

gen-i



PAMETNA ENERGIJA

Unlocking the aggregation in regional markets

Practical experience & best practice (aggregator's perspective)

dr.Rok Lacko, GEN-I

Head of Energy Services Development

Agenda

- About GEN-I
- Business model of the aggregation
- Main regulatory/social barriers
- Best practices

The GEN-I Group

Success based on Strategy, Innovation and Long-Term Vision

LEADING WHOLESALE ENERGY TRADER IN SEE FOR OVER A DECADE

- Operating in over 22 countries
- Present on 21 regional energy exchanges
- Further immersing into established Western energy markets

PREDOMINATING ENERGY SUPPLIER IN SLOVENIA

- Disruptor turned into a leading household supplier
- Leading end-customer market share on Slovenian electricity market
- Second largest end-customer market share on Slovenian natural gas market

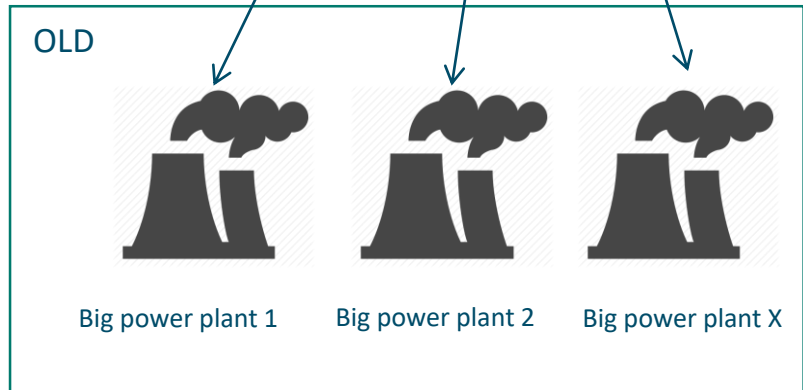
FRONTRUNNER IN ADVANCED ENERGY SERVICES

- Leader in digitalization and green technologies
- Largest self-supply (PV) solution provider in Slovenia (>30%)
- Comprehensive virtual power plant operator in Slovenia

GEN-I is an aggregator of demand response and distributed generation in Slovenia and Austria (business model)



Lesson #1
Flex can be monetised on different markets – enable harmonisation and access to flex markets and products



Anbieter	PRL	SRL	TRL
		x	x
Energie AG Obersteiermark Kraftwerke GmbH	x	x	
EVN AG	x	x	x
GEN-I Vienna GmbH		X	X
Lechwerke AG		x	x
Linz Strom GmbH			x
ÖBB-Infrastruktur AG		x	x
TIMAG-Traier Wasserkraft AG	x	x	x
Salzburg AG für Energie, Verkehr und Telekommunikation	x	x	x
VERBUND Energy4Business GmbH	x	x	x
VERBUND Energy4Flex GmbH	x	x	x
Stwerke vkw AG		x	x
Wien Energie GmbH		x	x

<https://markt.apg.at/netz/netzregelung/>

Best practice example



Lesson #1

Flex can be monetised on different markets – enable harmonisation and access to flex markets and products

- Short term products (e.g. daily product with six 4-hour blocks)
- Frequent auctions organised (e.g. daily, weekly clearing)
- Sequential GOT and GCT (e.g. FCV 09:00, aFRR 10:00, mFRR 11:00...)
- Automised bidding supported
- Small minimum bids sizes accepted (low entry barrier) (e.g. 1-3 MW)
- Low bid resolution (e.g. 1 MW)
- One common flexibility marketplace for all services and products

