



DER Scenario Modeling and Analysis Project

EPRI, Alectra, IESO

Project Background

■ Objective

- As part of the IESO York Region NWA Demonstration project, evaluate feasibility for DERs to provide grid services to an Ontario LDC (e.g. Alectra) ("distribution services") and/or IESO ("wholesale services").

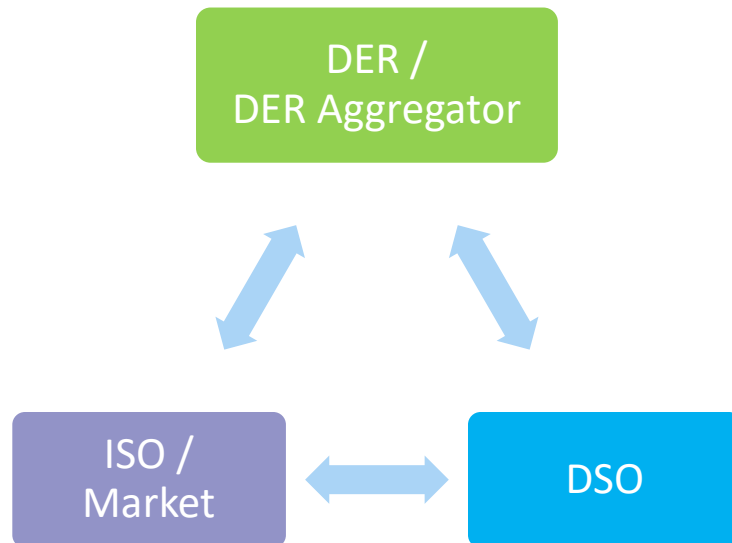
■ Approach

- Examine coordination needed between an Ontario LDC and IESO for various combinations of services (called "scenarios")
- Investigate the distribution impacts via simulations of actual circuits in the York Region

Two Models Considered for IESO-Alectra Coordination

– Model 1: “Total DSO”

- DSO dispatches DERs for distribution needs
- DERs and DERAs provide wholesale services to ISO only via DSO



– Model 2: “Dual Participation”

- DSO dispatches DERs for distribution needs
- DER or DERA directly participates in wholesale market

Definitions of **Grid Services** Considered

■ **Distribution Services (provided to Alectra)**

- Capacity Deferral: power provided to feeder under *planned conditions*; to defer traditional system upgrades
- Reserve: power provided to feeder in *unplanned conditions* - network abnormality

■ **Wholesale Services (provided to IESO)**

- Energy: scheduled power export on day-ahead or real-time basis for bulk system demand relief
- Capacity: committed energy capacity (well in advance) for bulk system upgrade deferrals
- Reserve: same as above, for bulk system needs/contingencies

Five Combinations of Services ("Scenarios") Evaluated

Transmission Energy Dispatch

- Focus on DER participation in wholesale energy market
- No distribution congestion or constraints considered

Distribution Override

- Recognize distribution constraints
- But, no services provided yet by DER

Distribution Import-Congestion (NWA)

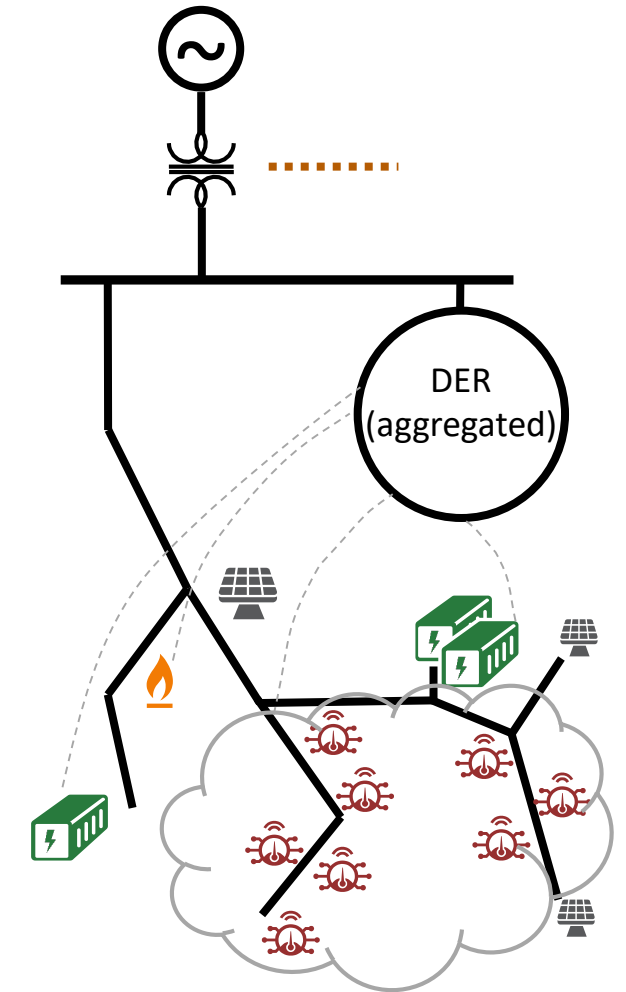
- Observe impact of DER for distribution services
- Consider impact of additional energy for bulk services

