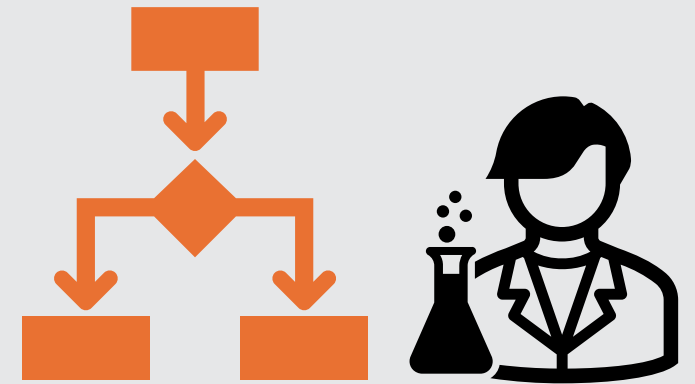
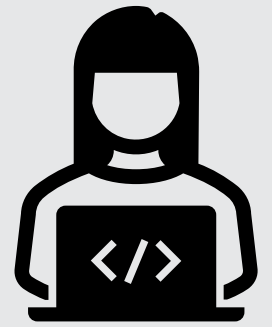
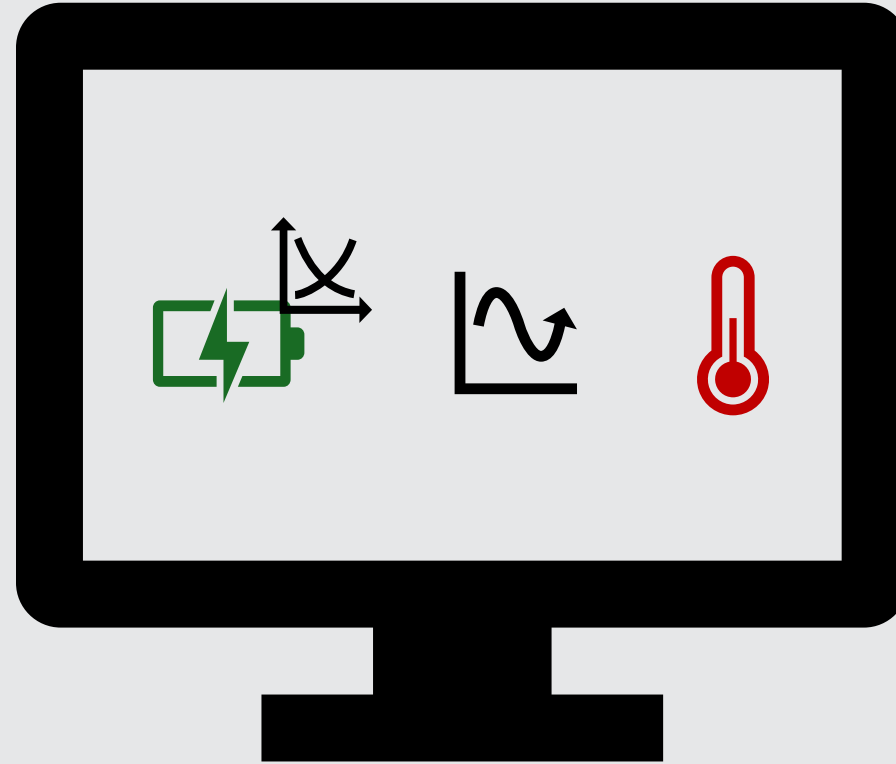
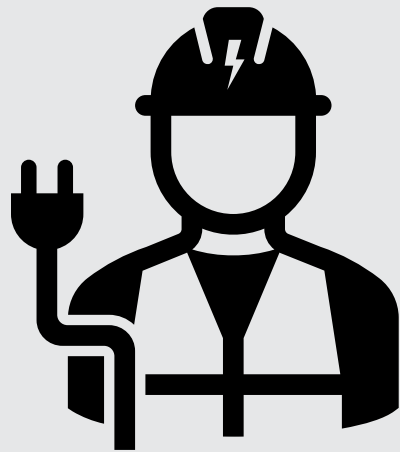




Session 3

Technology that supports operational planning

NextGrid
Summit | 2025

Some definitions...

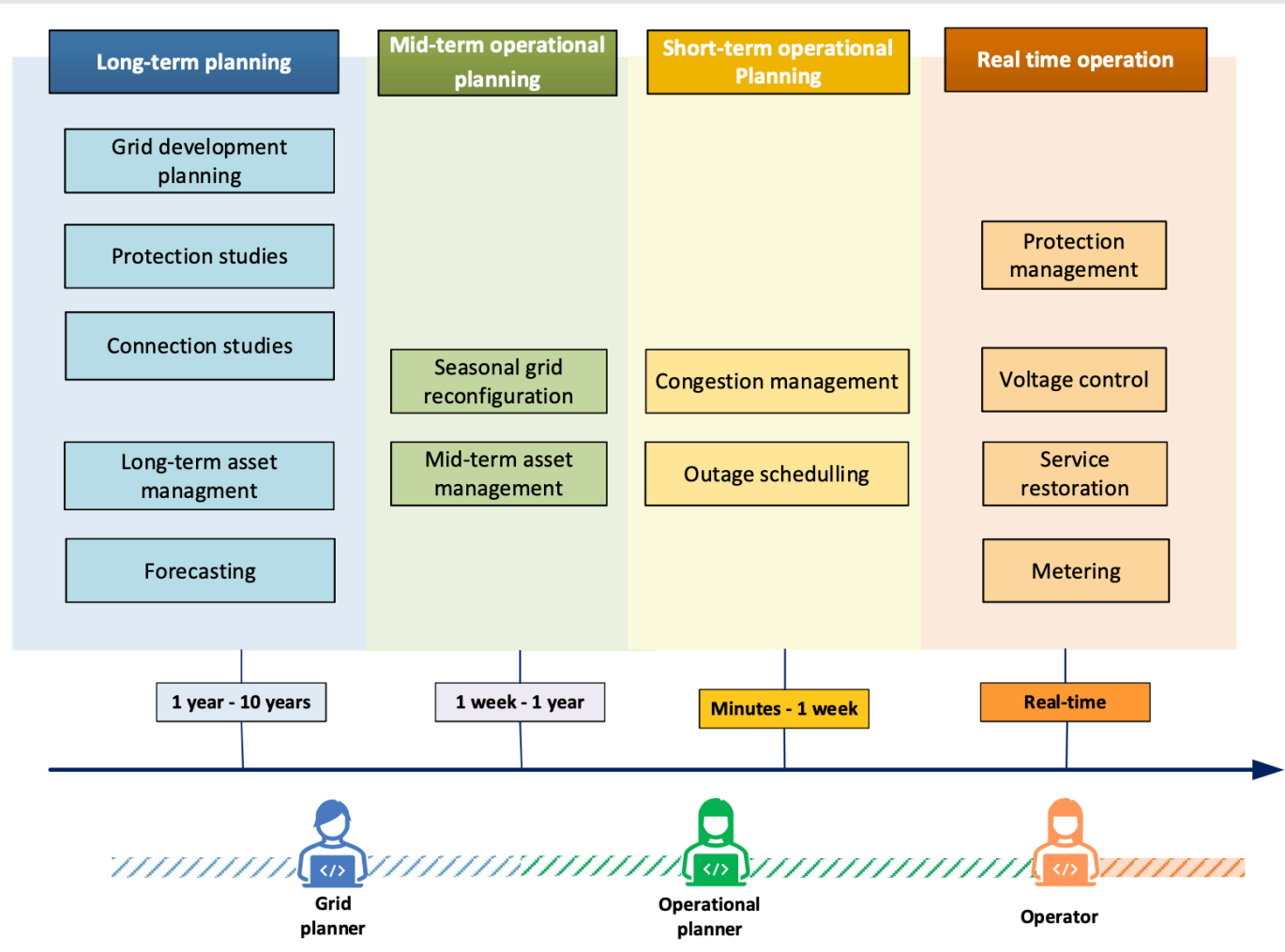
Proactive grid operation

Handling grid challenges before they occur. As opposed to *reactive operation*.

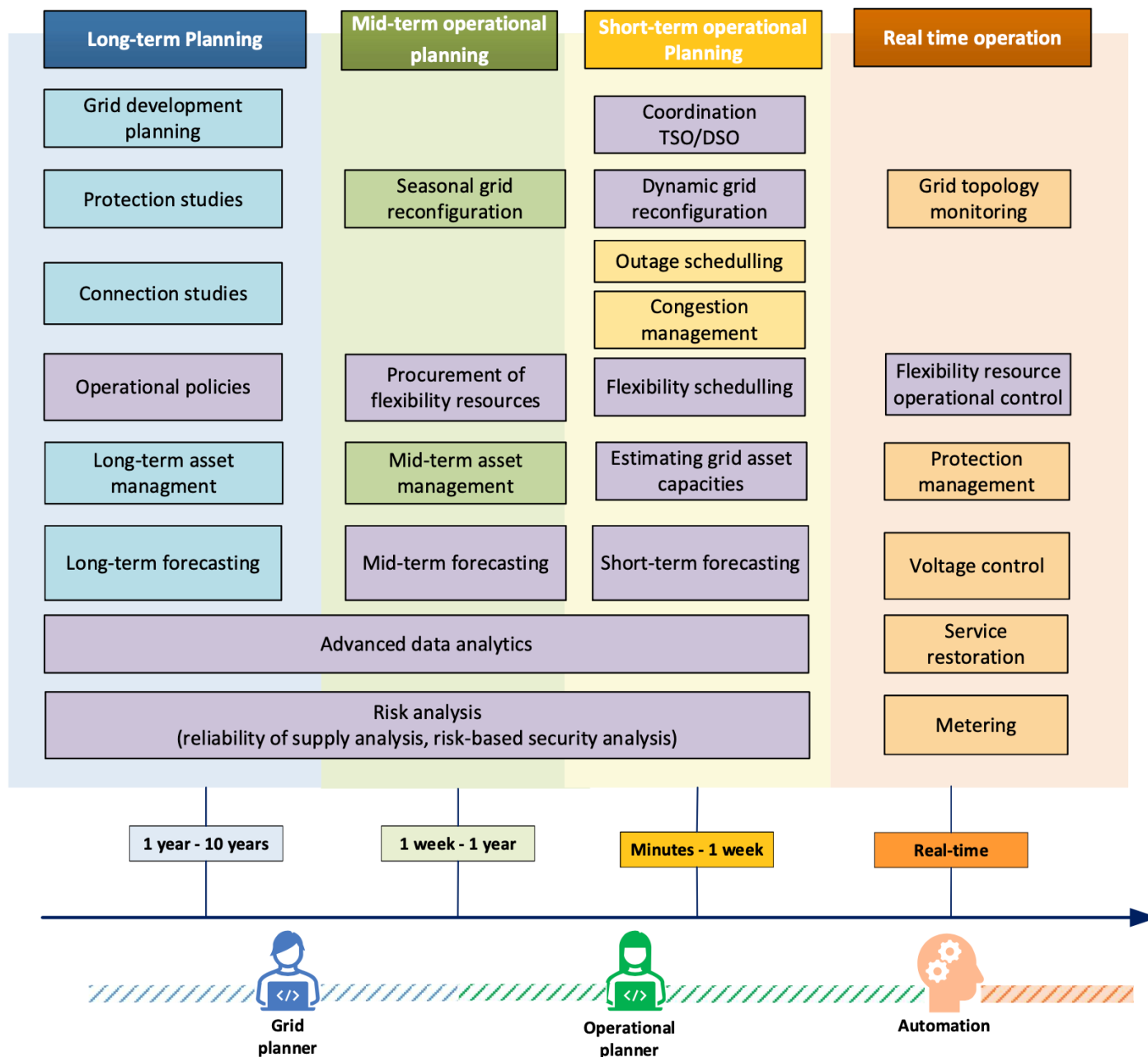
Operational planning

Proposed method for organizing proactive operation:
Planning and scheduling of operation ahead of time.

Distribution Grid Operational Planning

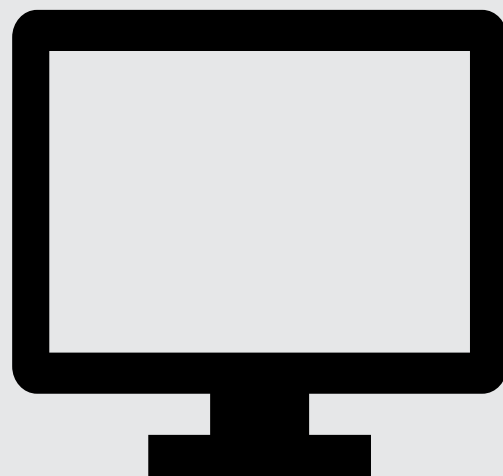


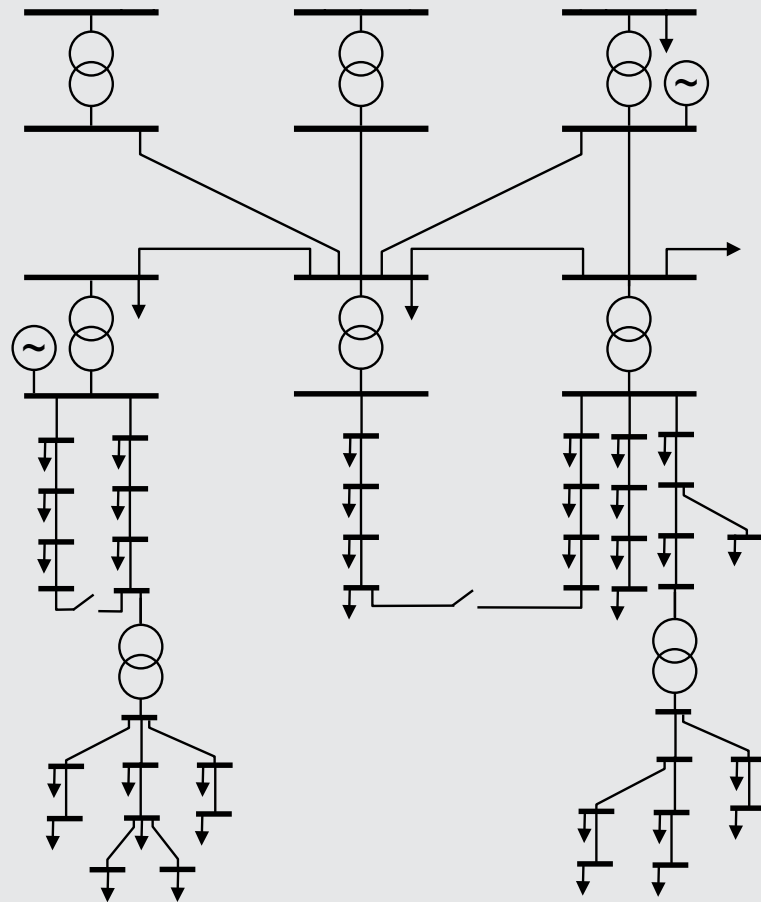
Traditional DSO planning process and activities on different time horizons.