Prequalified GEN-I pool size and sold quantity

4 countries

125 DR/DG units

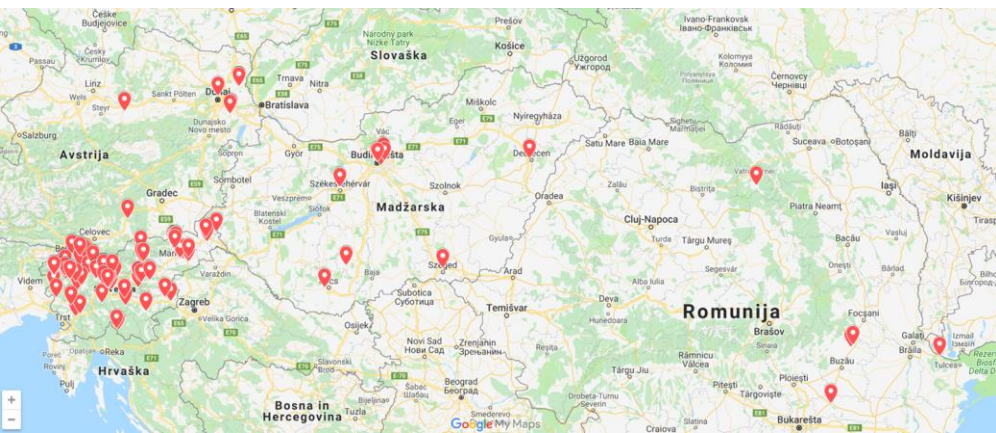
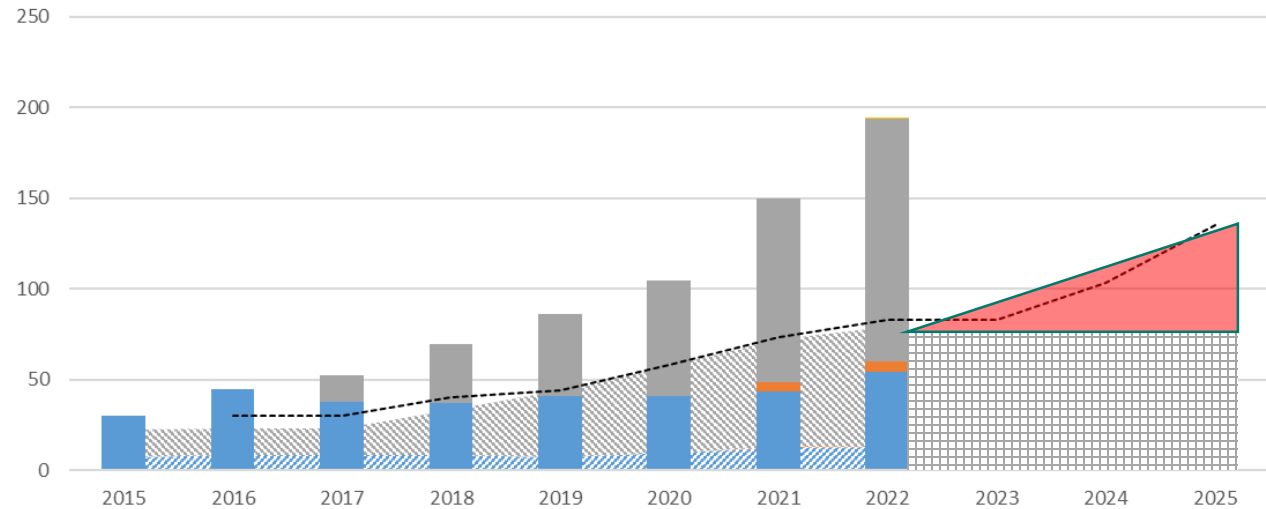
190 MW flex

Various DR/DG technologies

99% automated

Response time 2-15 min

GEN-I's prequalified and sold capacity (MW)



Lesson #2

It takes time to bring new reserve capacity to market – create stimulating and predictable market conditions, then let market to respond

Best practice example



Razpisna dokumentacija

za nakup električne energije, potrebne za izvajanje terciarne regulacije frekvence z vodenjem odjema in razpršene proizvodnje za leto 2015