Operating Reserves

- DER energy used for contingencies
- Address commitment/priority for distribution vs bulk

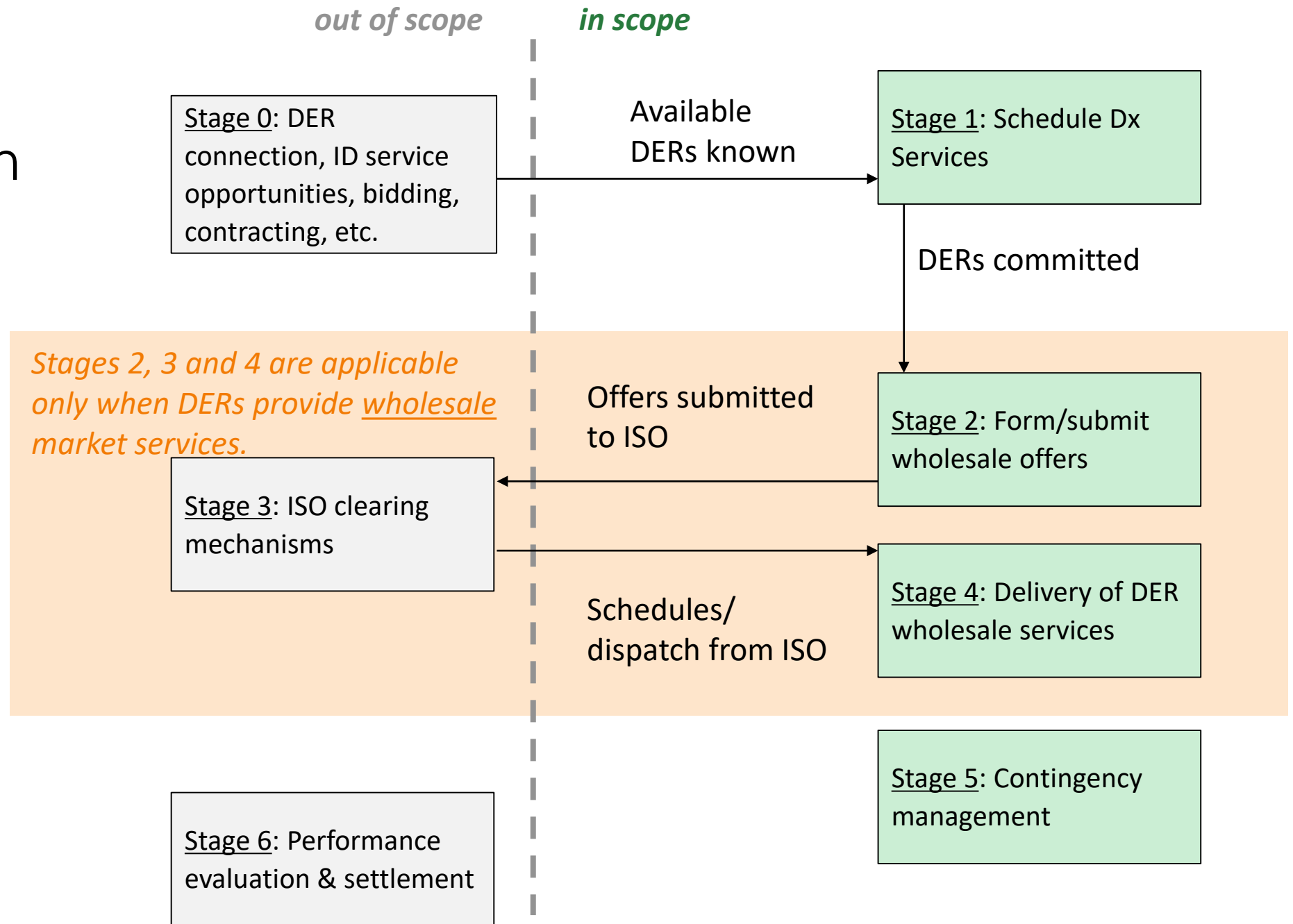
Capacity Service

- DER participating in capacity auction for bulk services
- Coincident capacity relief for distribution constraints



Coordination Stages

(Apply to Each Scenario)



