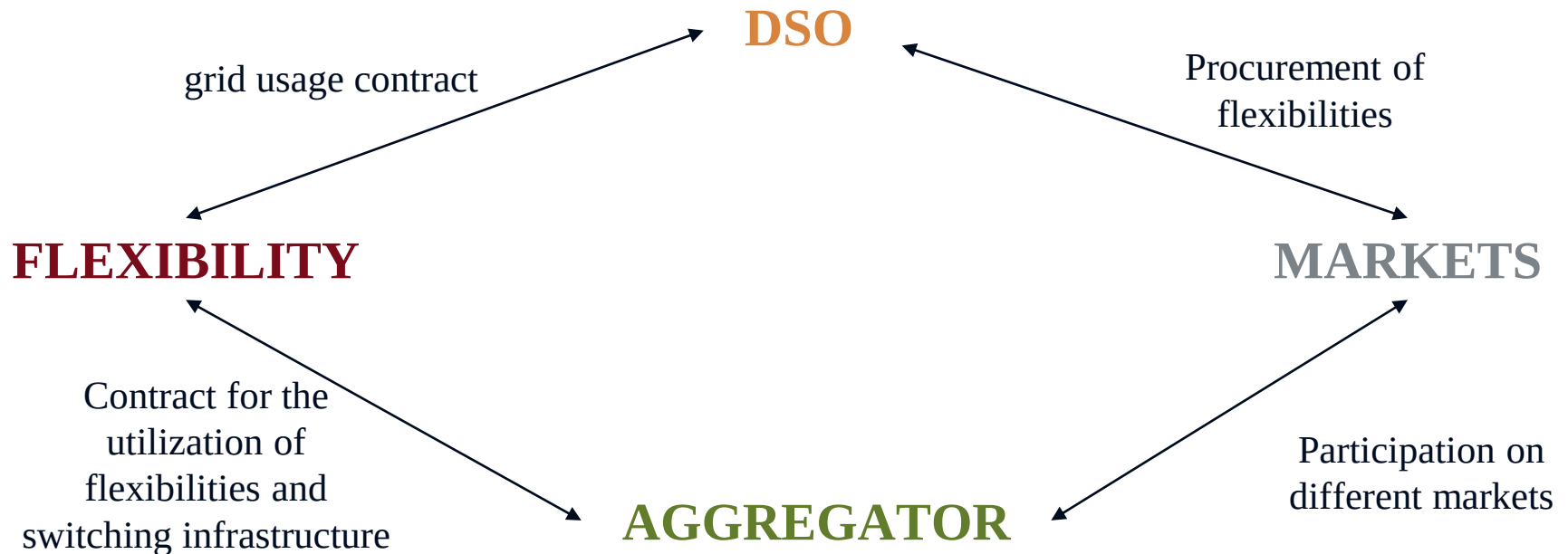


 competition

 DSO has to rely on third party for grid operation

hybrid-VPP Model Single Market

DSO procures the required flexibility on a Single Market for Flexibility



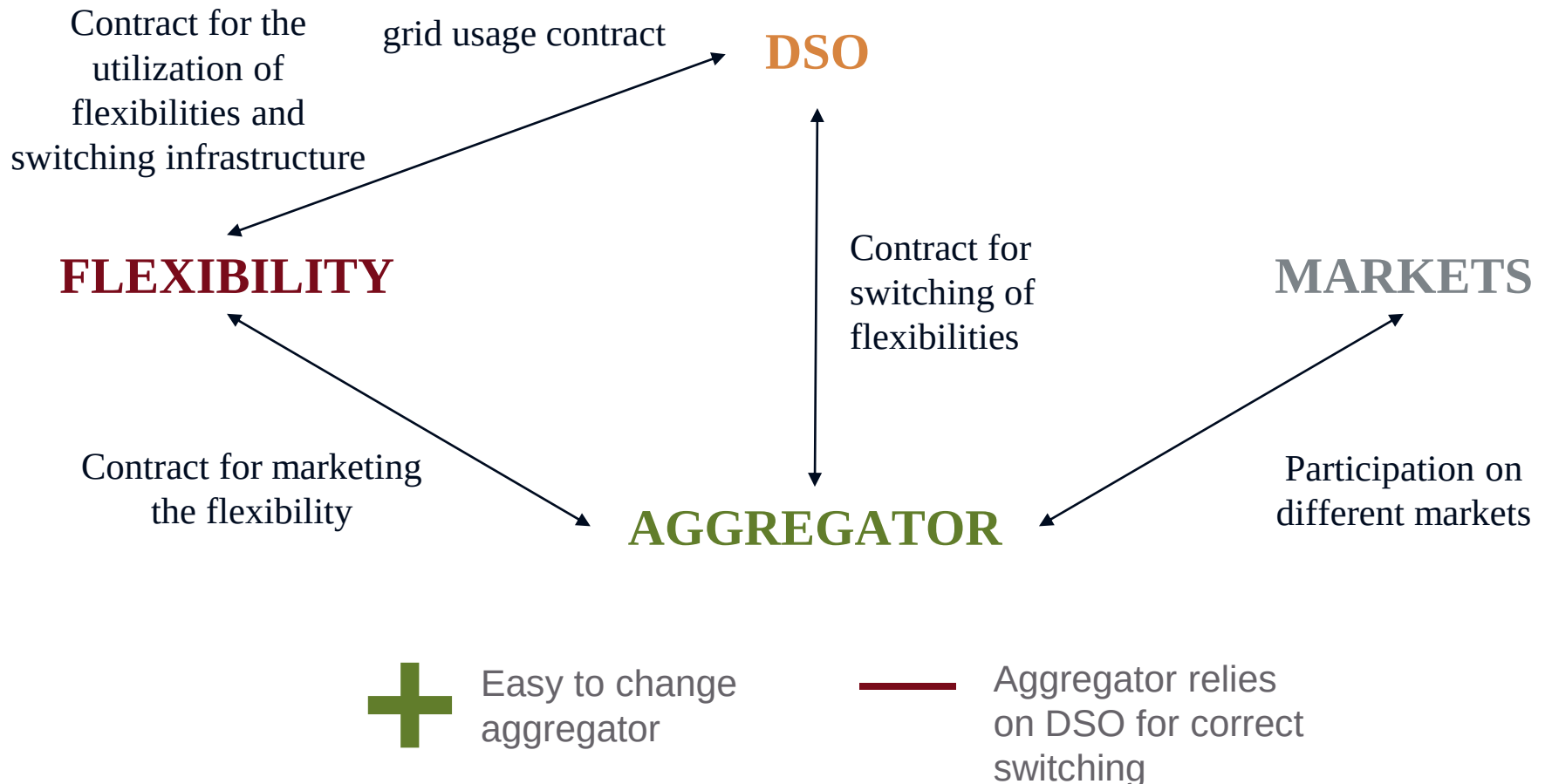
Single Market
for Flexibility



Risky for DSO

hybrid-VPP Model Flexibility

DSO runs switching infrastructure. Flexibility chooses its marketer.



hybrid-VPP Model DSO

DSO operates switching infrastructure. DSO aggregates and selects aggregator



Conclusio coordination schemes

- (How) can a hybrid-VPP be implemented in the current regulatory framework (coordination schemes)?

Model **SP**: One party takes over all roles in the operation of a hybrid-VPP.