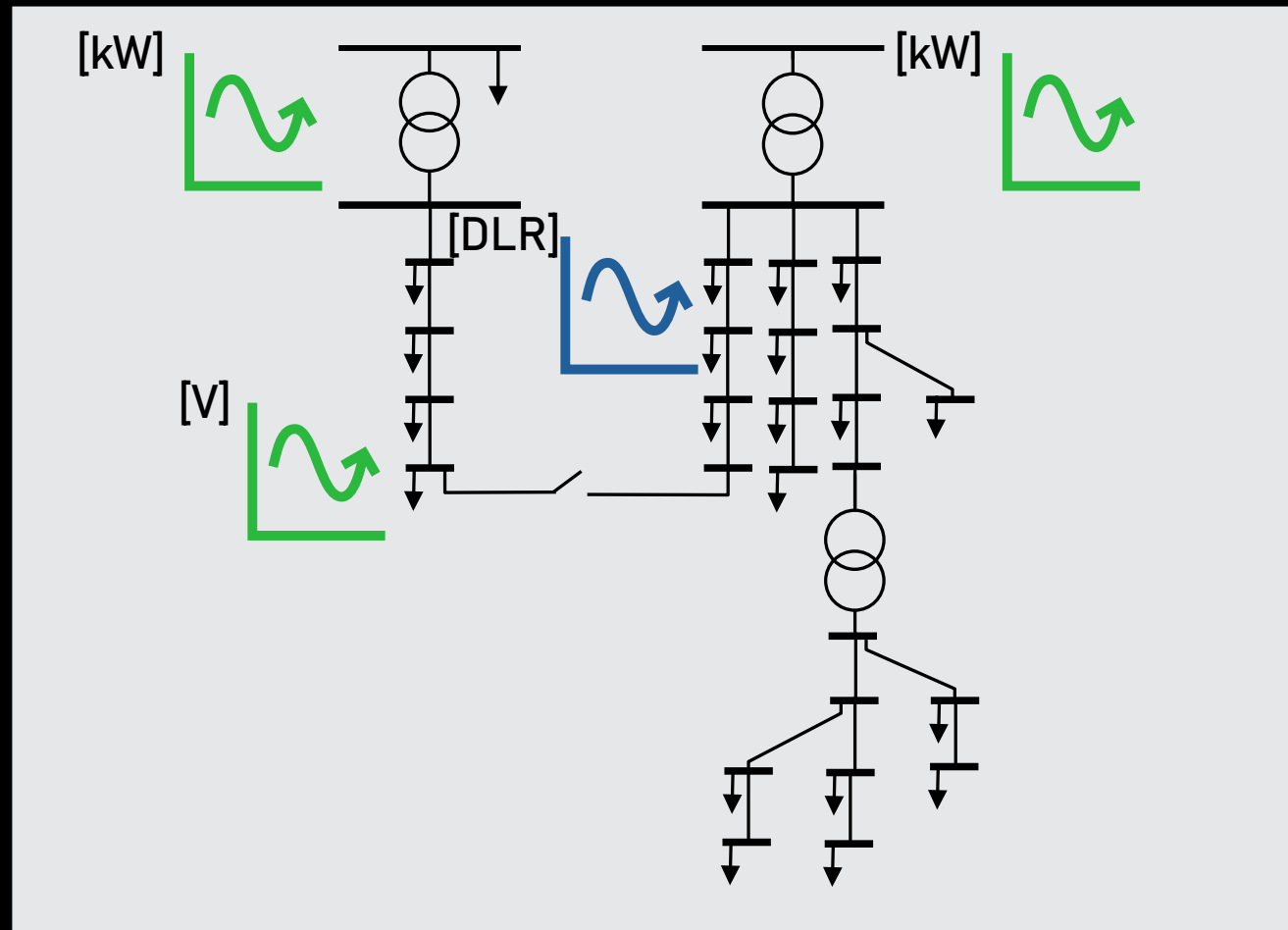


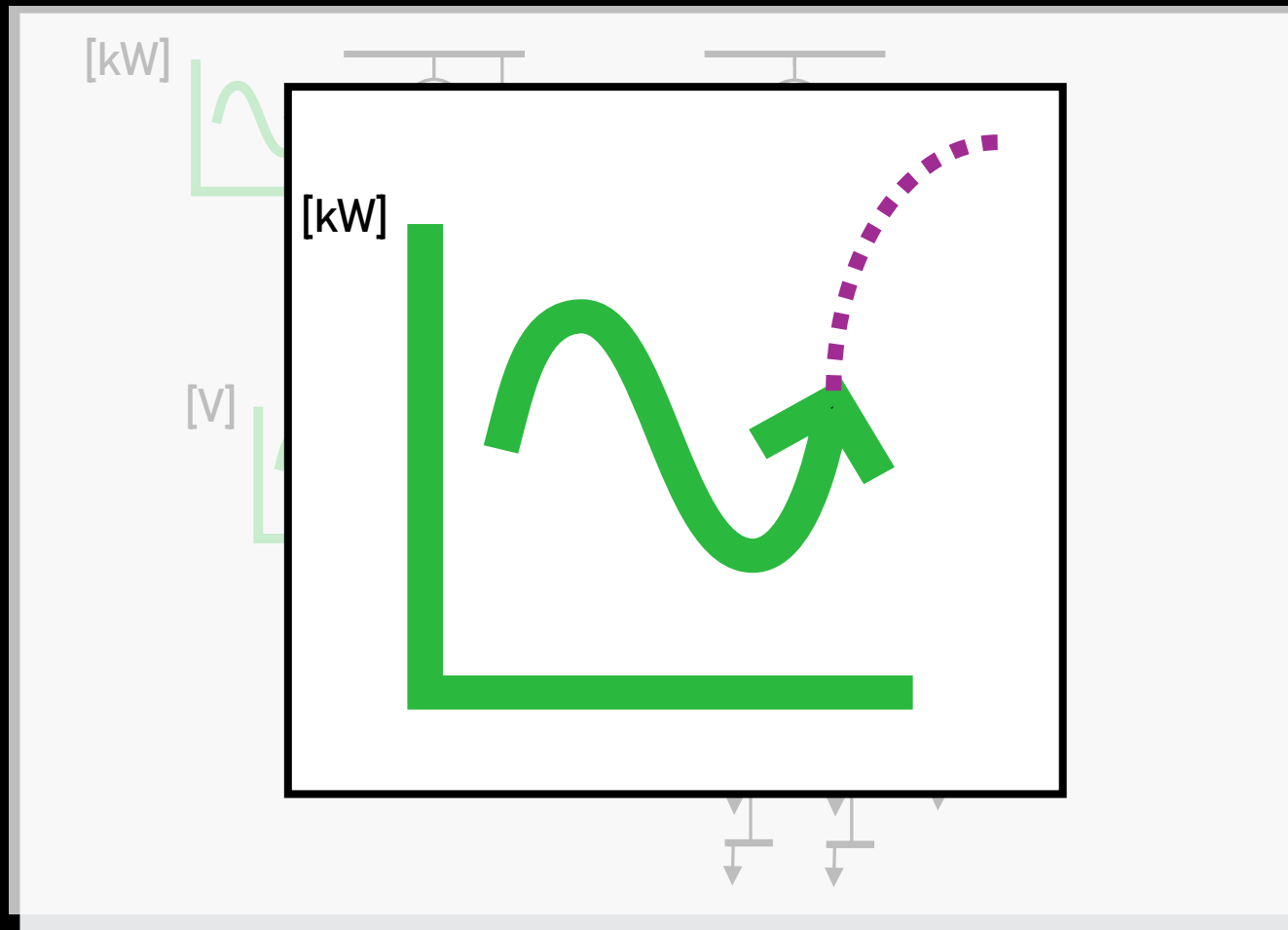
Proposed change to planning process

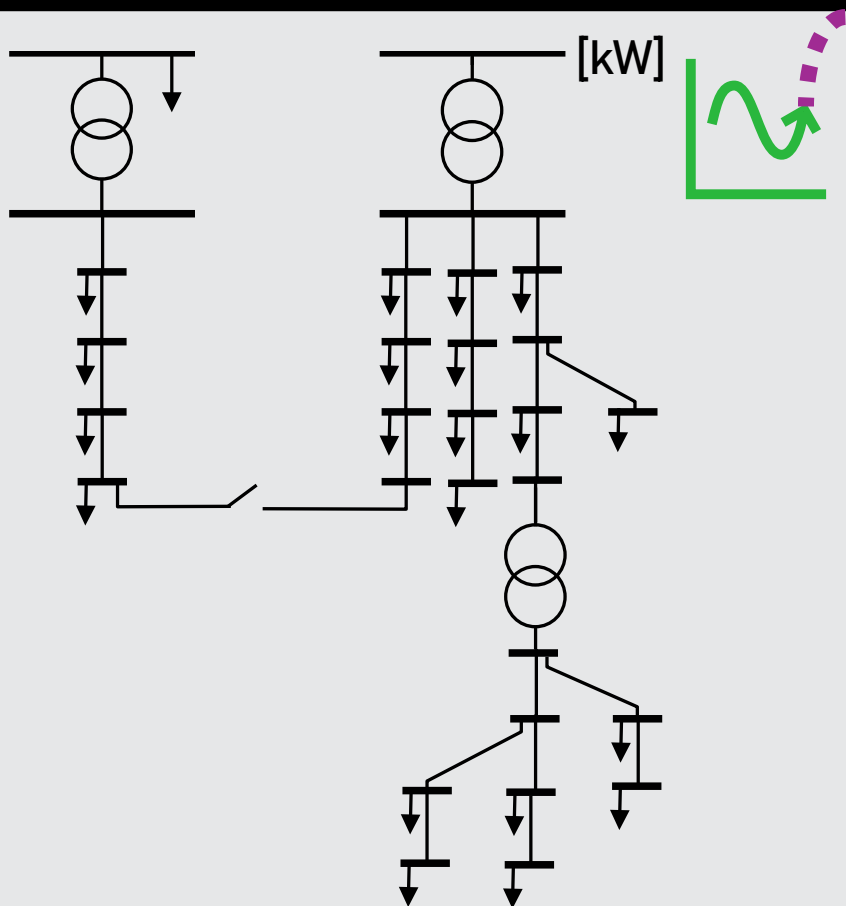
- Operational policies
- Procurement of flexibility resources
- Mid-term forecasting
- Coordination TSO/DSO
- Dynamic grid reconfiguration
- Flexibility scheduling
- Estimating grid assets capacities
- Short-term forecasting
- Flexibility resource operational control
- Advanced data analytics
- Risk analyses



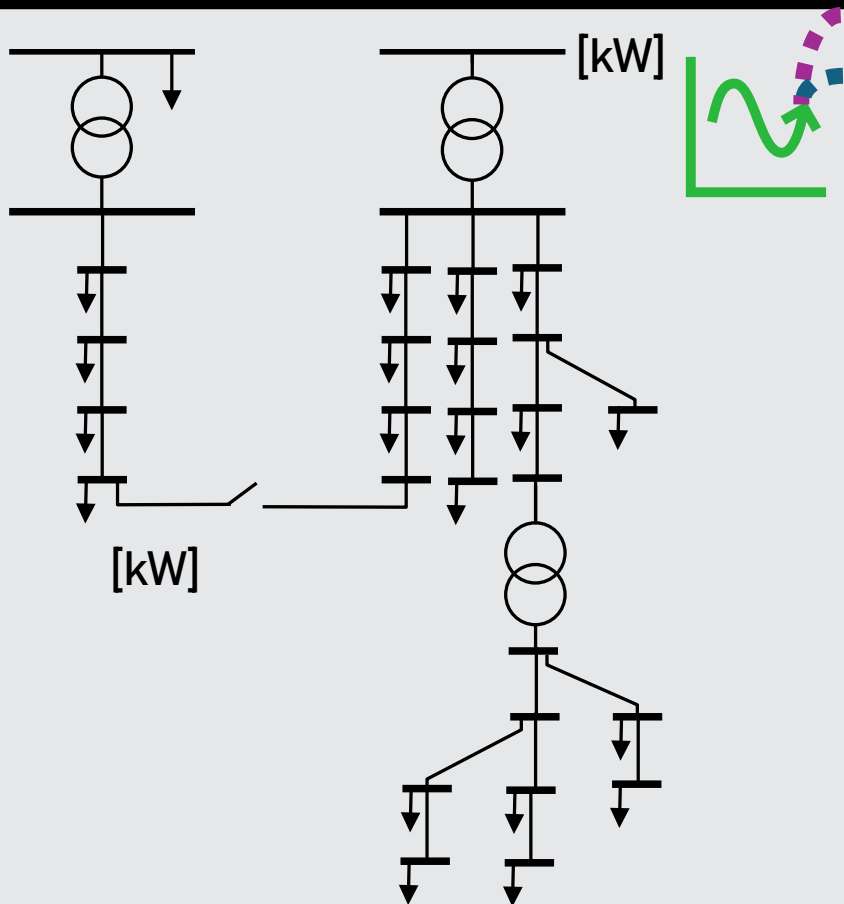




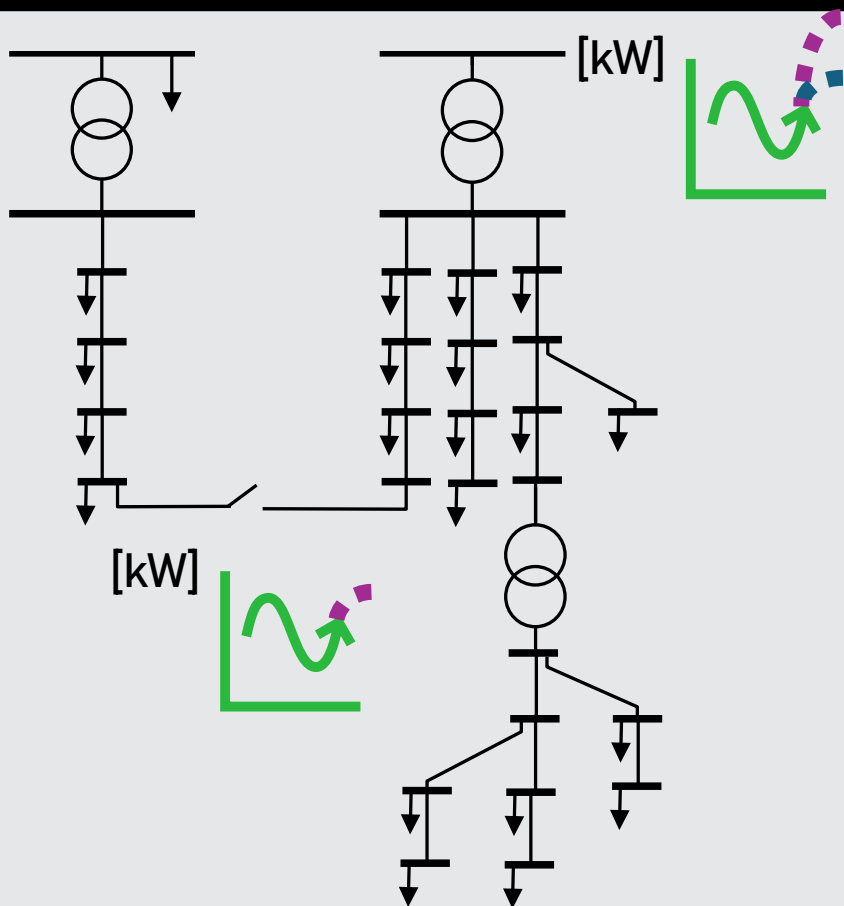




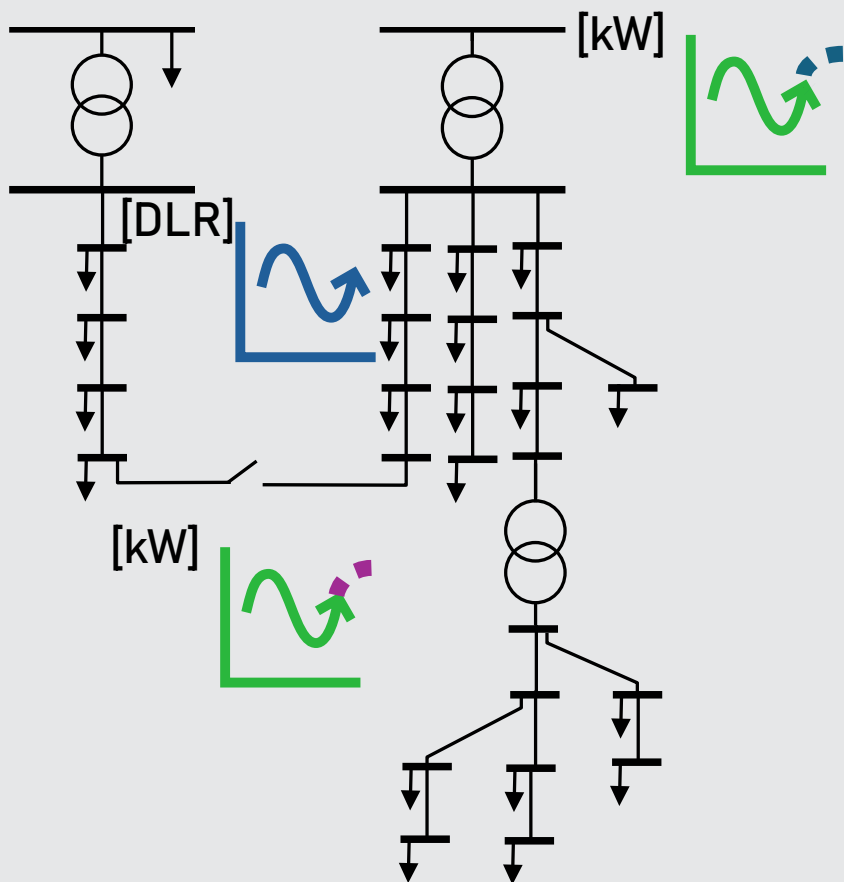
Time	Expected grid state	Planned action	Cost estimate
T-0	Nominal	-	
T+1	Nominal	-	
T+2	Nominal	-	
T+3	T2 overloaded	-	\$\$\$\$