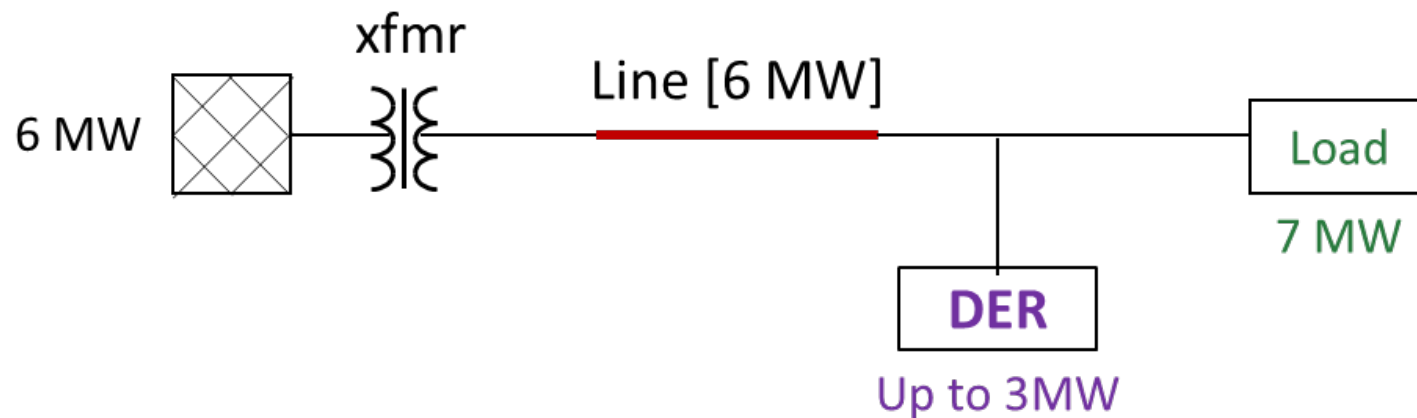


Sample Scenario Process

Scenario 3 – Distribution Import-Congestion/NWA

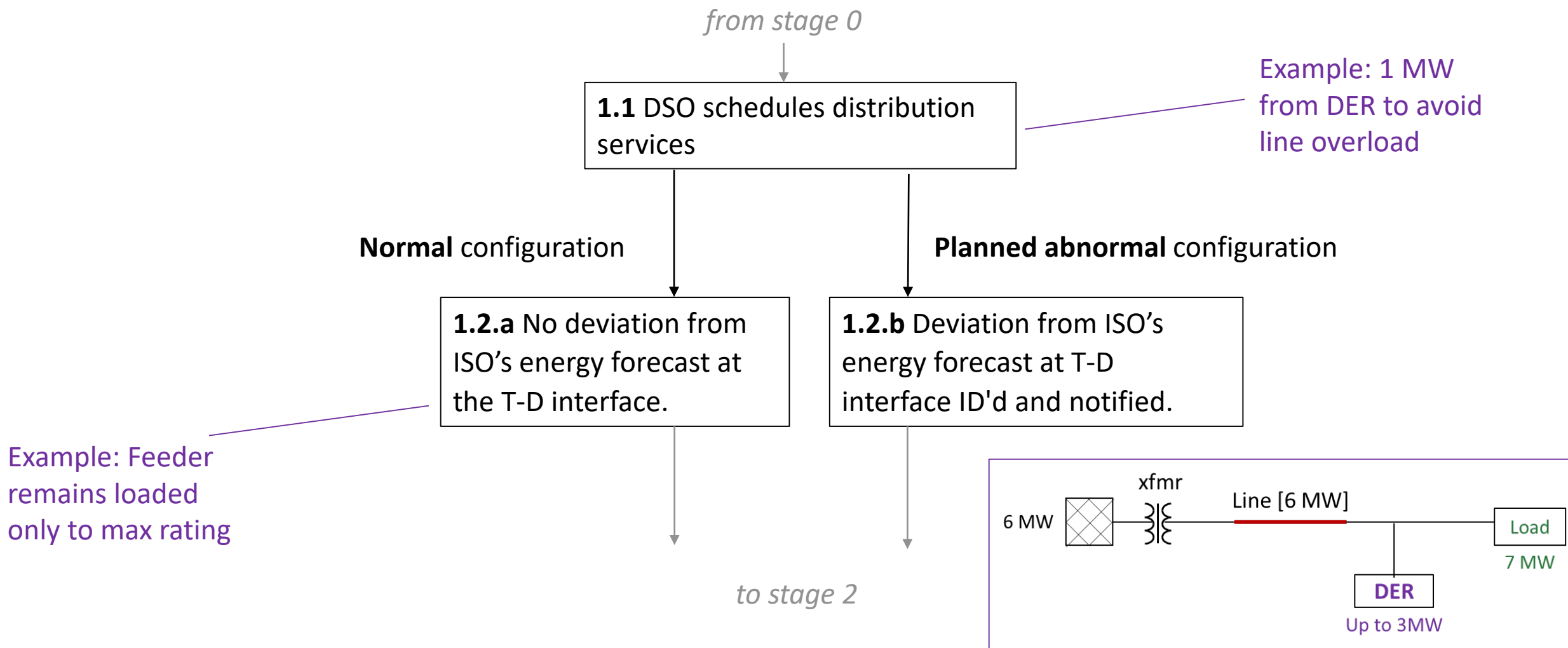
Scenario 3 – Distribution Import-Congestion (NWA)

- Sample of the process when individual DER serve more than one purpose
- Show complexities of how DER have to interact with DSO and ISO
- Following slides focus on Total DSO framework for today's TDWG discussion (project also investigated Dual Participation case)