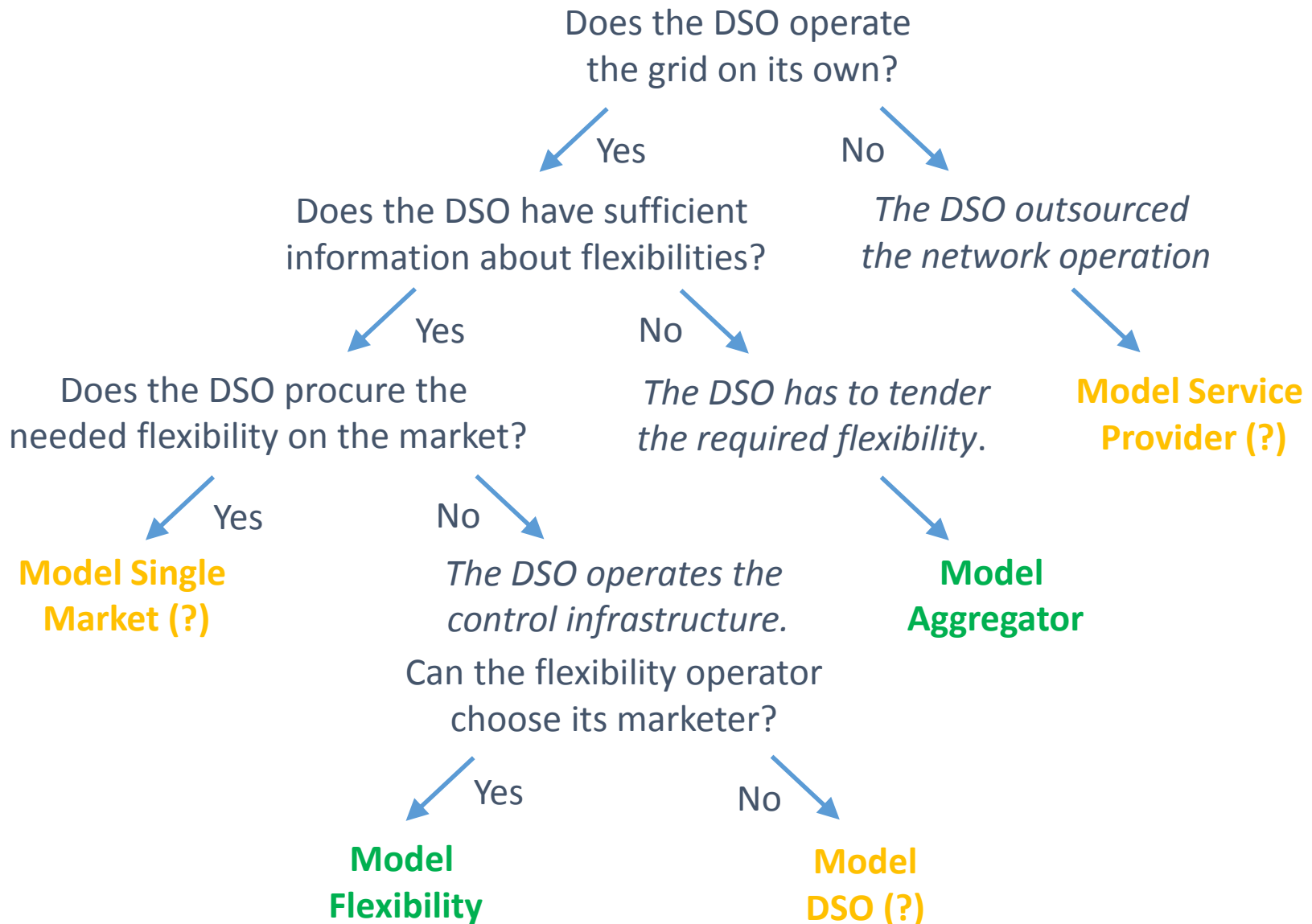
- Model **Aggregator**: DSO communicates grid state. AGG is responsible for dispatch.
- Model **Single Market**: DSO procures the required flexibility on a Single Market.
- Model **Flexibility**: DSO runs switching infrastructure. Flexibility chooses its marketer.

Model **DSO**: DSO operates switching infrastructure. DSO aggregates and selects the aggregator.