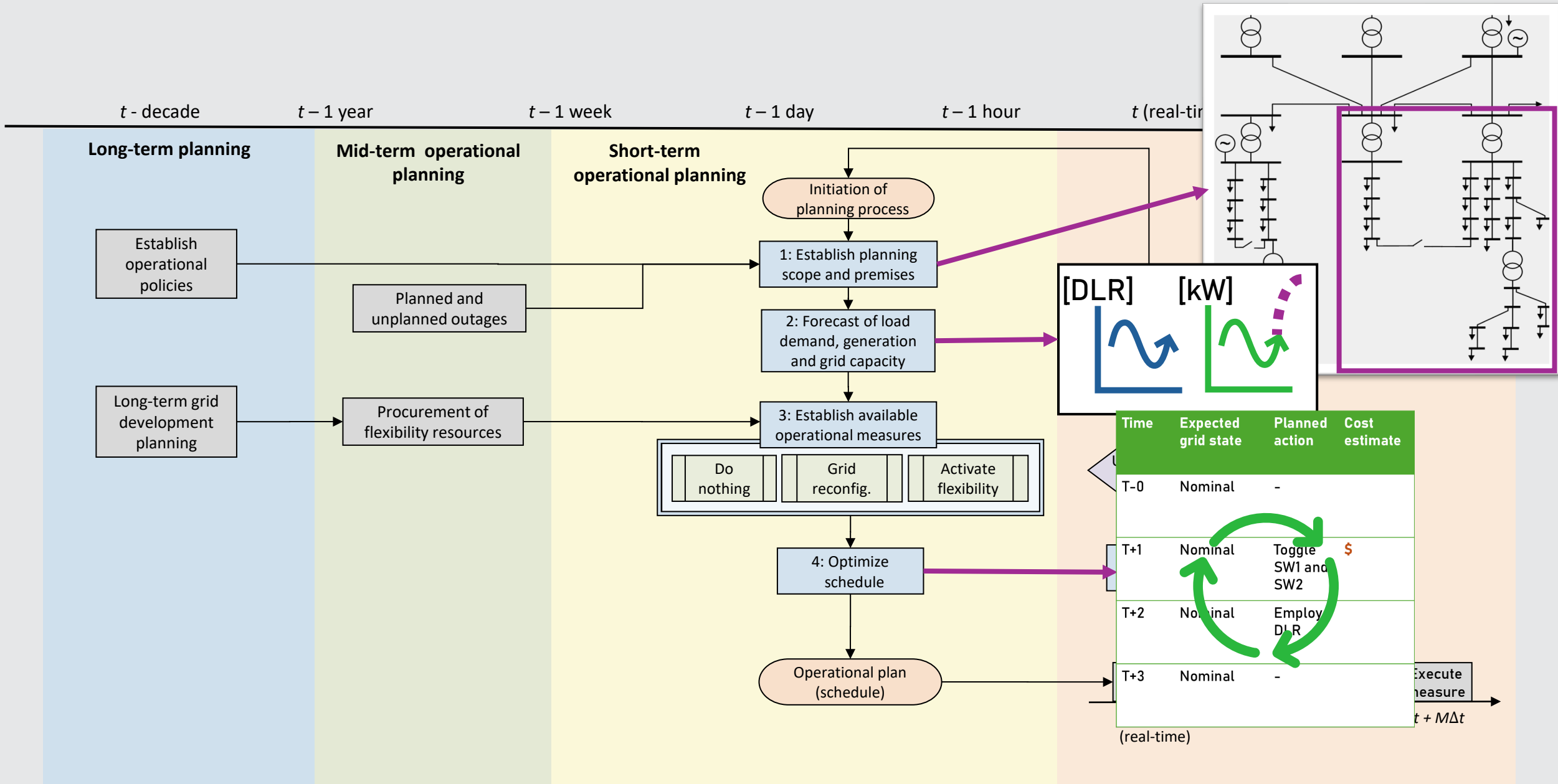
Time	Expected grid state	Planned action	Cost estimate
T-0	Nominal	-	
T+1	Nominal	-	
T+2	Nominal	-	
T+3	T2 overloaded	-	\$\$\$\$



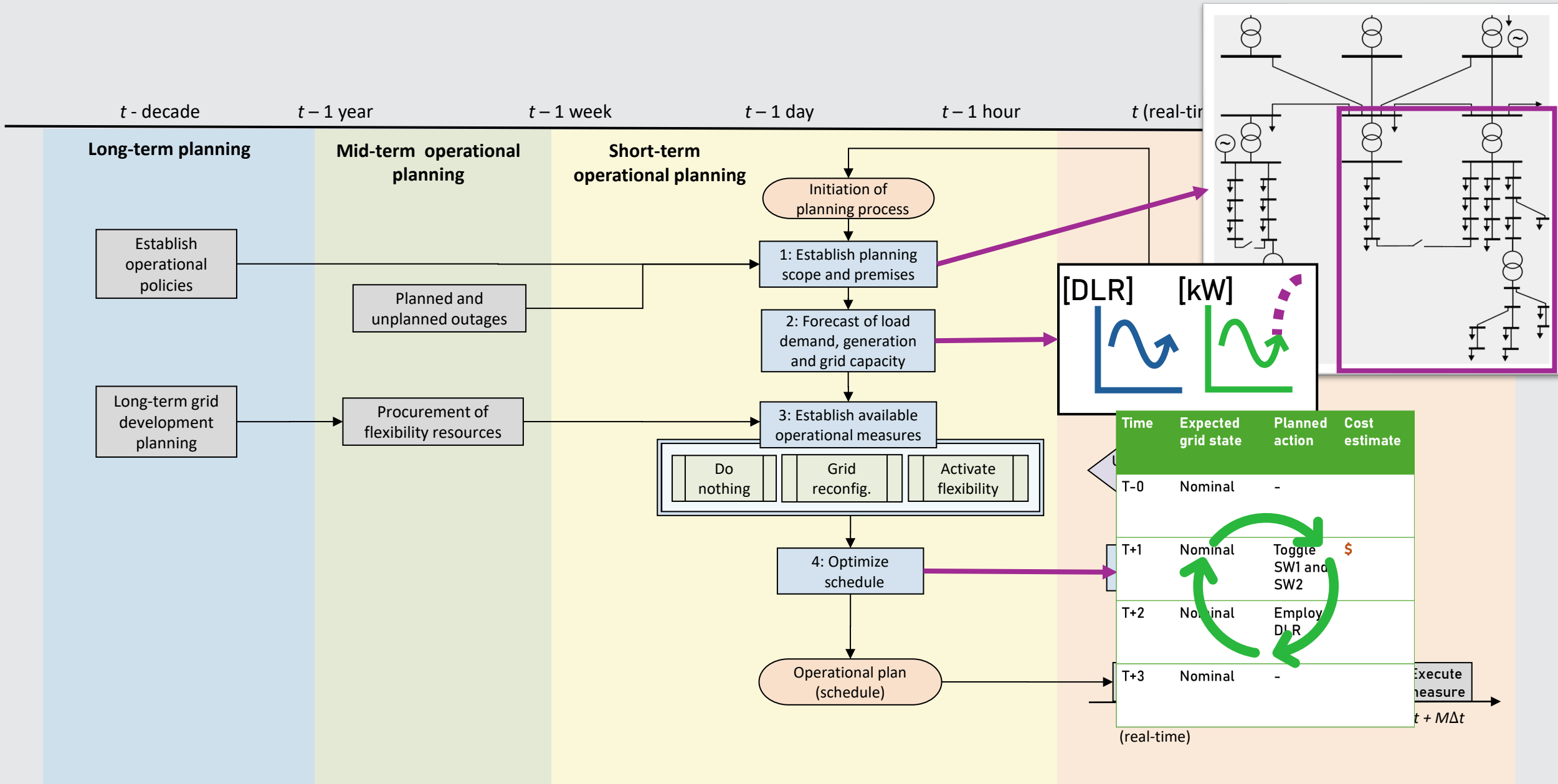
Time	Expected grid state	Planned action	Cost estimate
T-0	Nominal	-	
T+1	Nominal	Toggle SW1 and SW2	\$
T+2	L12 slightly overloaded	-	\$\$
T+3	Nominal	-	



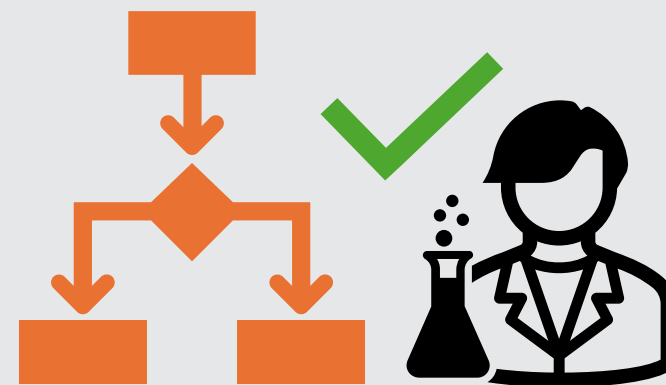
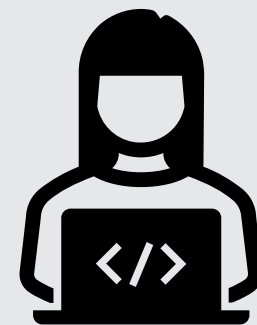
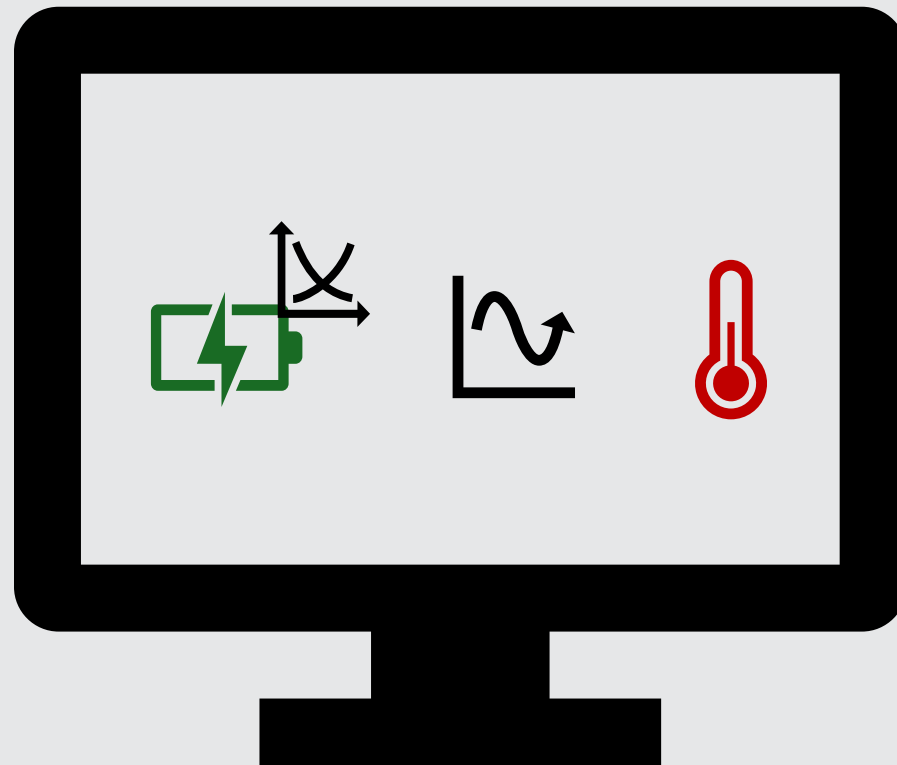
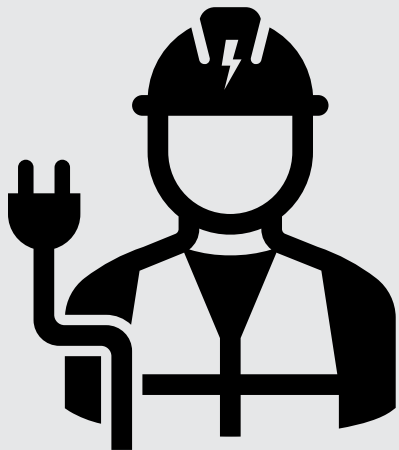
Time	Expected grid state	Planned action	Cost estimate
T-0	Nominal	-	
T+1	Nominal	Toggle SW1 and SW2	\$
T+2	Nominal	Employ DLR	
T+3	Nominal	-	



Raymundo E. Torres-Olguin, m.fl.: *Rethinking Distribution Network Operational Planning with Flexibility Resources*, CIGRE Session proceedings

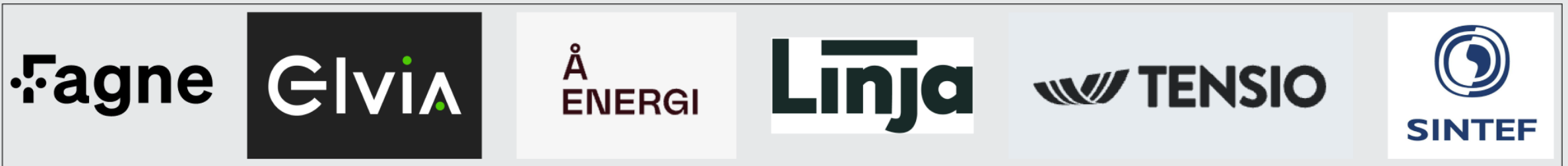


Raymundo E. Torres-Olguin, m.fl.: *Rethinking Distribution Network Operational Planning with Flexibility Resources*, CIGRE Session proceedings



Ways of working

We conducted different workshops with the partners in the project:

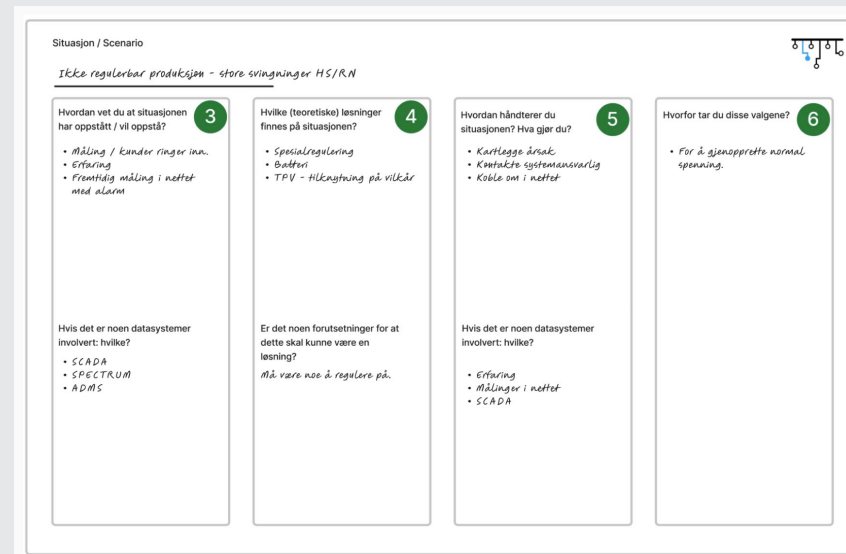
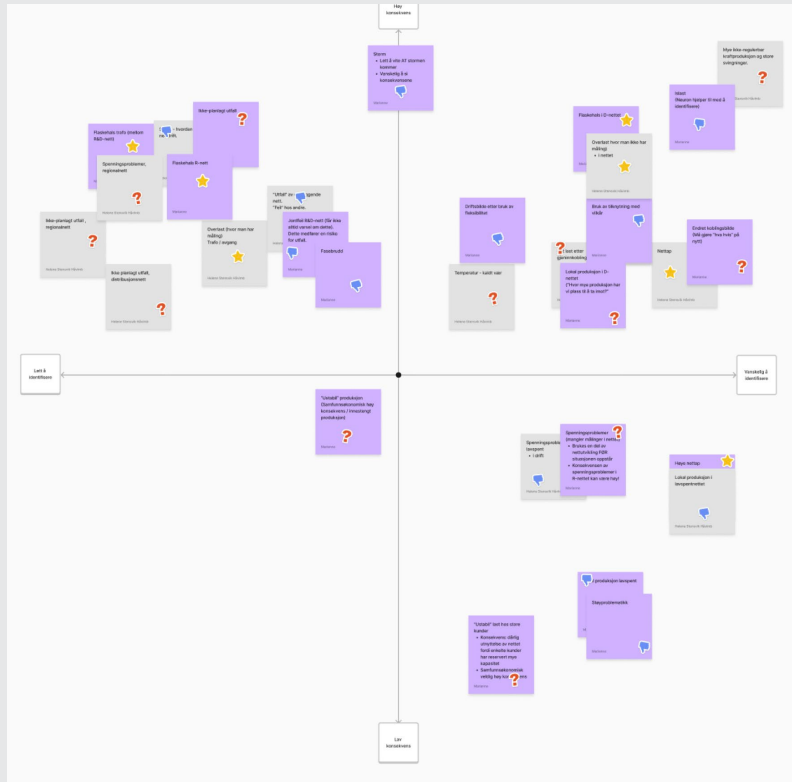


In these workshops we had one question as the main topic:

"Describe a situation that may occur in your work environment, where you need help from active/pro-active grid support."