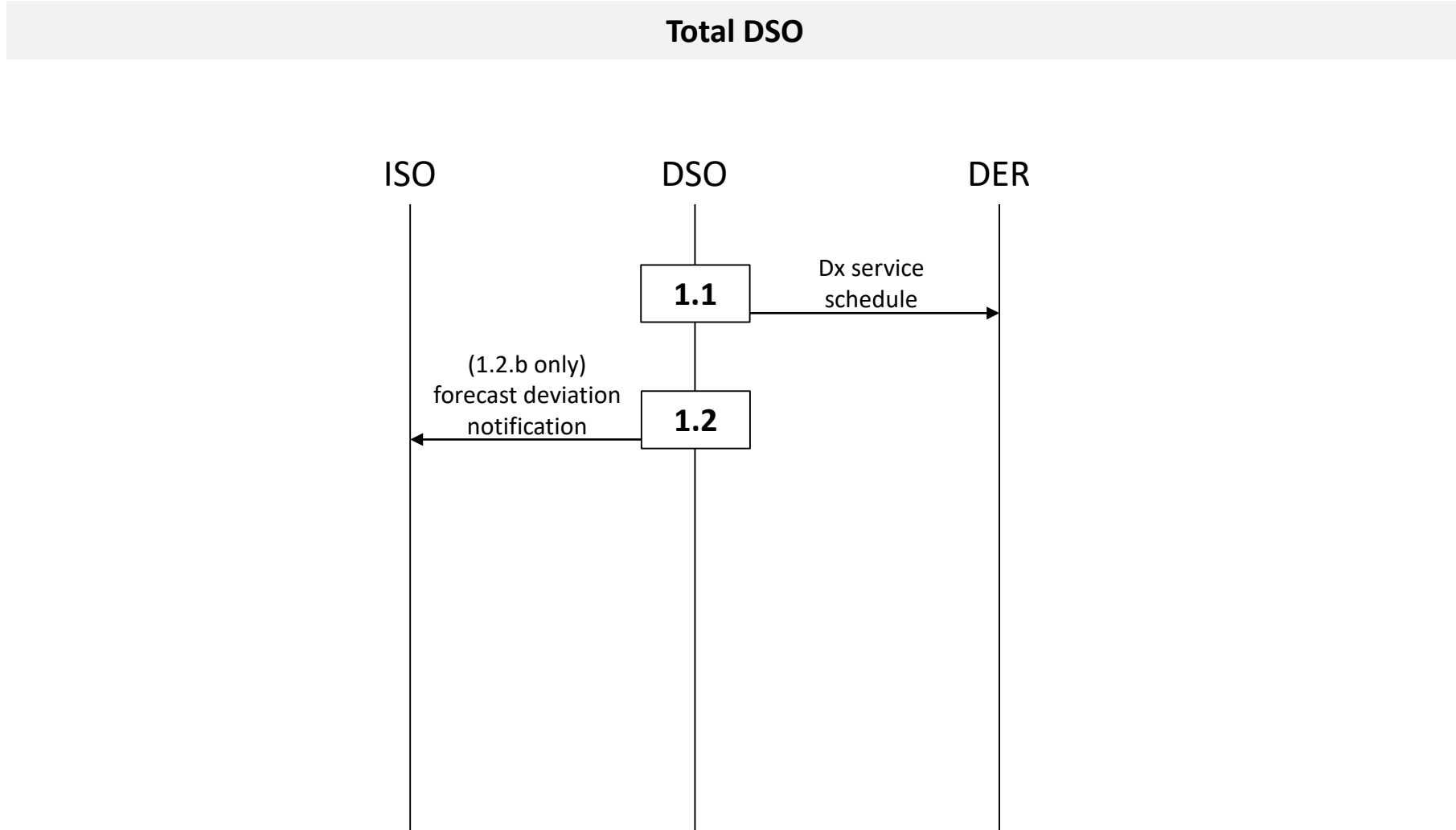


Stage 1: Scheduling of Dx Services - Steps

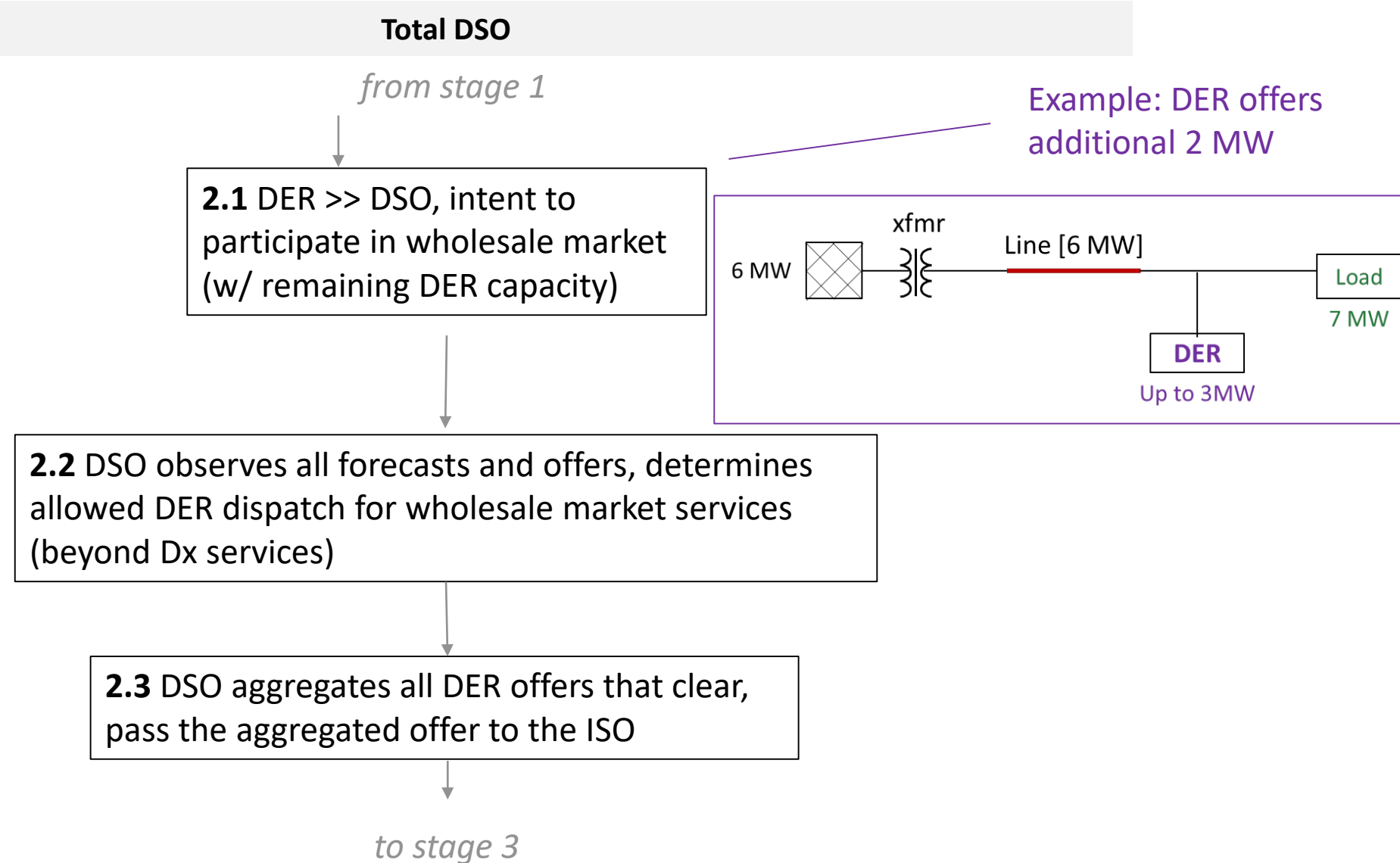