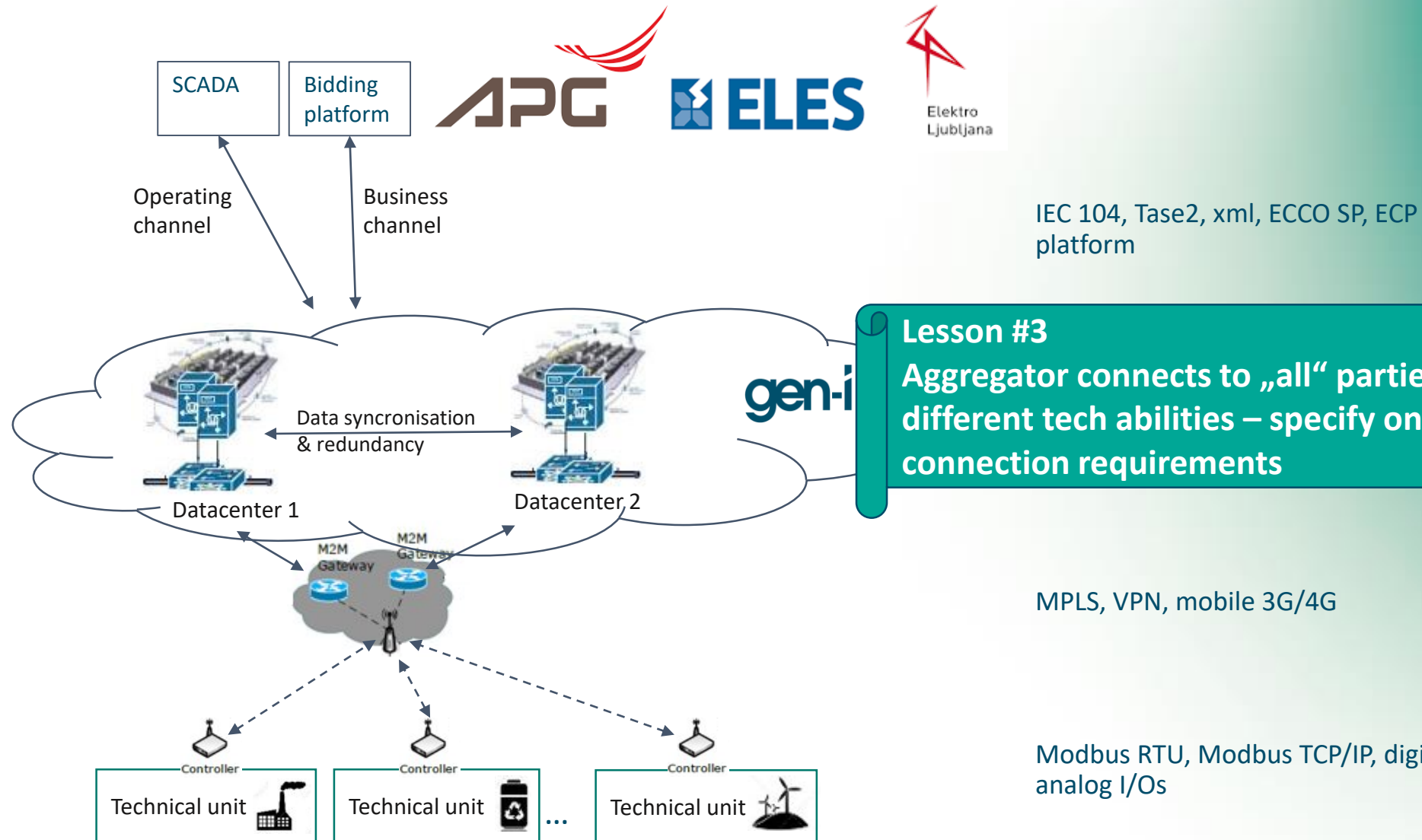
Lesson #2

It takes time to bring new reserve capacity to market – create stimulating and predictable market conditions, then let market to respond

ELES consulted the market and then organised a DSM specific product from 2015-2018 with adapted requirements „*Tender documentation for the purchase of electricity required for the implementation of tertiary frequency regulation with the management of consumption and distributed generation for 2015*“:

- Technical units must be connected to the DSO grid or private grid. Technical units connected to the TSO grid cannot participate. In the portfolio there has to be at least one unit which performs regulation through reduction of load.
- Product: 15 min response time, 2h length of activation, up to 2 activations per day, max 10h unit unavailability after activation

Virtual power plant architecture (real time 24/7 unit control)