Ways of working

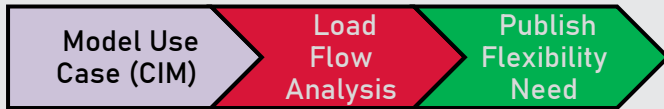
In the workshops we categorised the different answers and decided to focus on the following main problem areas:



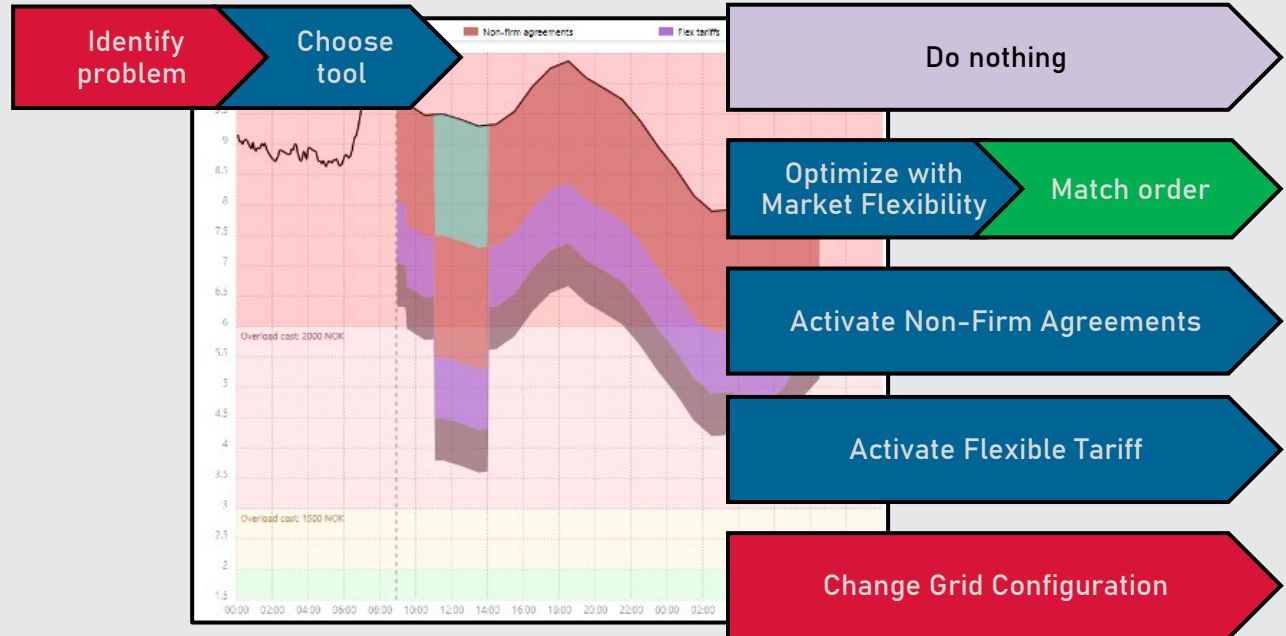
BOTTLENECKS
VOLTAGE DEVIATIONS

NextGrid workflow

Medium term planning



Short term planning and proactive decision support



Kognitwin Grid

Apps: knowledge management and decision support

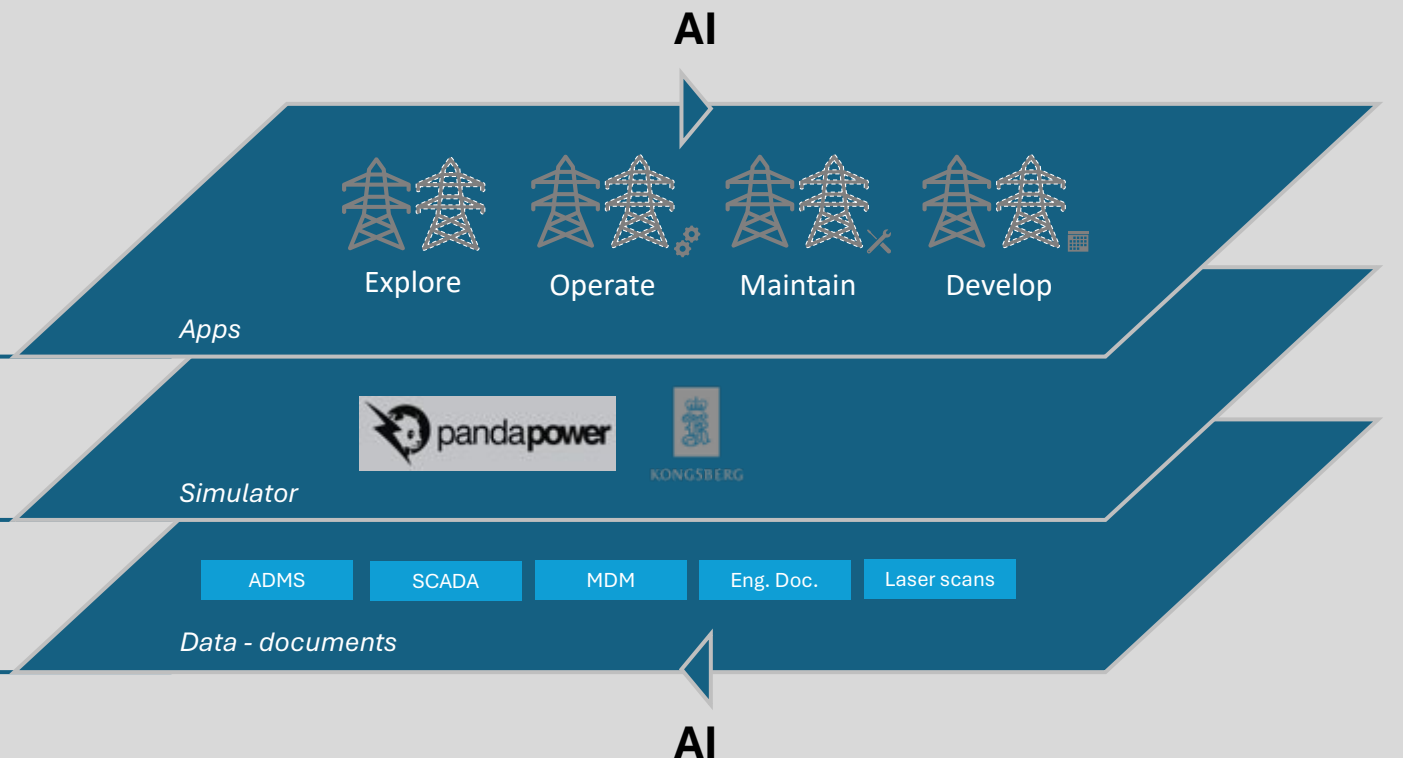
- 4 modules (Explore, Operate, Maintain, Develop)
- Various use cases
- Easy to build new use cases

Simulator

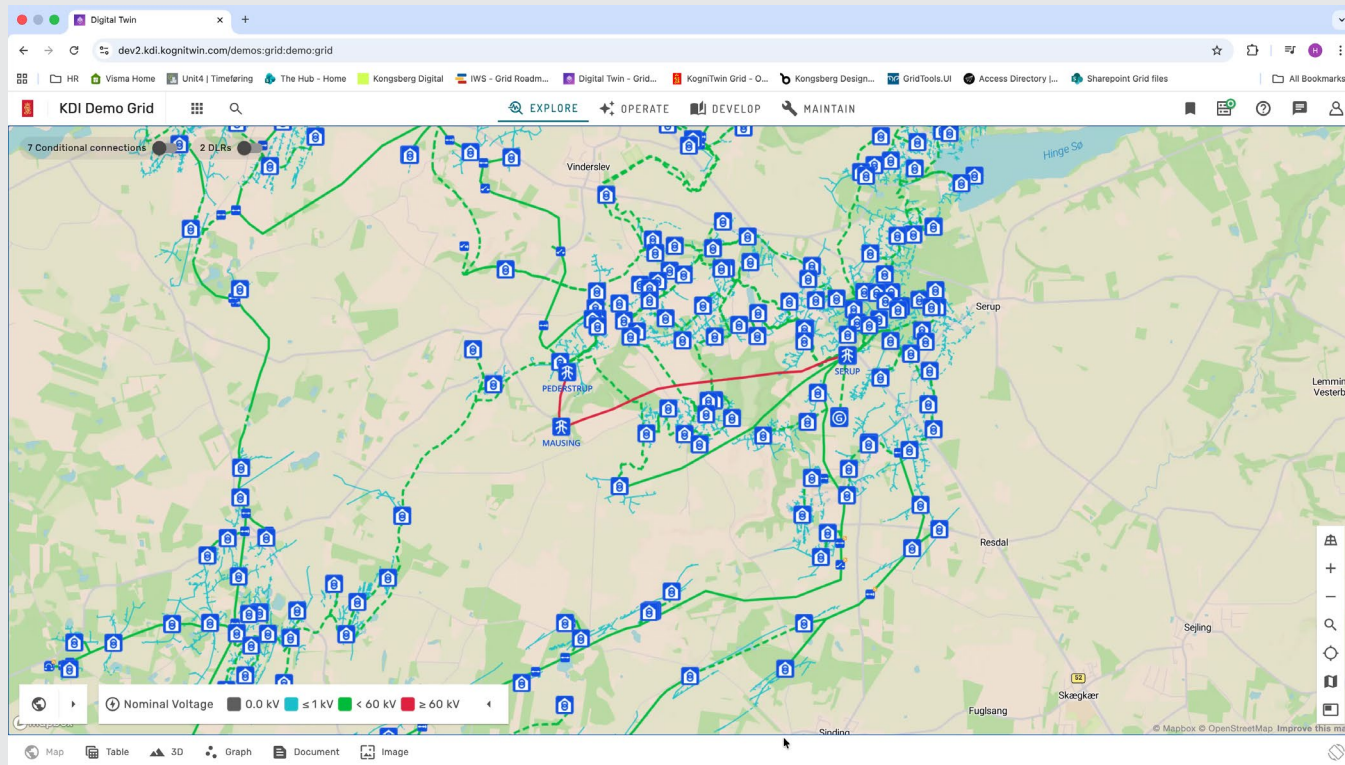
- Built-in (PandaPower) or company-specific
- Short and long term scenarios

Data - documents

- Contextualization engine
- Integration with more Data Platforms (e.g. Databricks)

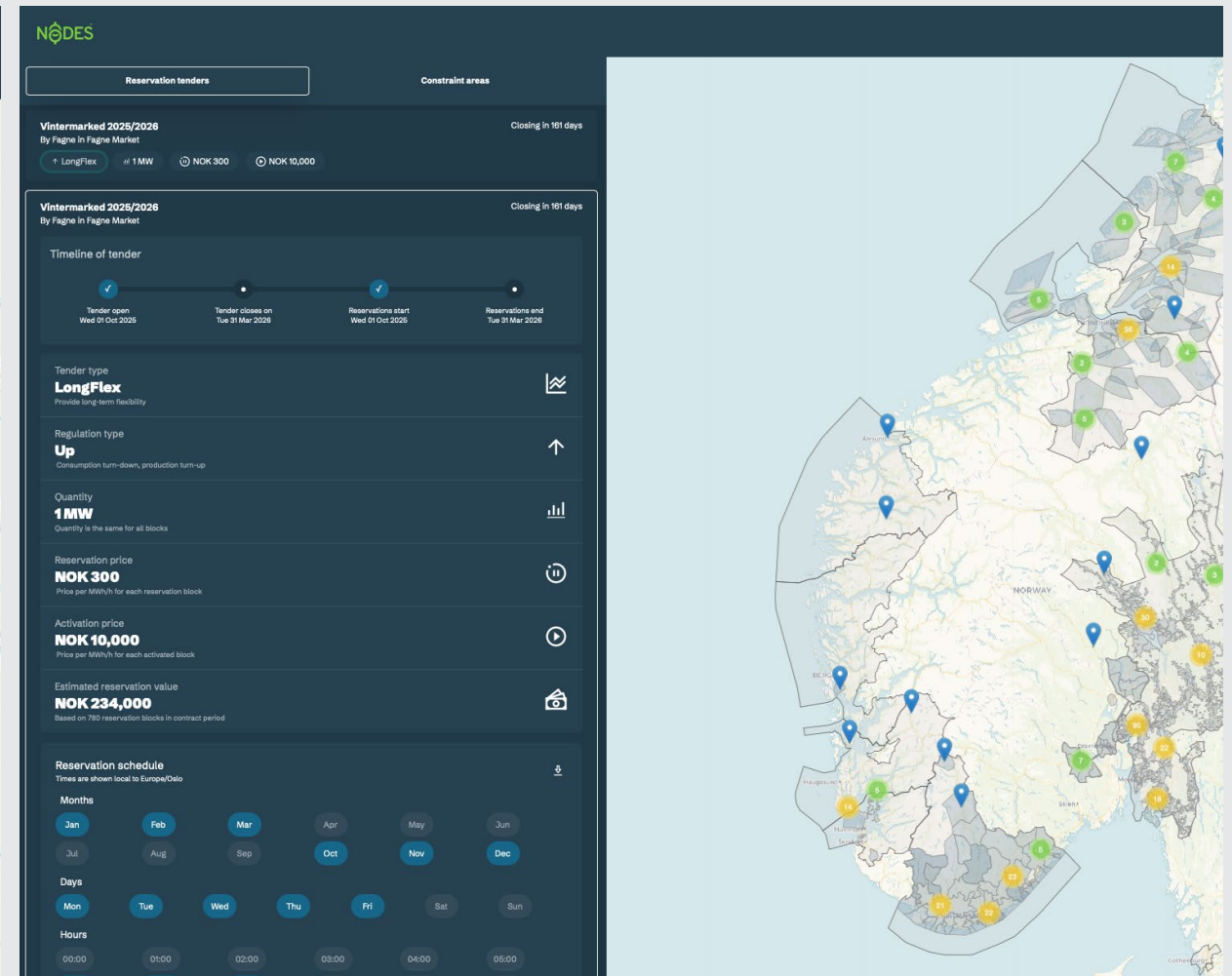
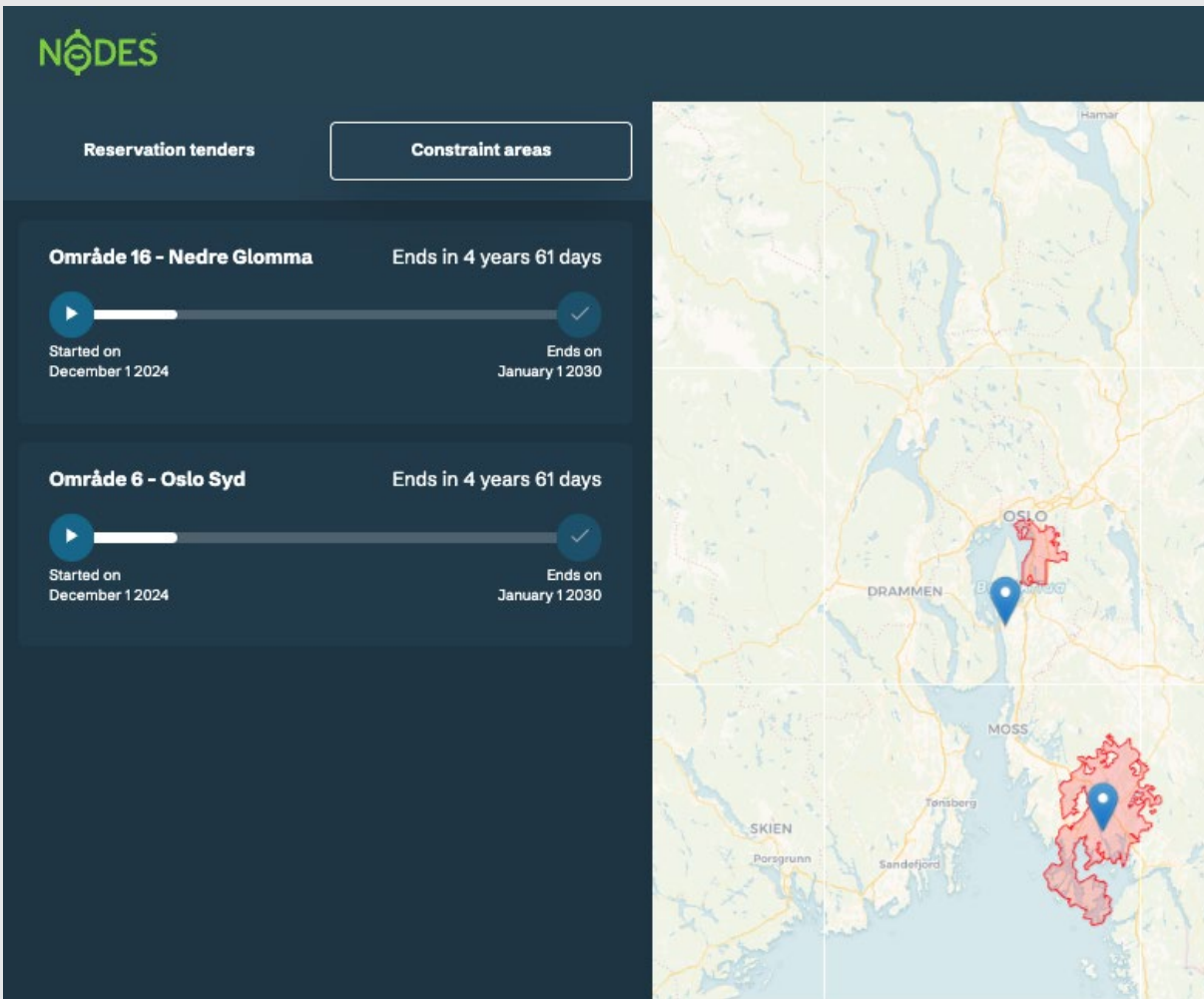


Grid modelling and load flow forecasting



- Grid modelling
- Load forecasting (ML)
 - Weather
- Load flow analysis
- Dynamic line rating
- Output: Problem areas