Total DSO (DER assumed to be on retail tariff)



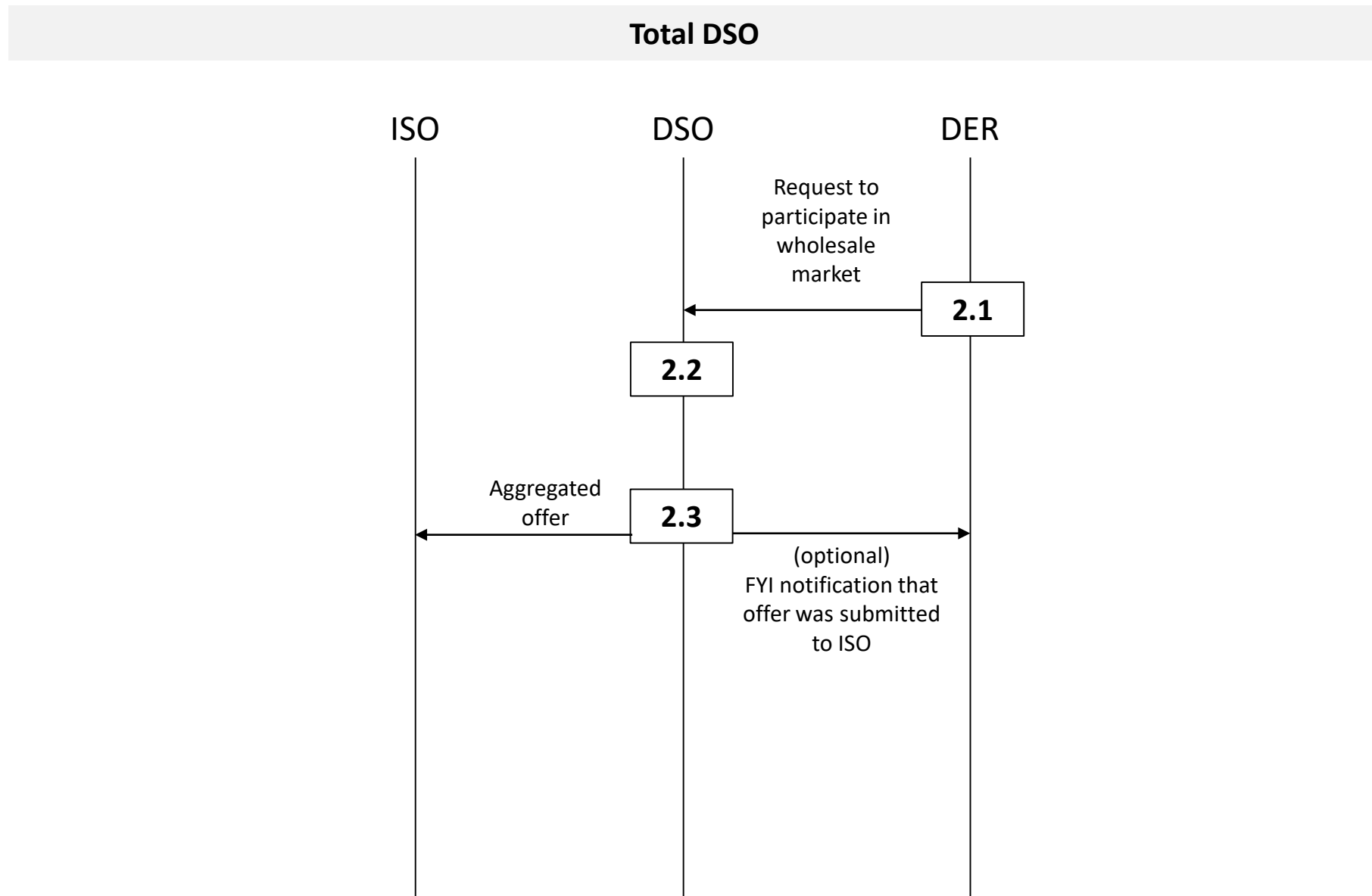
Stage 1: Scheduling of Dx Services - Communications