Best practice example



Lesson #3

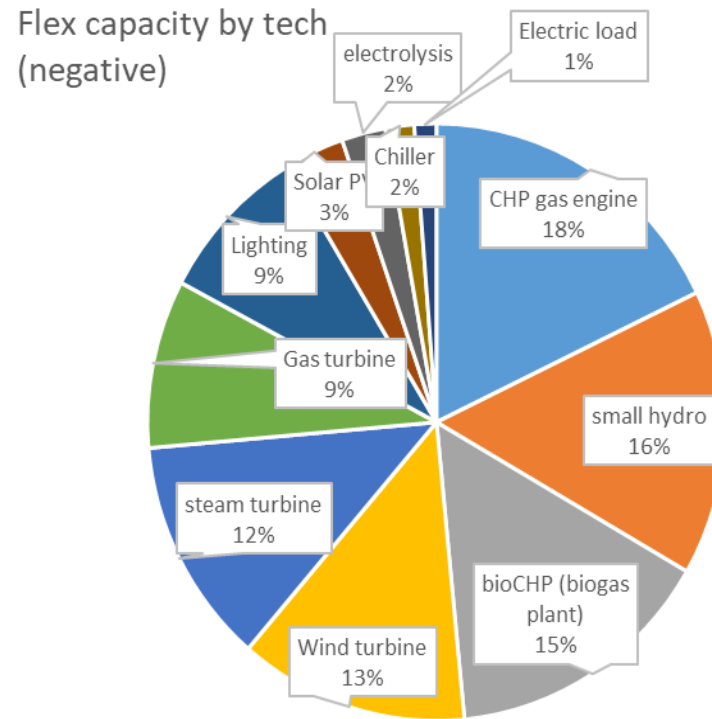
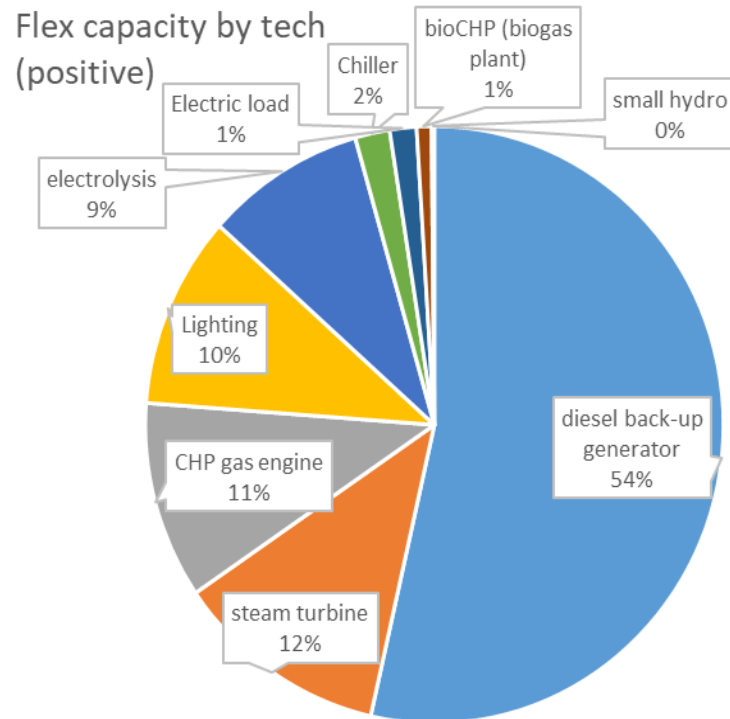
Aggregator connects to „all“ parties which have different tech abilities – specify only loose ICT connection requirements

- Physical location of the FSP control center is not specified, as long as communication is held in local language
- Official smart meter measurements from DSO or TSO as well as private meter-behind-meter data are accepted (varying meter accuracy is 2% <50 kW, 1% 50-999 kW, 0,5% 1 MW+)
- Aggregators provide live telemetry data on the pool level to TSO (archive data for each individual units available upon request up to 6 months)
- Energy meters data with a time interval of at least one (1) minute are required
- Unit control system is not specified. Aggregator sends his VPP system concept description.
- Operating channel to TSO available in two versions (Tase2 or IEC104)

GEN-I DR/DG pool structure

Lesson #4

Multiple technologies can provide flexibility – do not discriminate any



66% of reserve capacity in GEN-I's pool is not in our balance group (we are not supplier)