Publish Flexibility Need

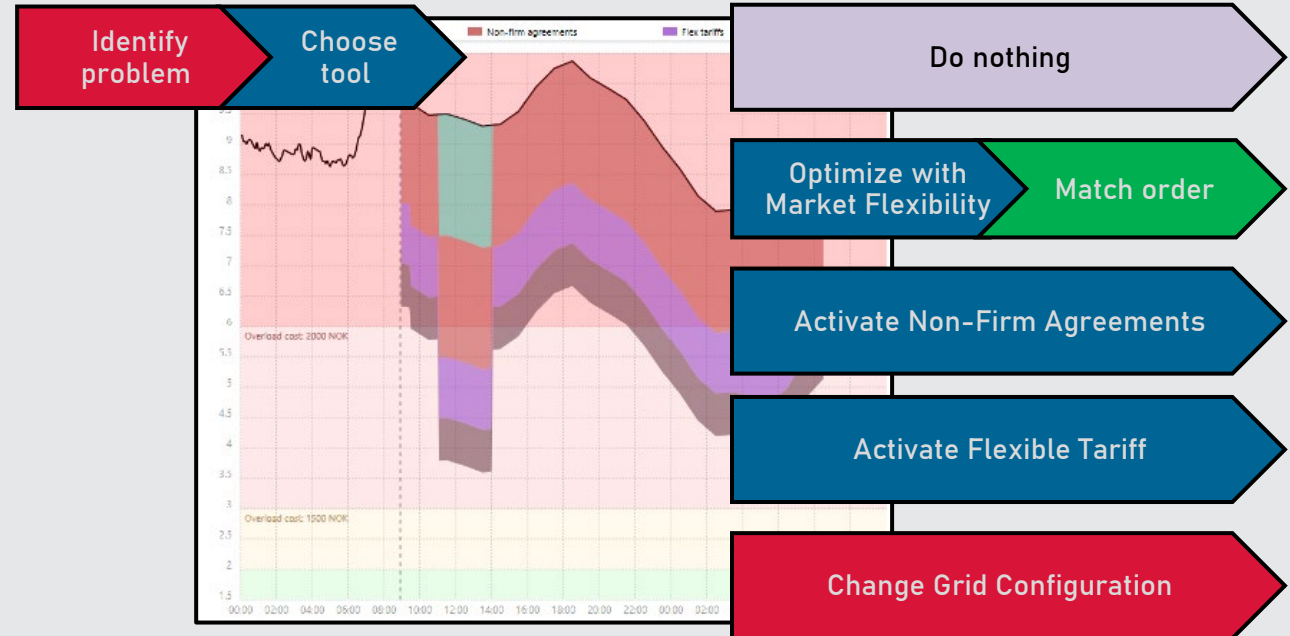


NextGrid workflow

Medium term planning

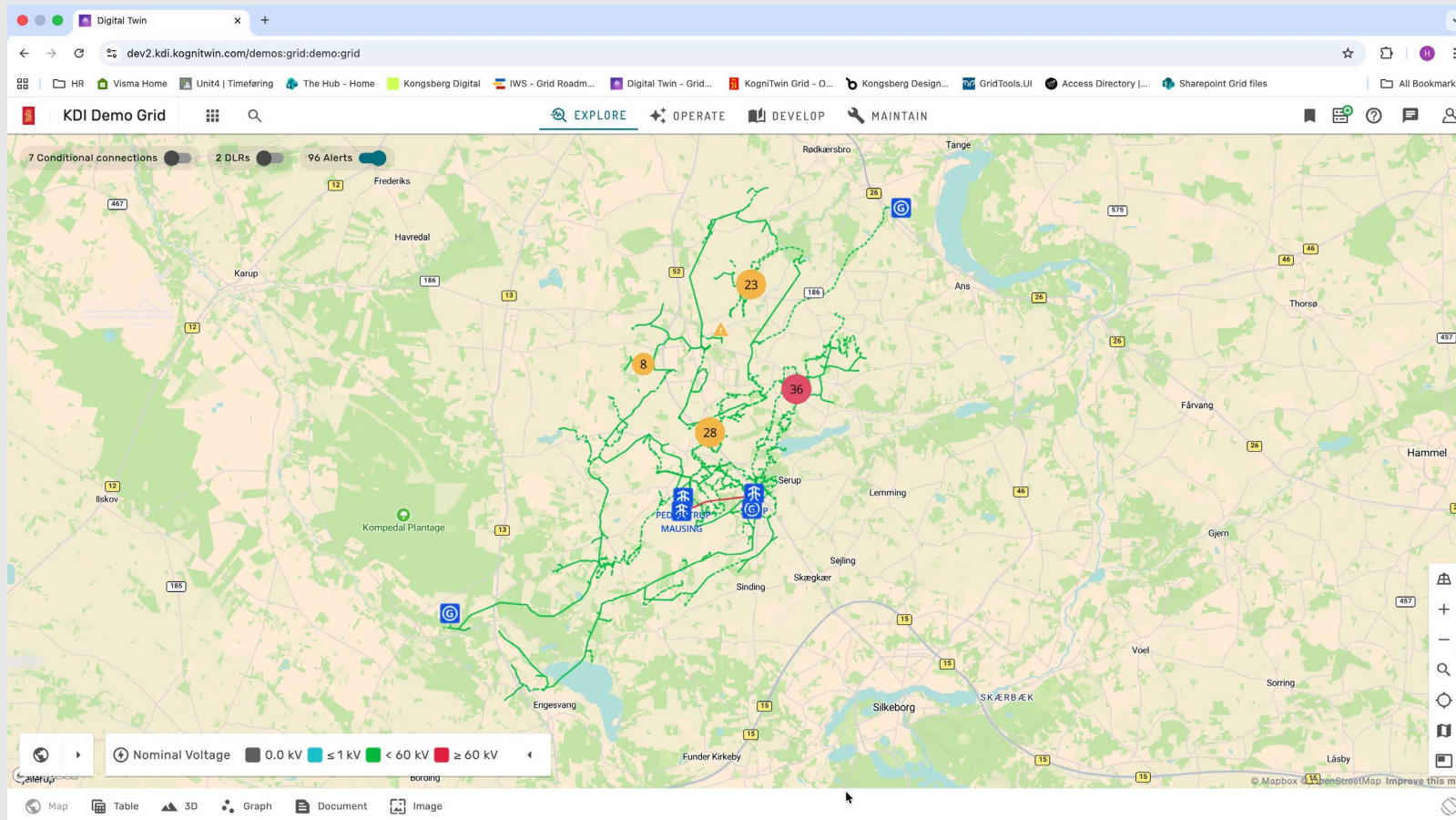


Short term planning and proactive decision support



Identify

ALERT LIST
FILTERING
SORTING

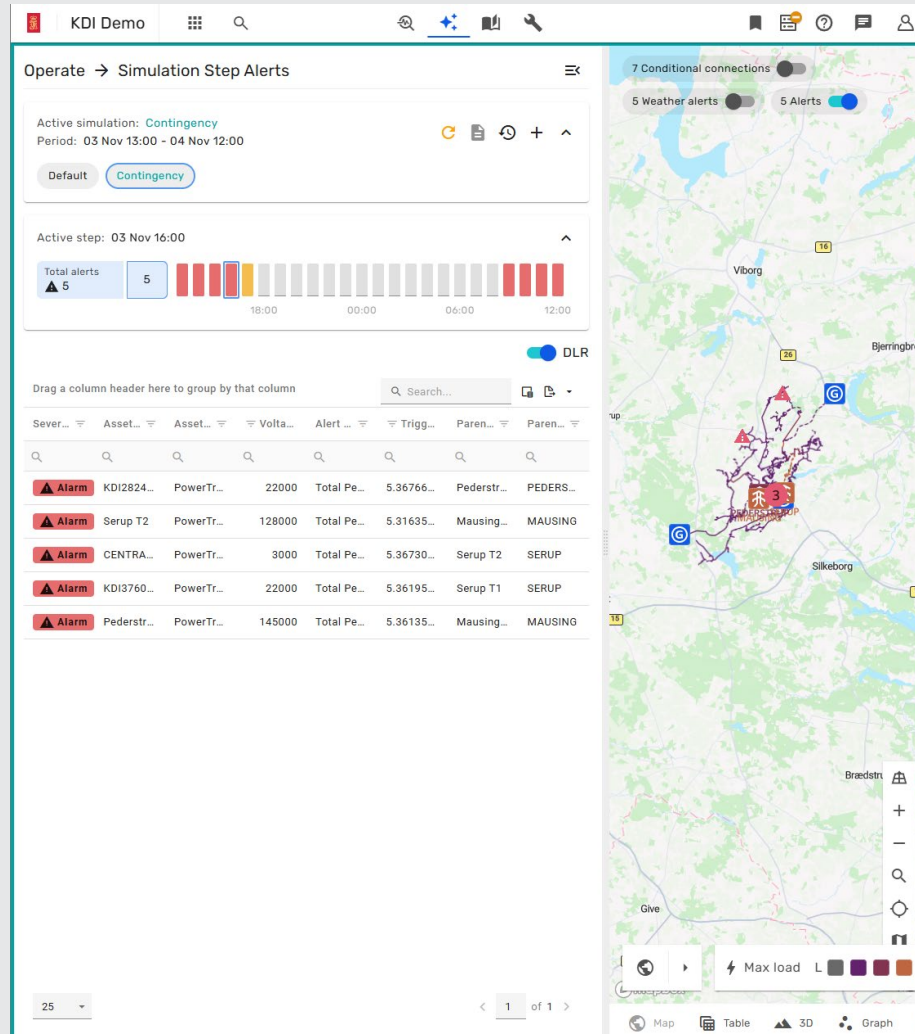
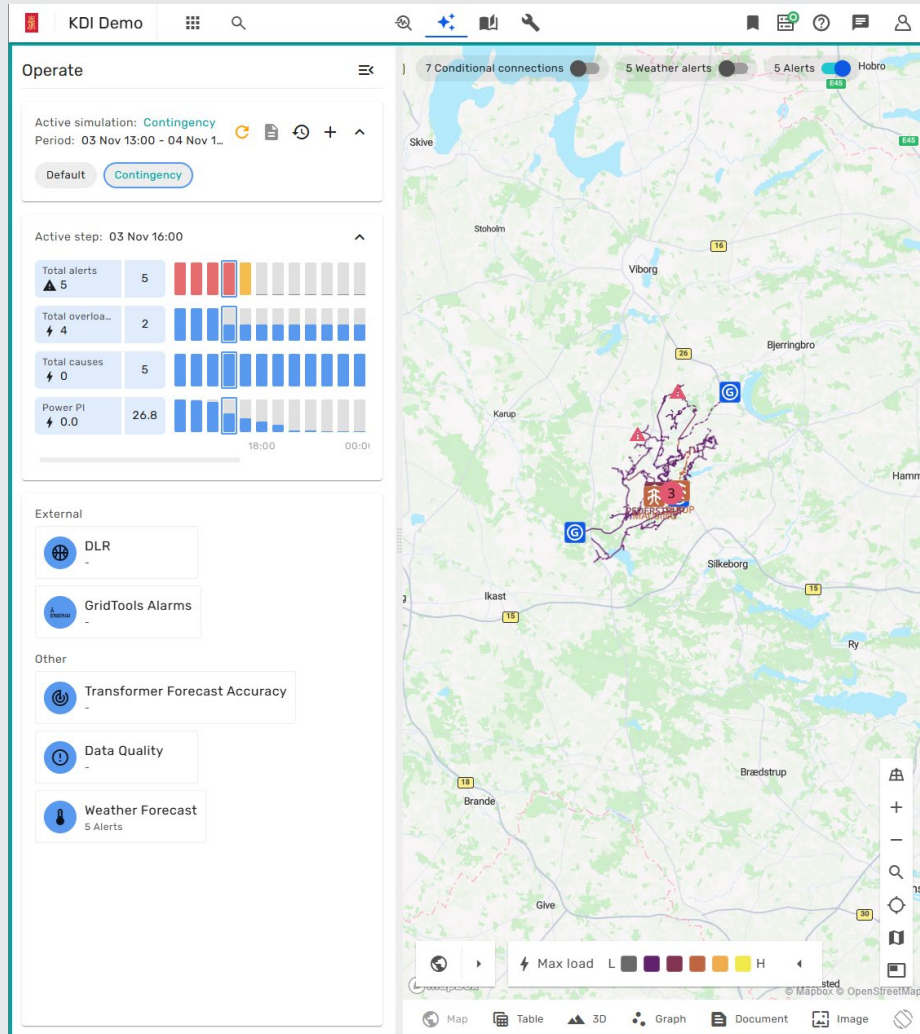


Enhancing the
filtering, sorting
and general
design on alert
list.

Analyze

N-1

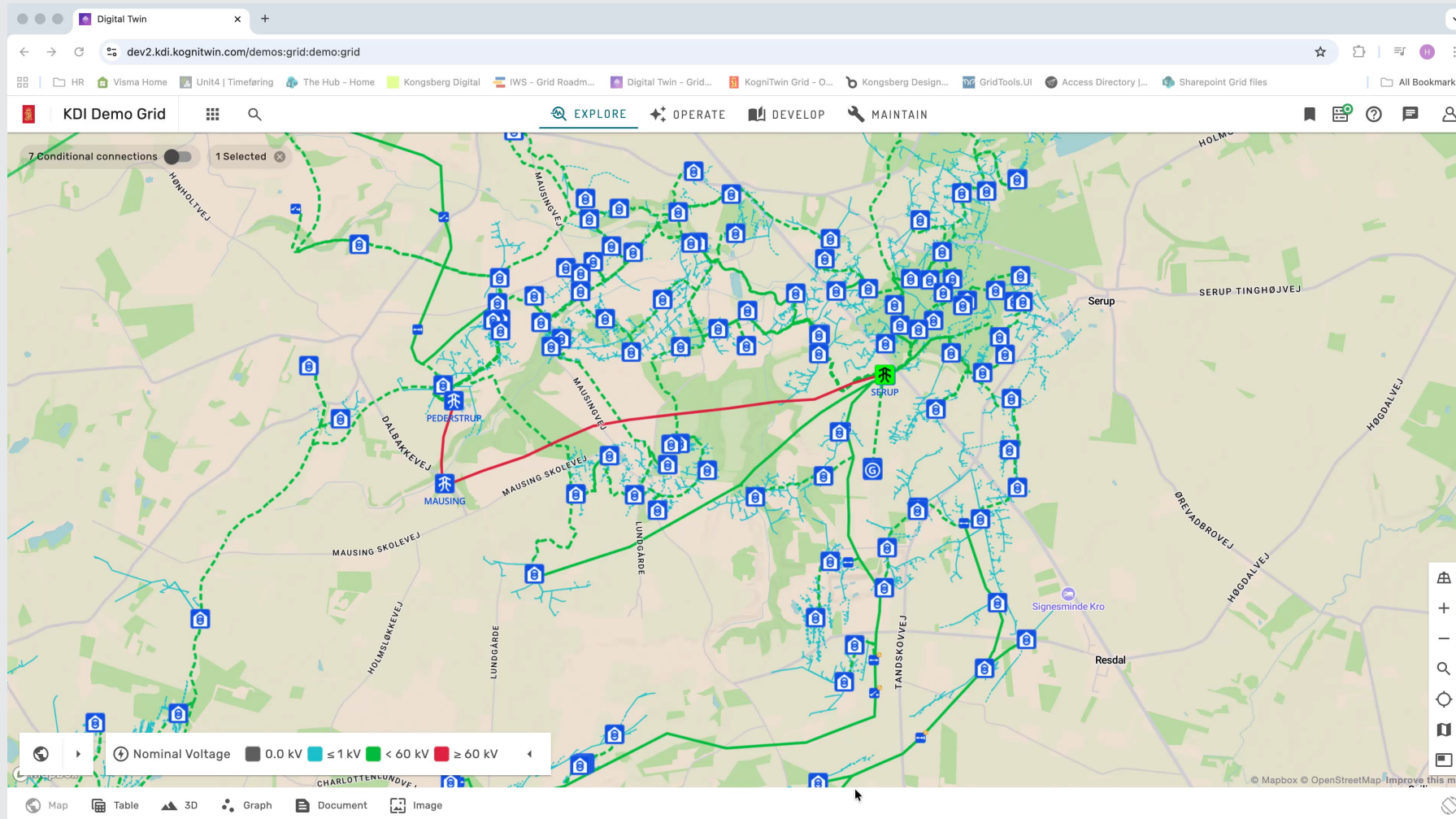
CONTINGENCY
ANALYSIS



How to best show
the result in an N-
1 situation.