Stage 2: Formation & submission of wholesale offers - Steps



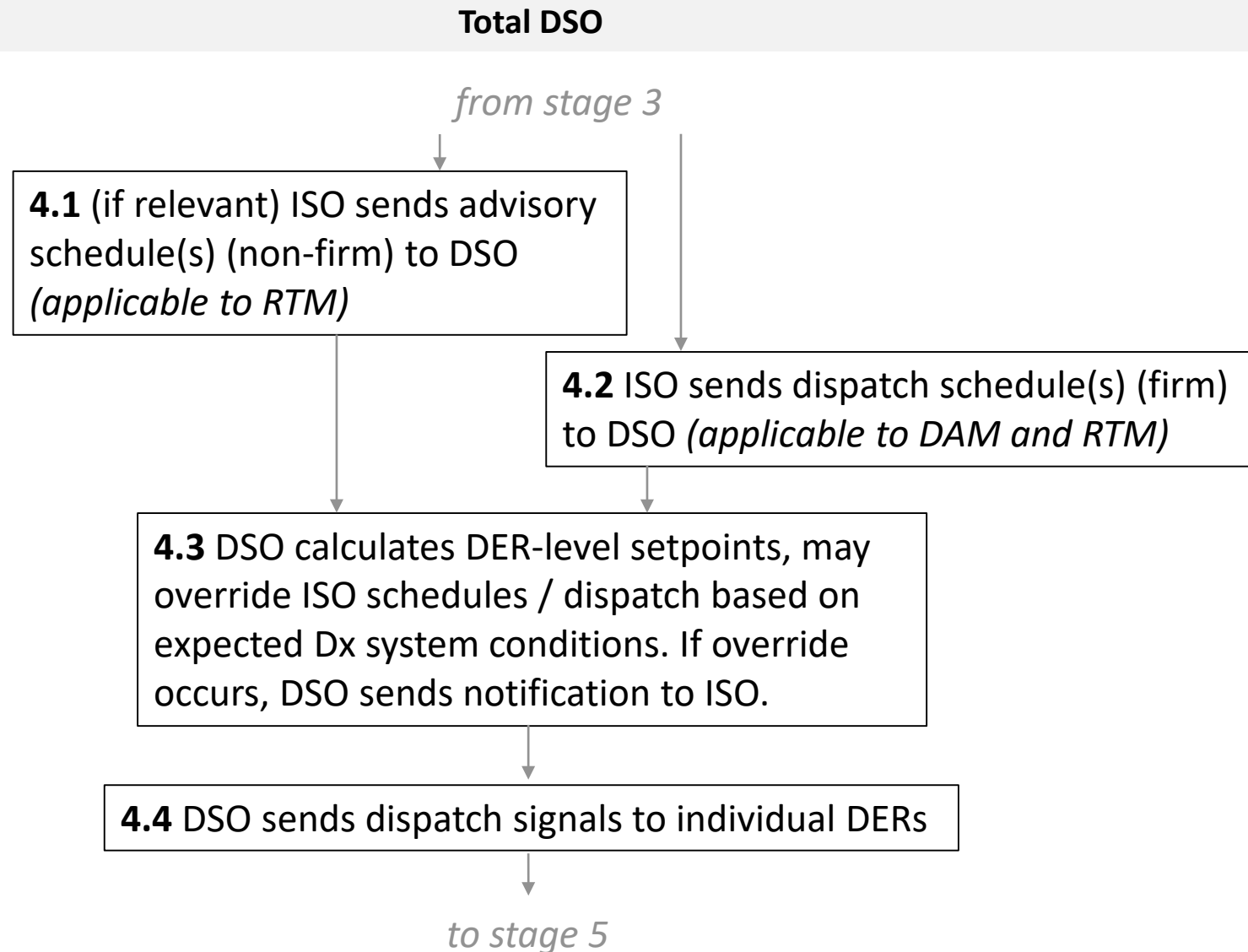
Stage 2: Formation & submission of wholesale offers - Communications