Best practice example

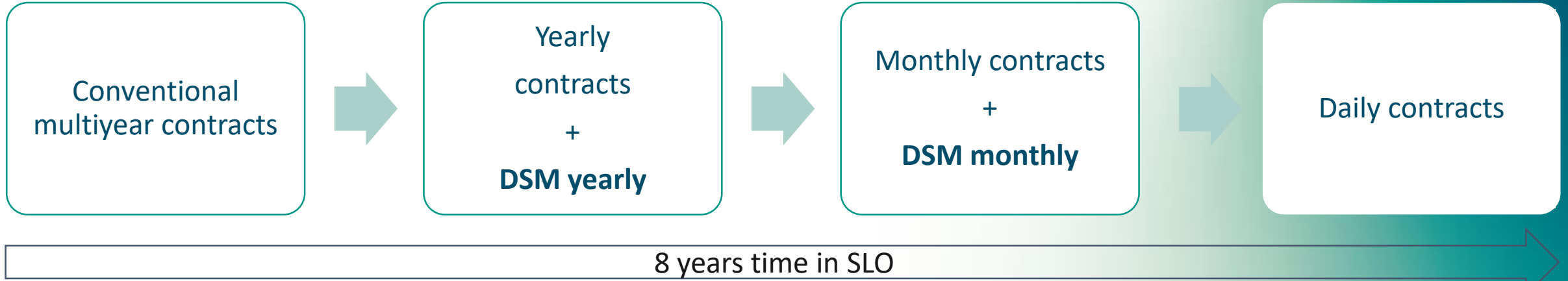


Lesson #4

Multiple technologies can provide flexibility – do not discriminate any

- Aggregation (of demand response and distributed generation) should be allowed
- Small load and generators should be allowed to participate (even household sized if aggregated)
- Units connected to DSO grid should be able to participate
- Generation units that receive feed-in tariffs or other generation subsidies should also be allowed to participate
- Diesel back-up generators (gen-sets) should be allowed grid parallel (synchronous) operation

Aggregation (mFRR) market evolution in Slovenia



Lesson #5

Longer the product duration:

- more predictability
- less risk for aggregator and TSO
- less reserve capacity for TSO
- higher prices

Lesson #5

Shorter the product duration:

- less predictability
- more risk for aggregator and TSO
- more reserve capacity for TSO
- lower prices

Best practice example



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Lesson #5

Shorter the product duration:

- less predictability
- more risk for aggregator and TSO
- more reserve capacity for TSO
- lower prices

SIMPLE INITIAL PHASE

1. Tender for yearly (and monthly) special product aimed at aggregators
2. Unit friendly product requirements, that enable aggregators to introduce ancillary services to new clients
3. Manual activations and reporting, that enable lower market entry costs for aggregators



TRANSITION

1. Tender for monthly products aimed at aggregators
2. Same product requirements as for other market participants
3. Manual activations and reporting, option of automated communication for advanced aggregators