 Little need for coordination	 Little competition
Competition	DSO has to rely on third party for grid operation
Single Market for Flexibility	Risky for DSO
Easy to change aggregator	Aggregator relies on DSO for correct switching
Simple configuration; Aggregator focuses on core business	Aggregator is reduced to marketer role

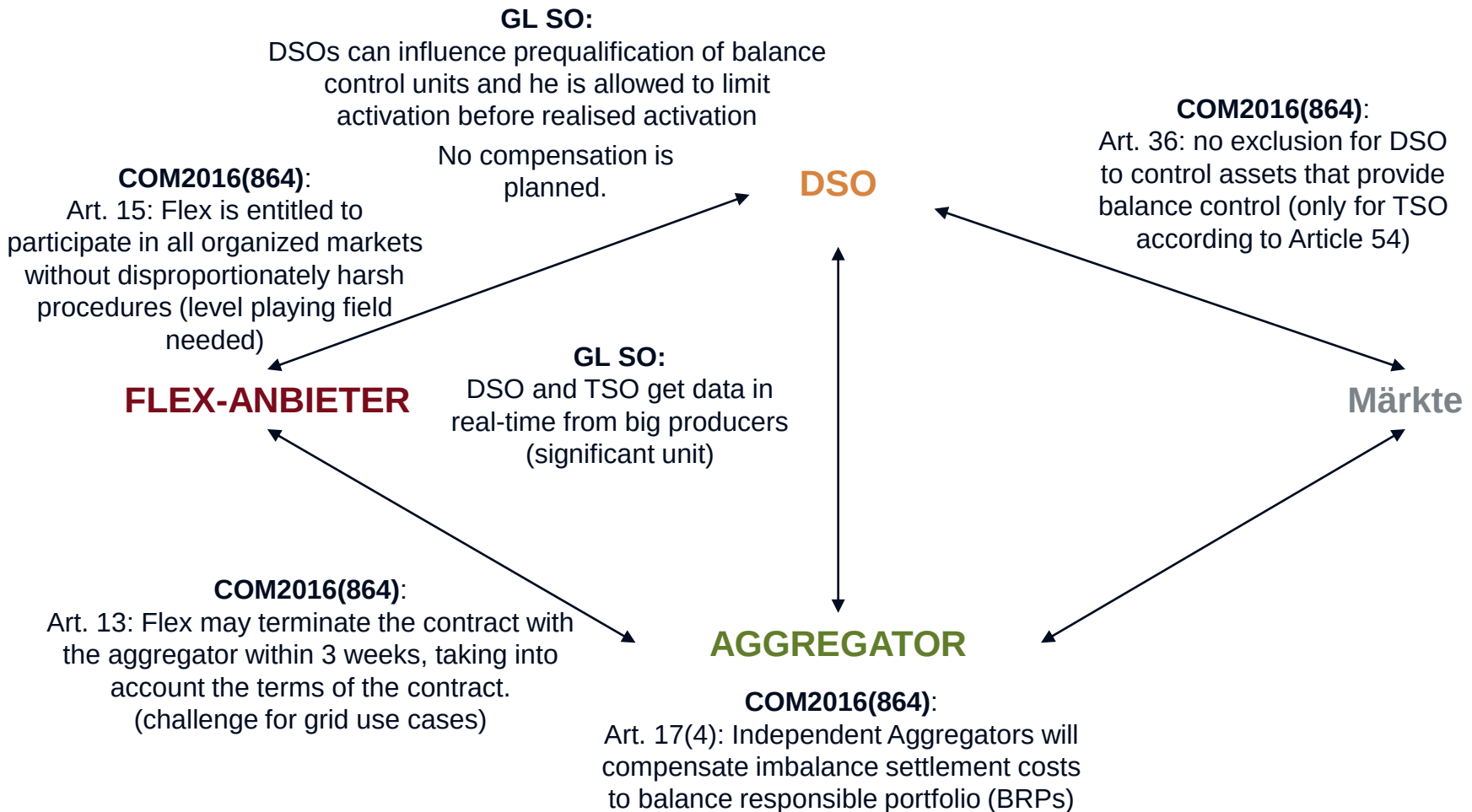
Shift of competence

Coordination schemes



Outlook

Outlook



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