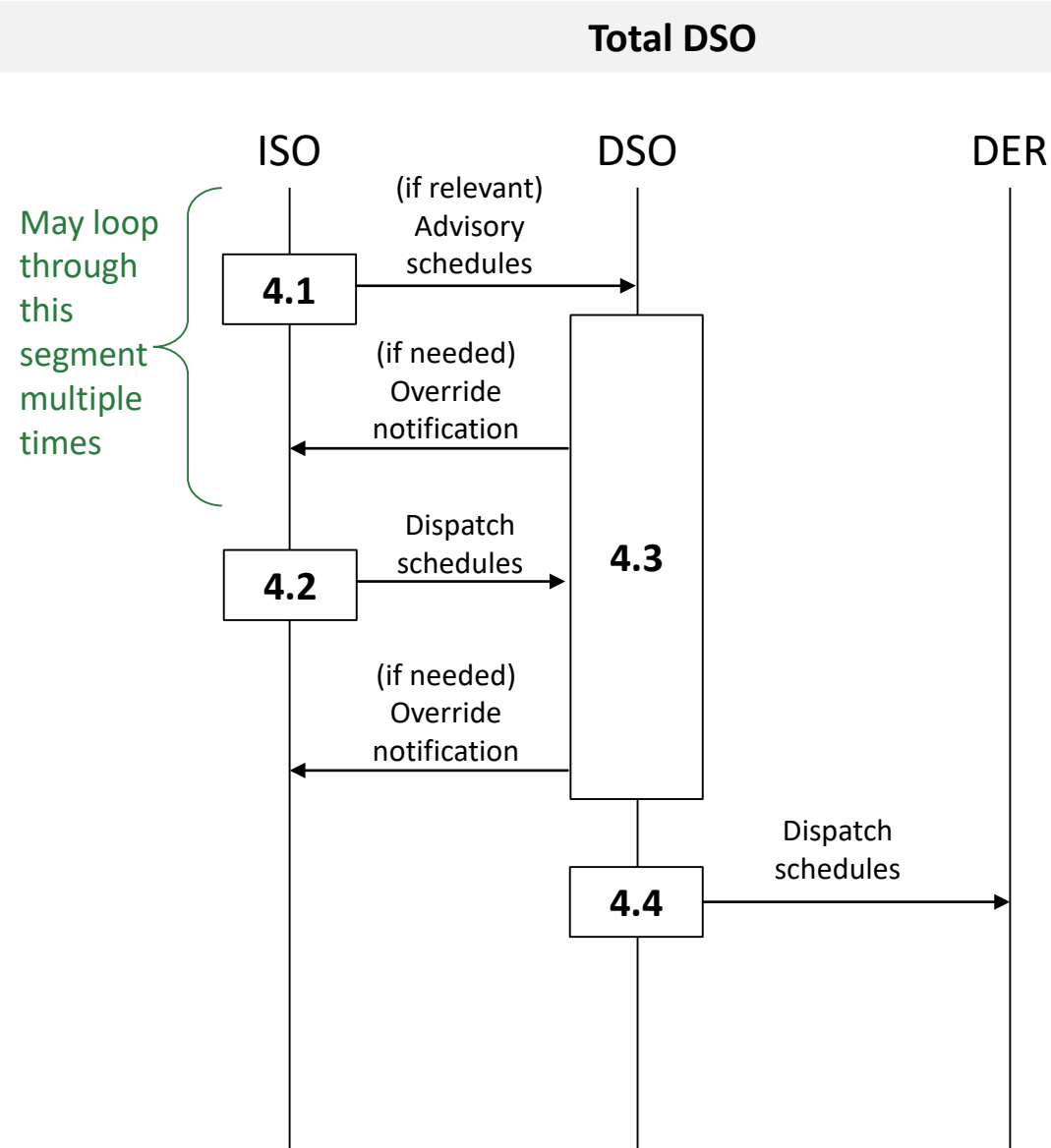
Stage 3: ISO clearing mechanisms

- (not in scope for this project)
 - ISO-specific rules
 - Including financial rules