FINAL PHASE

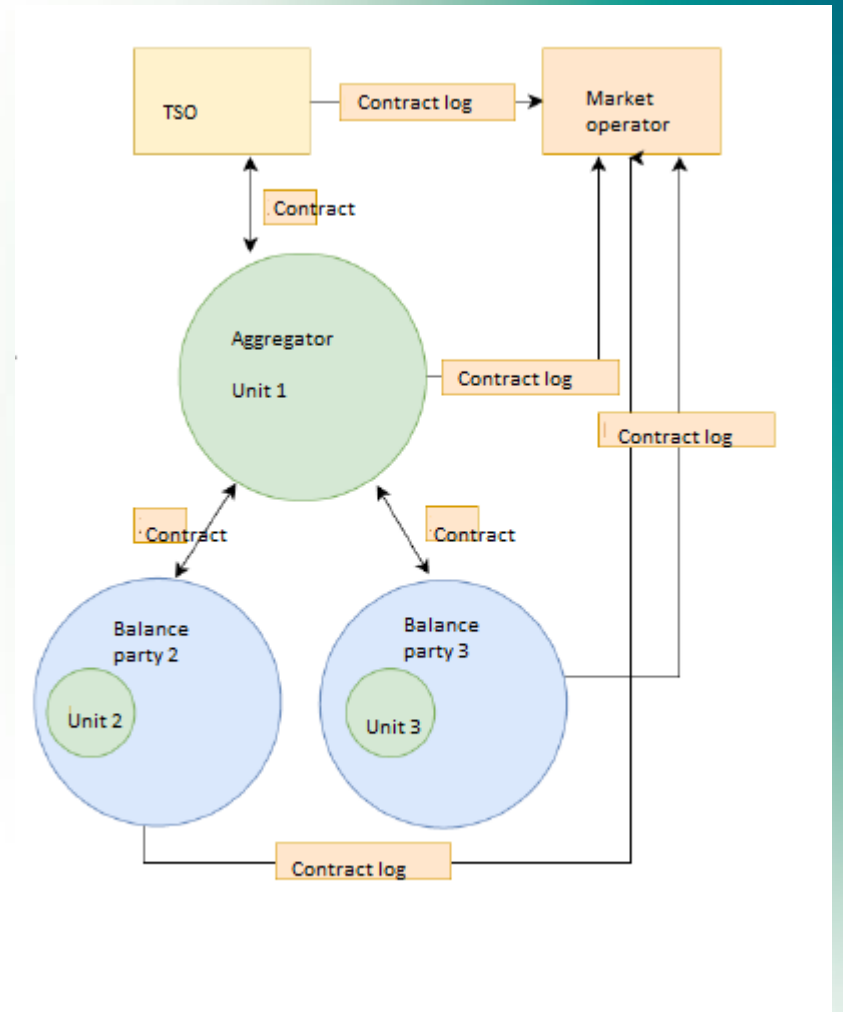
1. Everyone competing on the same market (daily)
2. Same product requirements as for other market participants
3. Fully automated activations and reporting for all aggregators