Build Scenario

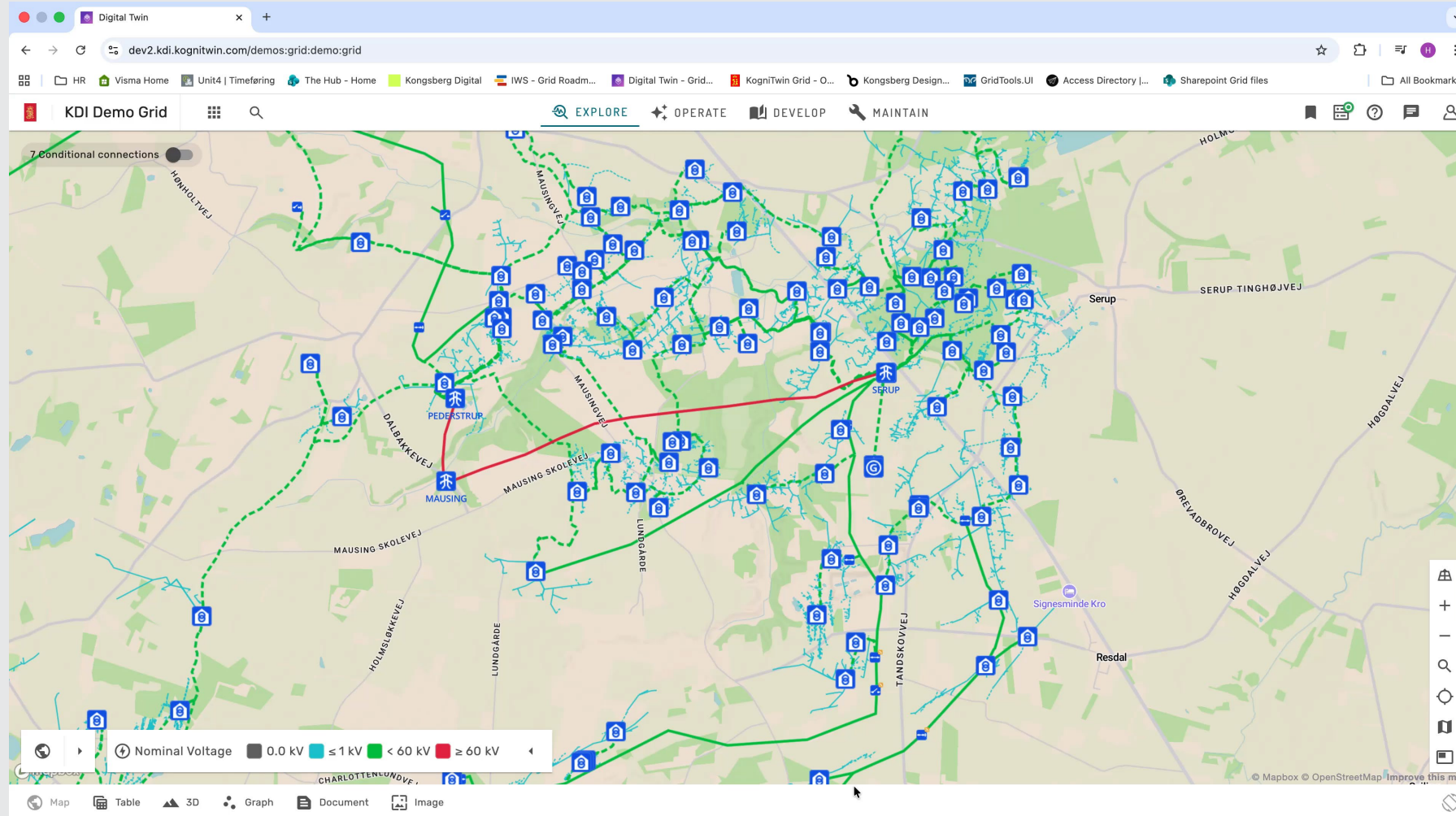
SCENARIO
BUILDER



Simplicity of
adding assets to
the scenario in
order to
simulation a
possible situation.

Connect and compare

CONNECTING
KOGNITWIN
GRID AND
GRIDTOOLS



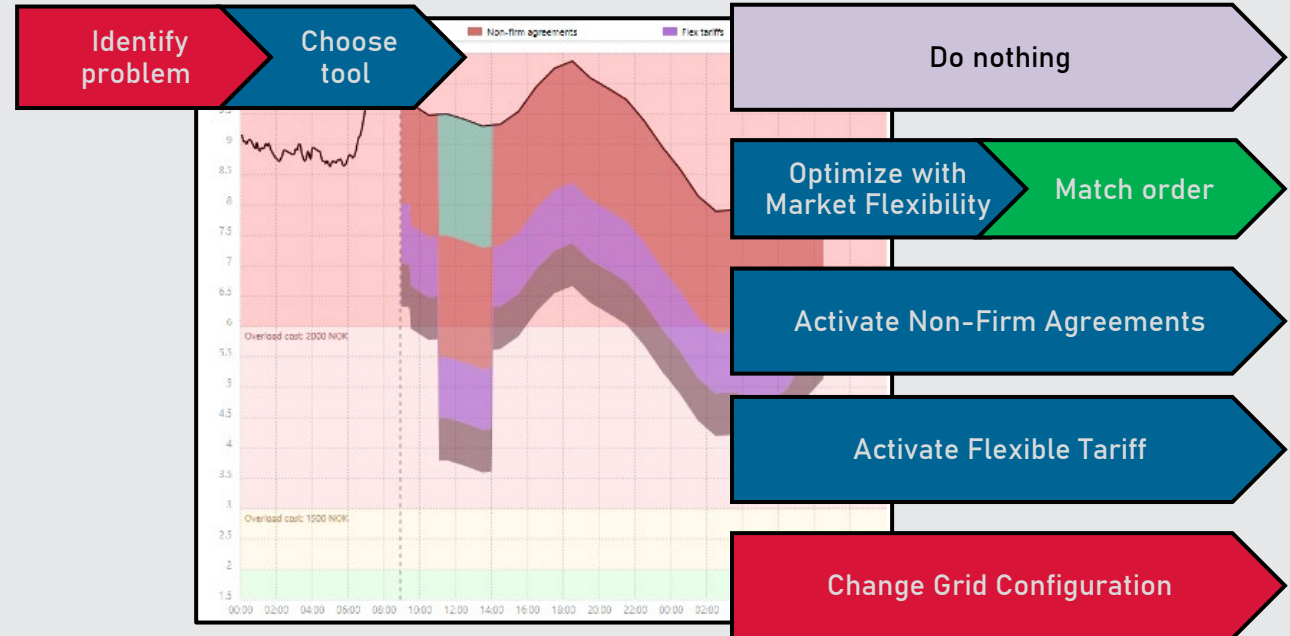
Created a link
between
Kognitwin Grid
and Gridtools.

NextGrid workflow

Medium term planning



Short term planning and proactive decision support

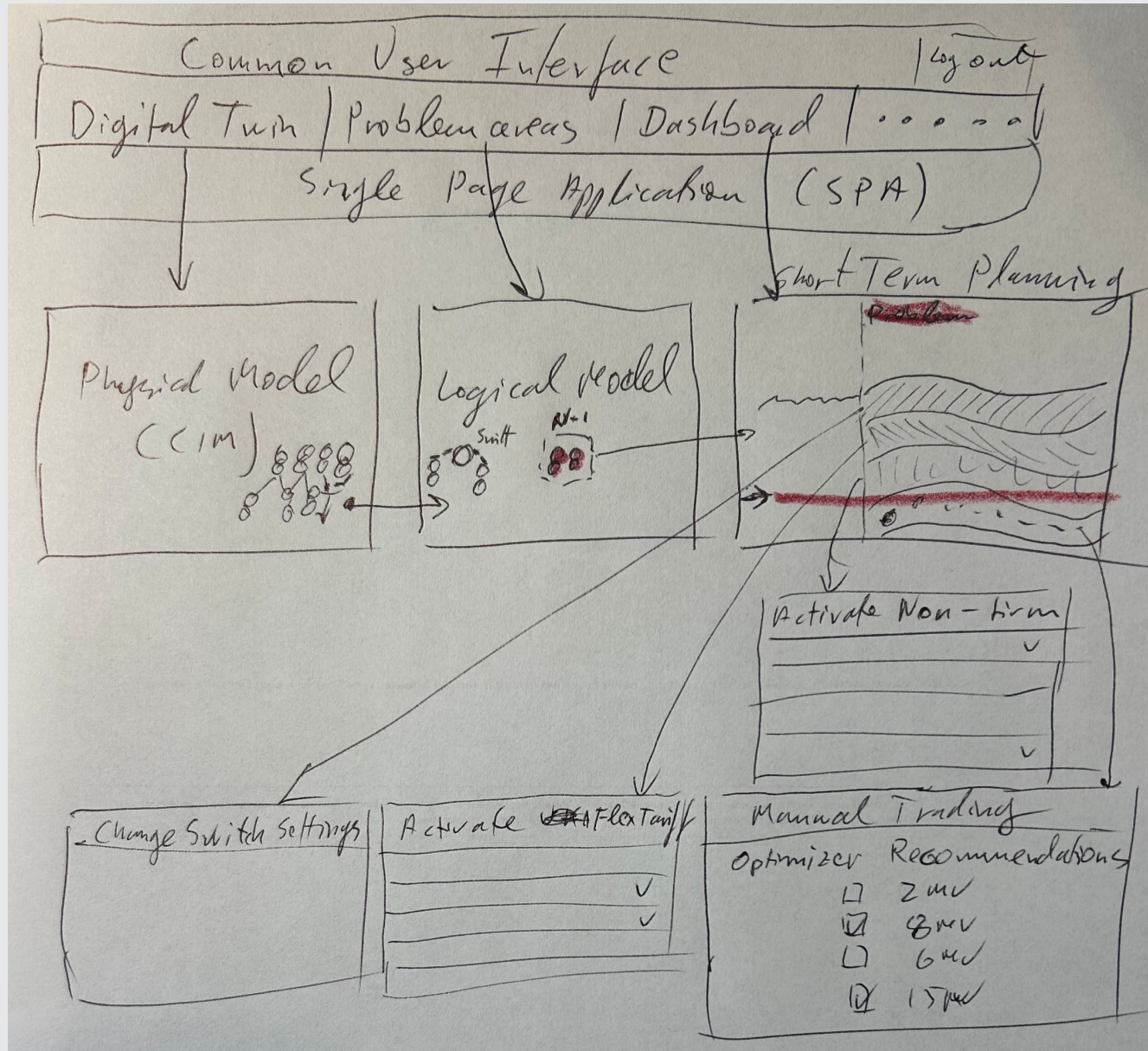


Common Work Surface

- Future scenarios and workshops
- Grid modeling and integrations
- Decision support and automation
- Demonstration, tests and reports



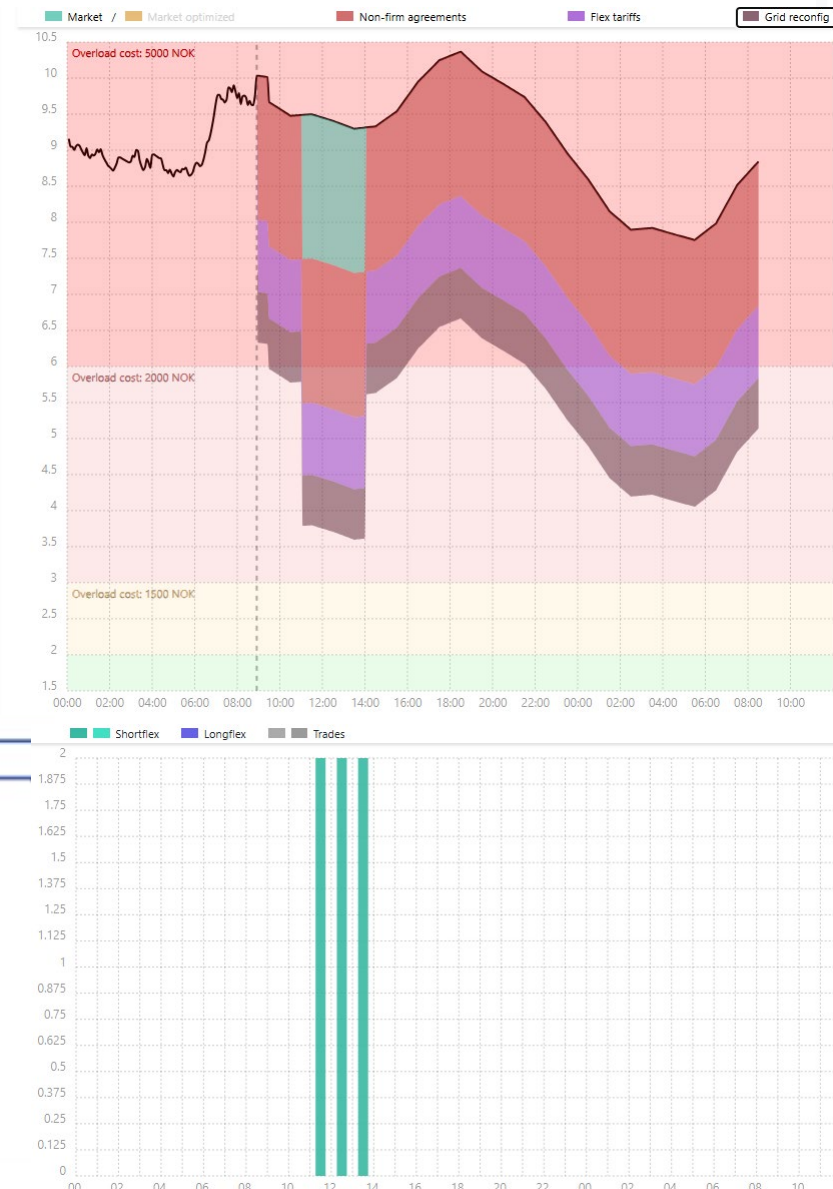
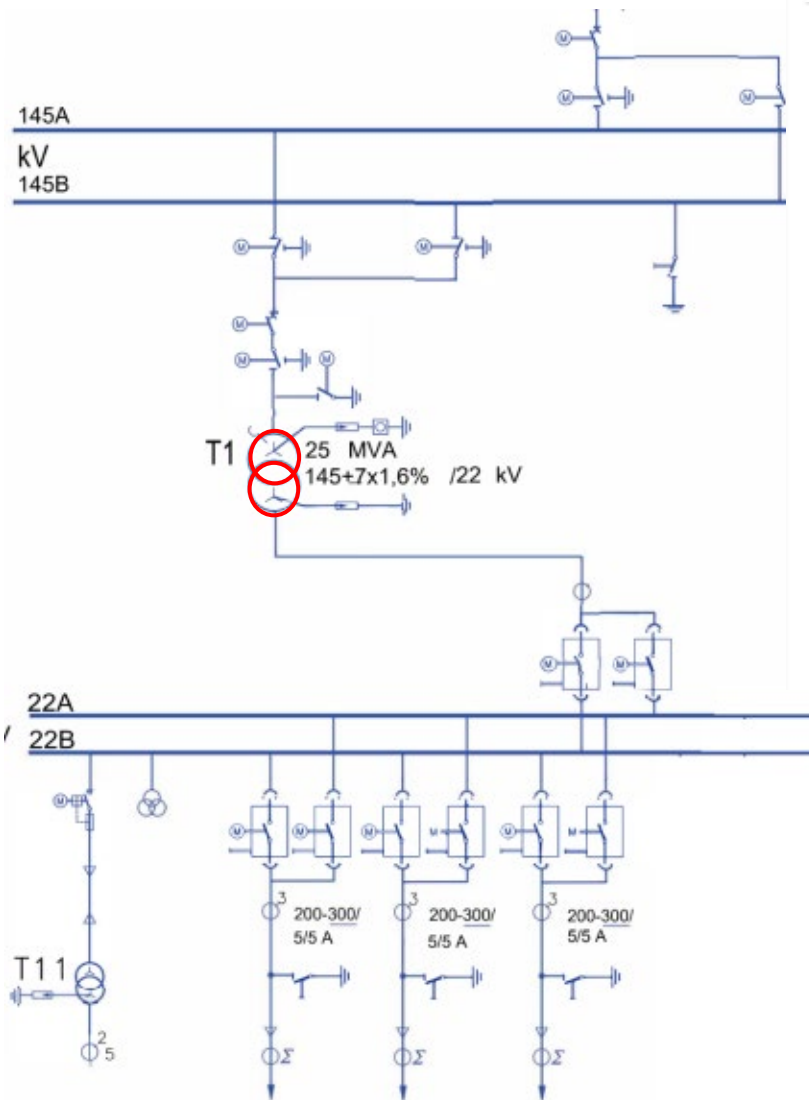
First sketches



- Single Page Application
- Digital twin (physical model)
- Problem Areas (logical model)
- Dashboard
- 4 tools
 - Change switch settings
 - Market flexibility
 - Flexible Tariff
 - Non-firm agreements