Stage 4: Delivery of DER wholesale services (RTM) - Steps



Stage 4: Delivery of DER wholesale services (RTM) - Communications



Stage 5: Contingency management - Steps

Total DSO

Unplanned incident occurs

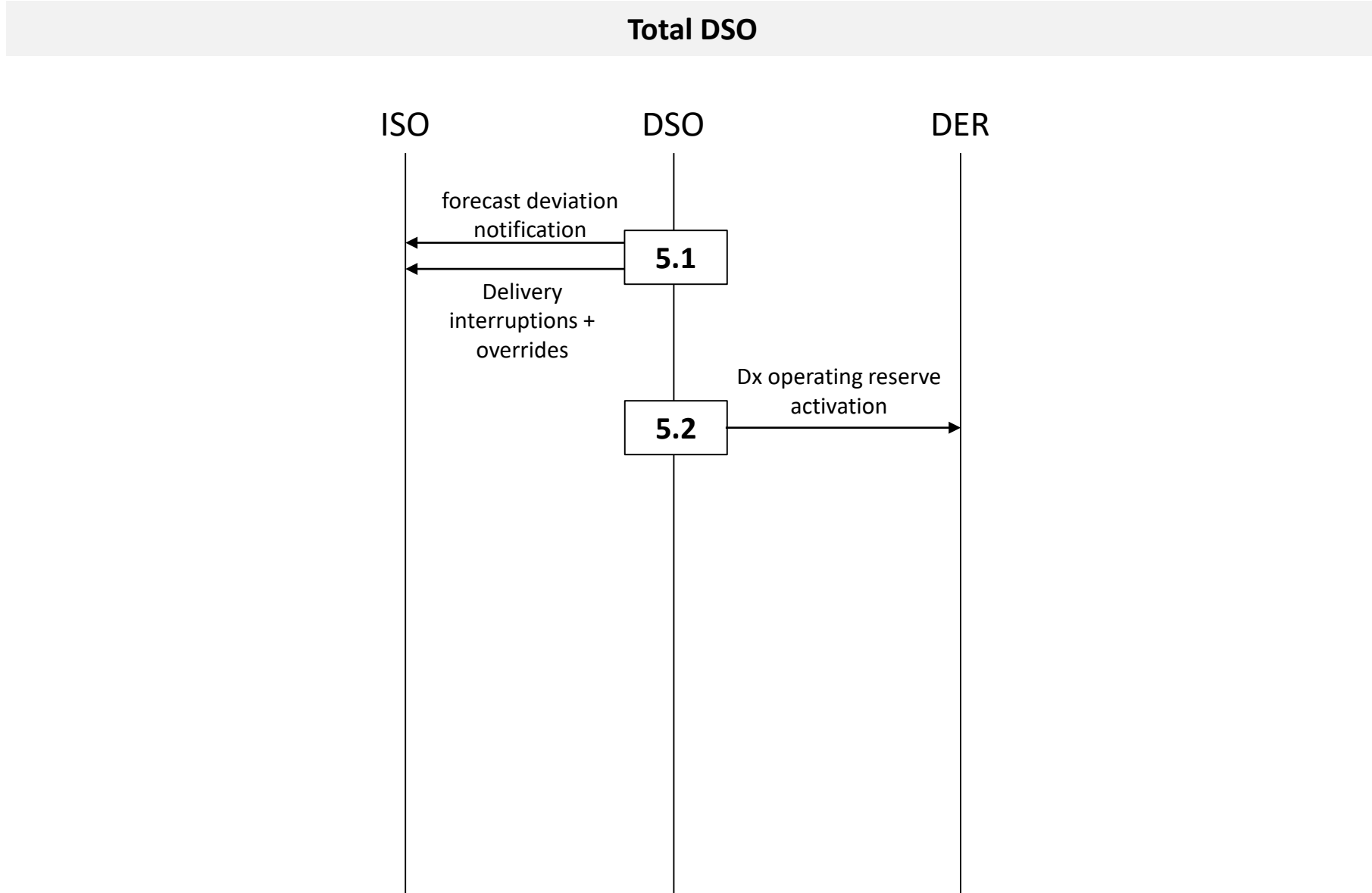


5.1. DSO notifies ISO if significant magnitude, including interruptions of wholesale service delivery + overrides of future deliveries



5.2 DSO dispatches distribution operating reserve if relevant to address incident

Stage 5: Contingency management - Communications





Overall Topics/Opportunities

Grid Services Considered for Each of the Five Scenarios

		DER-Provided Services					Value Stacking
		<i>Wholesale Domain</i>			<i>Distribution Domain</i>		
RFP Scenarios		Energy	Capacity	Reserve	Capacity deferral	Reserve	
“Transmission Energy Dispatch”	1	●					
“Distribution Override”	2	●					
“Distribution Import-Congestion”	3a				●		
	3b	●			●		●
“Distribution Operating Reserves”	4a					●	
	4b	●		●		●	●
“Capacity Service”	5	●	●		●		●

Challenges and Opportunities

- Processes and software needs for repetitive studies
- Must address agreement priorities, especially for operating reserves
- Applicability to industry ISO/DSO relationships vs the specific Alectra/IESO case
- Capabilities and processes unique to other LDC's coordinating with IESO



Questions?