Other important DR market enablers

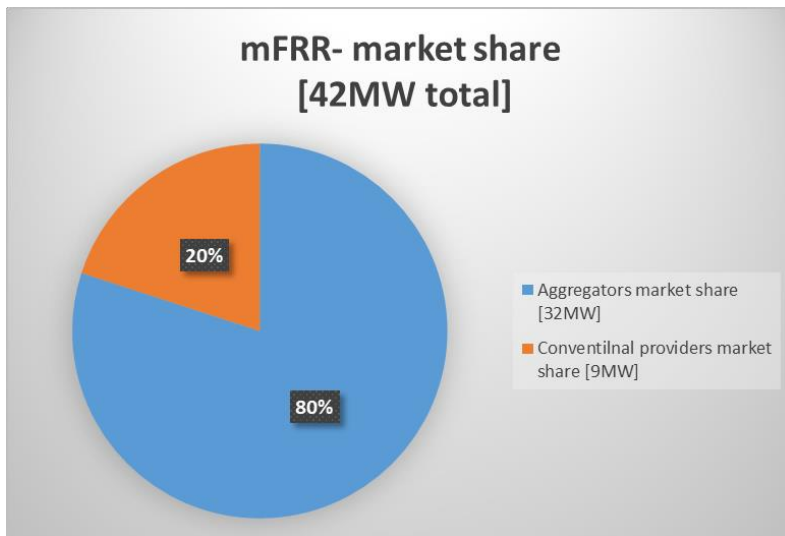
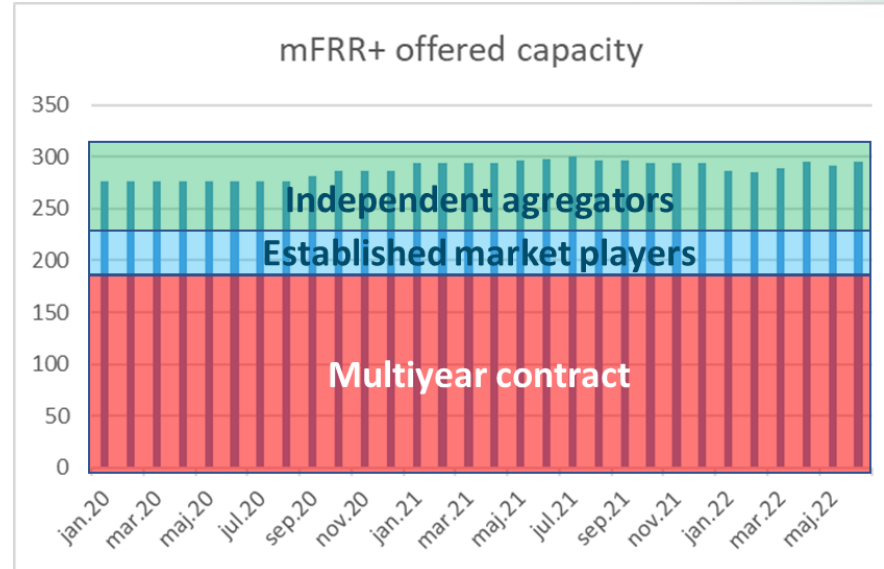
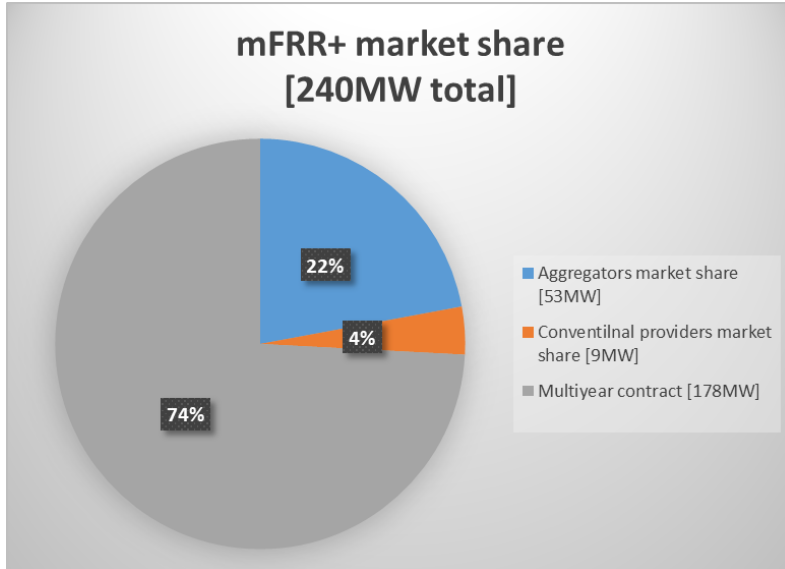
- Resources from other balance groups allowed
- Symmetric bid: not required
- Baseline: intraday shortterm corrections allowed (no day ahead „market“ schedules be used for baseline)
- Baseline methodology: use as proposed by aggregator
- A portfolio based prequalification procedure (don't set strict requirements per unit)
- Aggregator can be any legal entity that is a member of a balancing group
- „Independent aggregator“ which means a market participant engaged in aggregation who is not affiliated to the customer's supplier. Does not need any permission from or contract with supplier.
- Activated regulation energy is taken into account for the imbalances (added to the ex-post schedule correction)
- DSOs do not charge peak tariff fee for the part contributed by the activation energy

HOT TIP: Imbalance settlement

- After activation the activated energy is attributed from TSO (marked yellow) to the aggregator (marked green) in form of closed contract
- The aggregator then exchanges data about activated energy with other balance group operators (blue) in form of closed contracts
- They all record activated energy originating from their own balance group at the market operator (orange) for the ex-post schedule correction



Market share of demand response products in SLO



Conclusions

- Aggregators can provide a competitive addition to existing large providers of ancillary services
- It is important that the initial entry bar is not set too high, so that new market players are not repelled
- Markets with high prices and limited supply are the most suitable for introduction of independent aggregators
- More market players eager to compete weakens price pressures from existing monopolies when negotiating for multiyear contract renewals
- Large number of market players successfully drive the market prices down while maintaining the security of (reserve power) supply

Thank you for your attention!

Rok Lacko Ph.D.

Head of Energy Services Development

M: +386 41 279 041

E: rok.lacko@gen-i.si



GEN-I, trgovanje in prodaja električne energije, d.o.o.

Dunajska cesta 119, SI-1000 Ljubljana, Slovenia

T: +386 1 58 96 671; F: +386 1 58 96 429

W: www.gen-i.eu