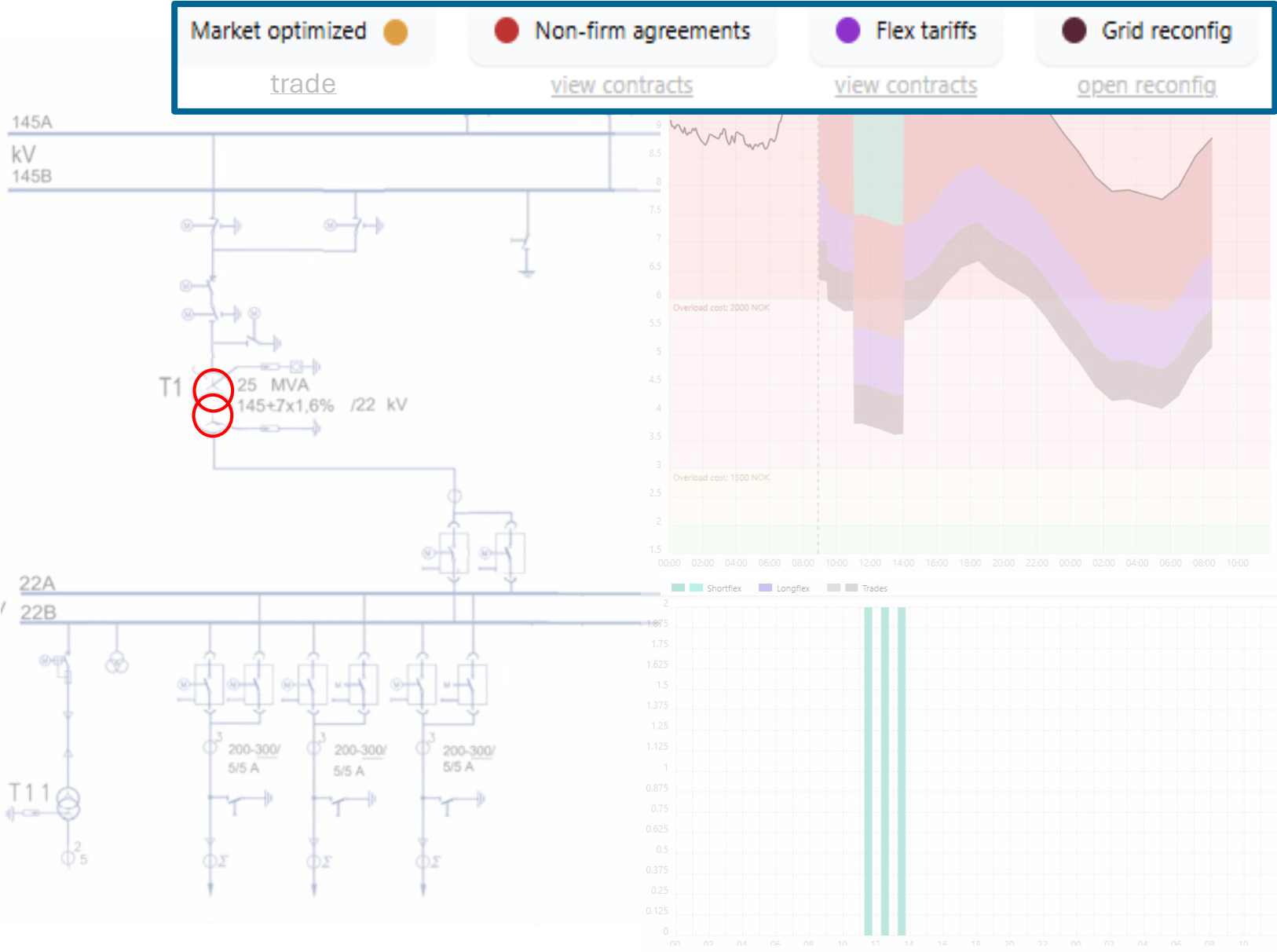
Severity ▾	Asset type	Asset Name	High Level	Time lasted
 Alarm	Trafo	T1	7,25 MW	4h
 Alarm	AC Line Segment	AFG-015BVCPW	Low Voltage	Name
 Alarm	AC Line Segment	AFG-015BVCPW	Low Voltage	Name
 Alarm	AC Line Segment	AFG-015BVCPW	Low Voltage	Name
 Alarm	AC Line Segment	AFG-015BVCPW	Low Voltage	Name
 Alarm	AC Line Segment	AFG-015BVCPW	Low Voltage	Name
 Alarm	AC Line Segment	AFG-015BVCPW	Low Voltage	Name
 Alarm	AC Line Segment	AFG-015BVCPW	Low Voltage	Name
 Alarm	AC Line Segment	AFG-015BVCPW	Low Voltage	Name
 Alarm	AC Line Segment	AFG-015BVCPW	Low Voltage	Name
 Alarm	AC Line Segment	AFG-015BVCPW	Low Voltage	Name

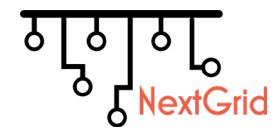




Severity	Asset type	Asset Name	High Level	Time lasted
Alarm	Trafo	T1	7,25 MW	4h

Alarm	AC Line Segment	AFG-015BVCPW	Low Voltage	Name
Alarm	AC Line Segment	AFG-015BVCPW	Low Voltage	Name
Alarm	AC Line Segment	AFG-015BVCPW	Low Voltage	Name
Alarm	AC Line Segment	AFG-015BVCPW	Low Voltage	Name
Alarm	AC Line Segment	AFG-015BVCPW	Low Voltage	Name
Alarm	AC Line Segment	AFG-015BVCPW	Low Voltage	Name
Alarm	AC Line Segment	AFG-015BVCPW	Low Voltage	Name
Alarm	AC Line Segment	AFG-015BVCPW	Low Voltage	Name
Alarm	AC Line Segment	AFG-015BVCPW	Low Voltage	Name
Alarm	AC Line Segment	AFG-015BVCPW	Low Voltage	Name



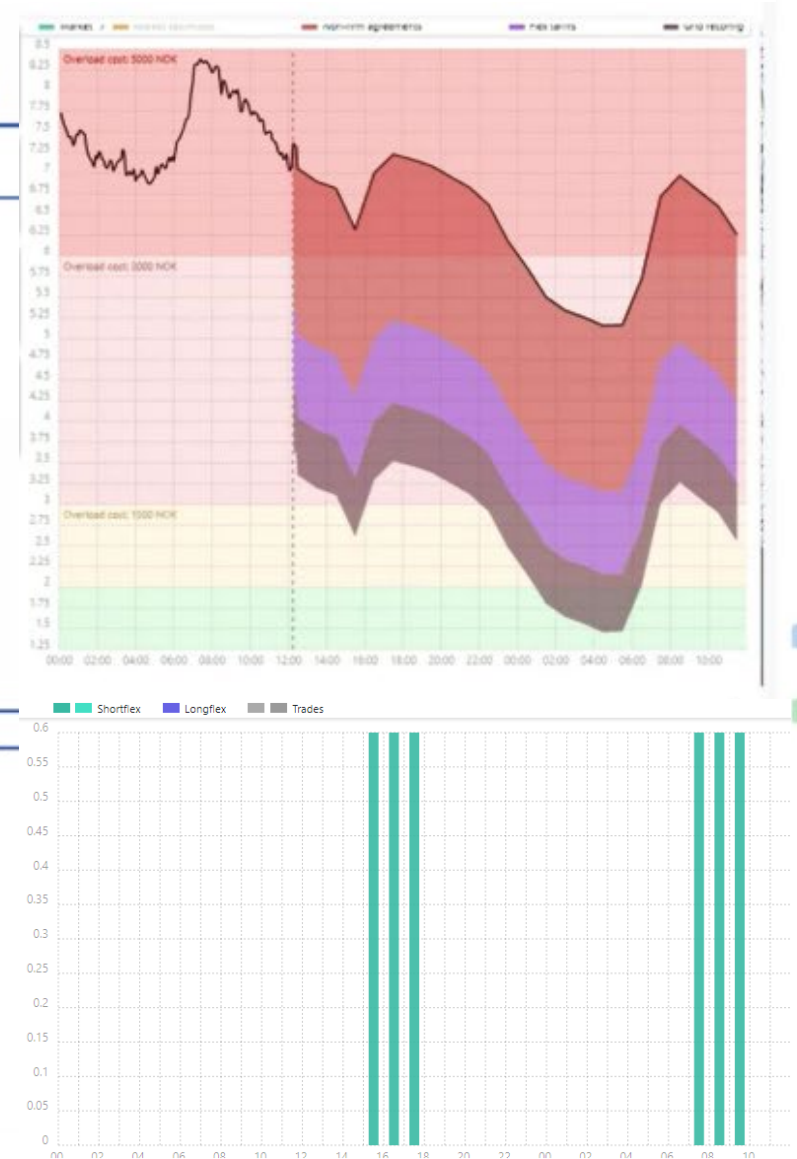
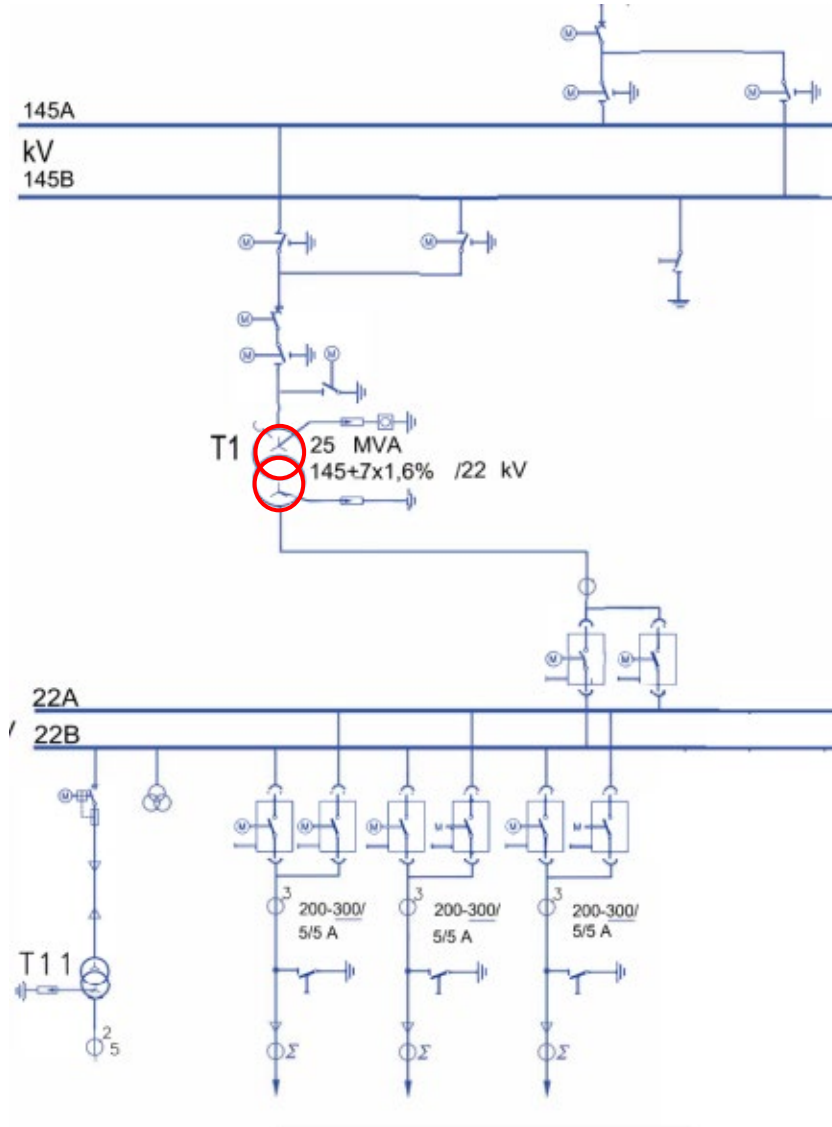


Only one alarm per day pr node
(trafo/line)

Preconfigured/persisted filter
- Filter also on overload length



Severity	Asset type	Asset Name	High Level	Length
Alarm	Trafo	T1	7,25 MW	4h

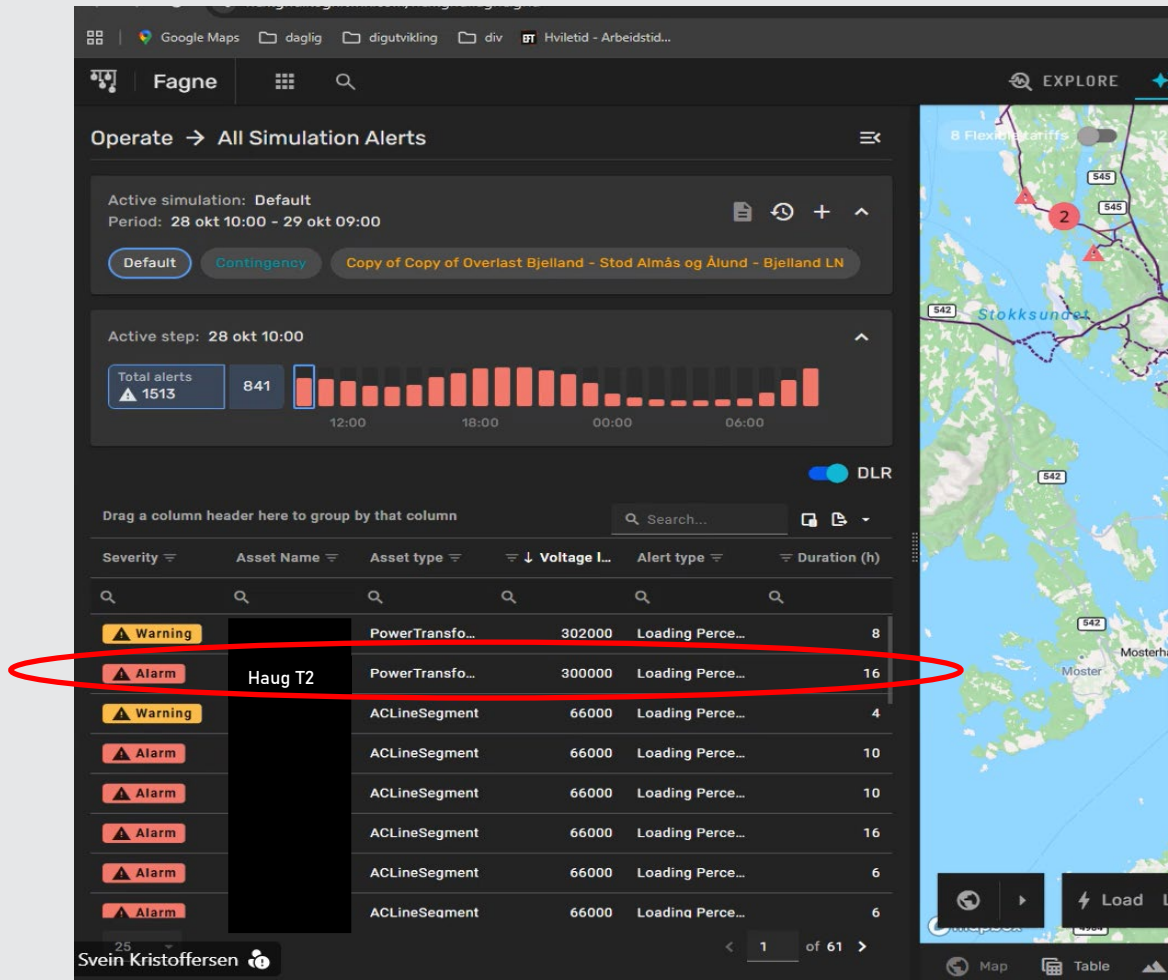


Test with Fagne

Real test with the latest developed software

- Real data, but no real activation
- Case: Overload in «Haug T2»

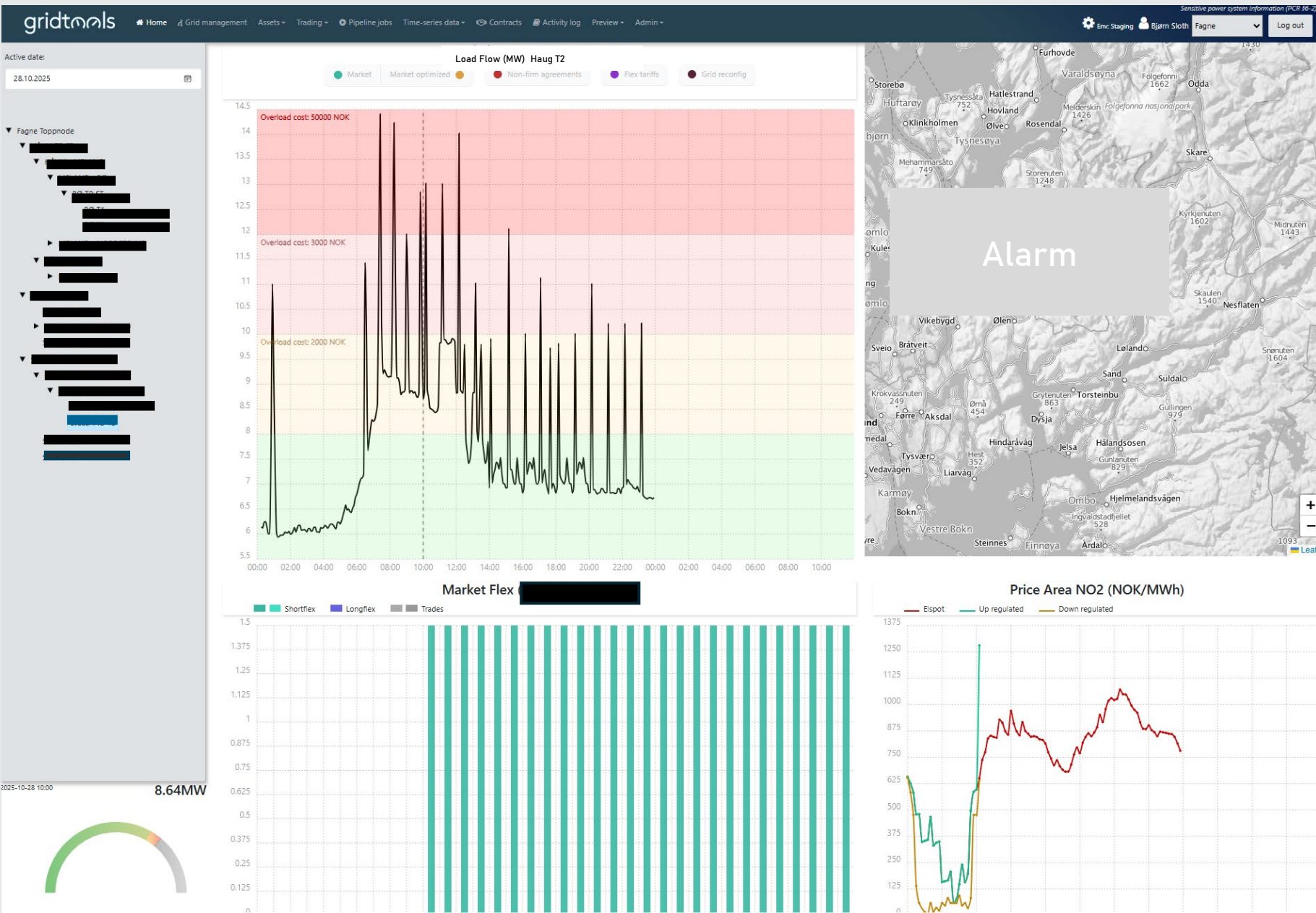
Alarm list



Overload in «Haug T2»

- Need operator invention

Operational planning dashboard



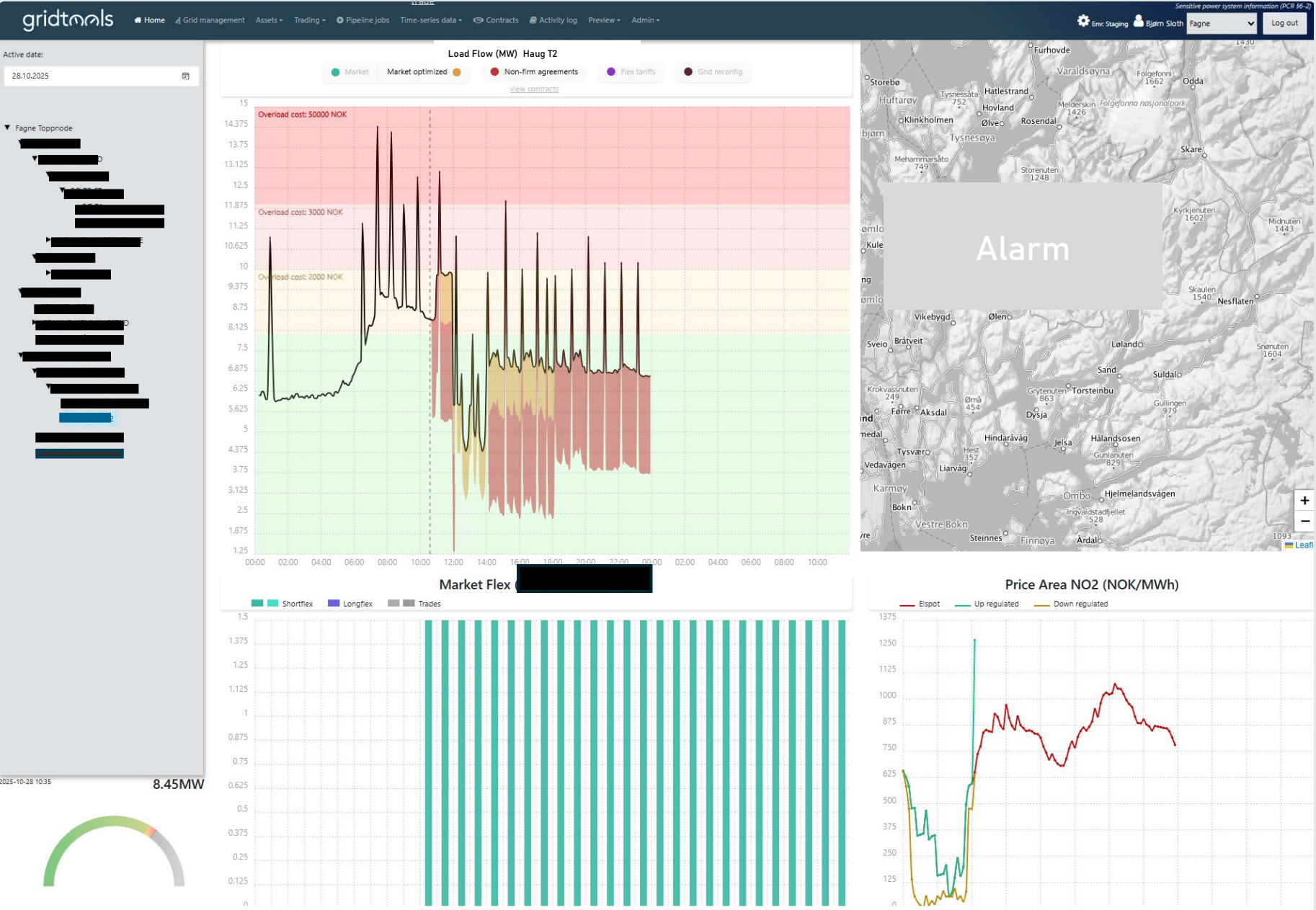
The tools

Market optimized ●	● Non-firm agreements	● Flex tariffs	● Grid reconfig
trade	view contracts	view contracts	open reconfig

Activate non-firm agreement

Activation start	Activation end	Quantity	
28.10.2025, 12:00	28.10.2025, 14:00	3	

Add



Non-firm
agreement
activated

Buy recommended market flex

Fri, 31 Oct, 12:33:49
ShortFlex
FinFlex ...
Suomi
Up regulation
Renewable t...
Asset type

Contracts Activity log Preview Admin

Recommendations

Count	Start	End	Name
7			
7			
7			
7			
7			
7			
7			
7			
7			
7			
7			
3			
7			
7			
7			
2			
6			
6			
5			

Demo Env.

- Notifications
- Dashboard
- Grid Areas
- Reservation
- Activation
- Asset Management
- Settlements
- Market Messages
- My Organization

		Best buy orders				Best sell orders				Buy	Sell
⊗	Fri, 31 Oct 11:00 - 12:00 Closed	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	0,0 MW	0,0 MW	
⊗	Fri, 31 Oct 12:00 - 13:00 Closed	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	0,0 MW	0,0 MW	
⊗	Fri, 31 Oct 13:00 - 14:00 Closed	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	0,0 MW	0,0 MW	
🛒	Fri, 31 Oct 14:00 - 15:00 13.00	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	0,0 MW	0,0 MW	
🛒	Fri, 31 Oct 15:00 - 16:00 14.00	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	2 MW 15 000,00 €	0 MW 0,00 €	0 MW 0,00 €	0,0 MW	2,0 MW	
🛒	Fri, 31 Oct 16:00 - 17:00 15.00	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	2 MW 300,00 €	5 MW 400,00 €	1 MW 450,00 €	0,0 MW	30,0 M...	
🛒	Fri, 31 Oct 17:00 - 18:00 16.00	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	2 MW 300,00 €	5 MW 400,00 €	1 MW 450,00 €	0,0 MW	32,0 MW	
🛒	Fri, 31 Oct 18:00 - 19:00 17.00	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	2 MW 300,00 €	5 MW 400,00 €	1 MW 450,00 €	0,0 MW	28,0 MW	
🛒	Fri, 31 Oct 19:00 - 20:00 18.00	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	2 MW 300,00 €	5 MW 400,00 €	1 MW 450,00 €	0,0 MW	28,0 MW	
🛒	Fri, 31 Oct 20:00 - 21:00 19.00	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	0,0 MW	0,0 MW	
🛒	Fri, 31 Oct 21:00 - 22:00 20.00	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	0,0 MW	0,0 MW	
🛒	Fri, 31 Oct 22:00 - 23:00 21.00	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	0,0 MW	0,0 MW	
🛒	Fri, 31 Oct 23:00 - 00:00 22.00	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	0 MW 0,00 €	0,0 MW	0,0 MW	

Go to next day

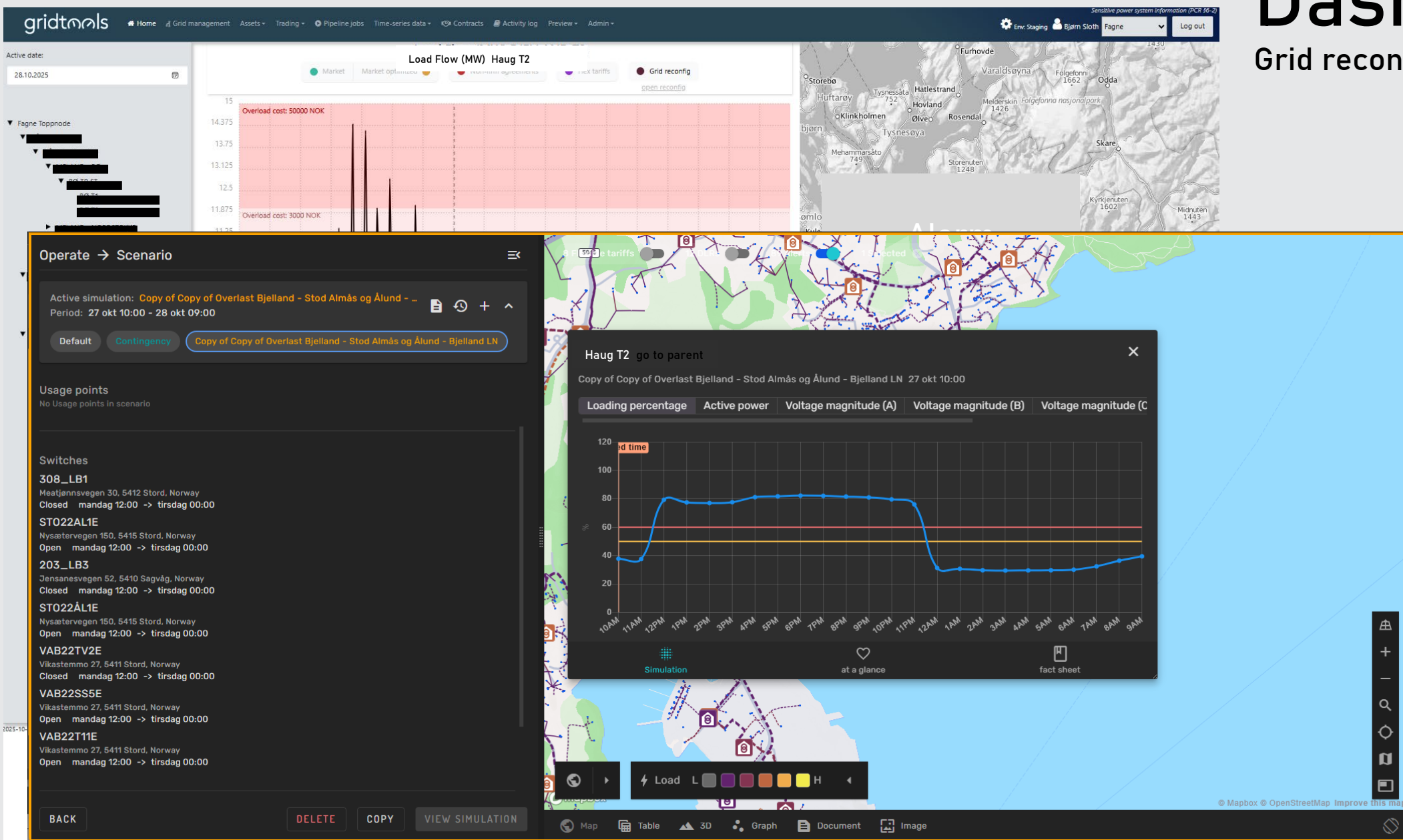
My Orders Sides Status Sources Fill types

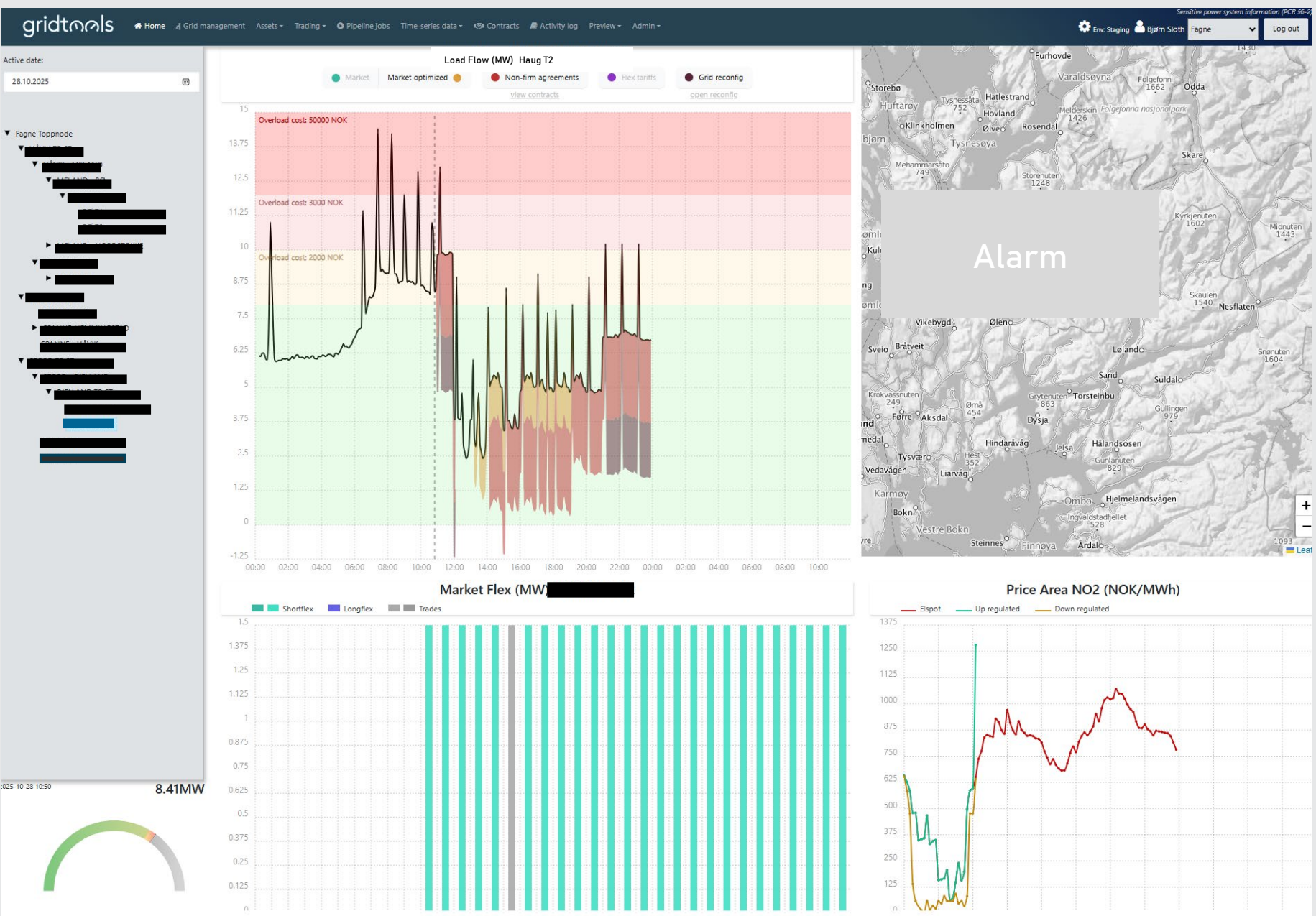
Showing orders in FinFlex Demo market starting from today. To view all your orders, go to the [orders page](#). To view your trades with the final price, quantity and period, please go to the [trades page](#).

Time ↑	Order Group	Side	Regulation Type	Status	Trades	Price	Quantity	Quantity Completed	Fill Type	Grid Node	Portfolio	LongFlex Contract	Last Modified	Comments	Actions
🛒 Fri, 31 Oct 07:00 - 08:00		Sell	Up	Expired		€15,000.00	2.0 MW	0.0 MW	Normal	Caruna Espoo	Espoo assets	Espoo.Reservation	1 Oct 2025, 03:55		
🛒 Fri, 31 Oct 08:00 - 09:00		Sell	Up	Expired		€550.00	3.0 MW	0.0 MW	Normal	FG Etelä	Soumi.Etelä	Soumi.LongFlex	1 Oct 2025, 03:55		

Dashboard

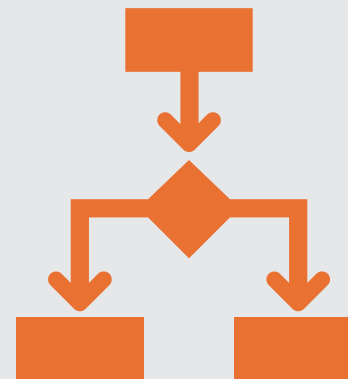
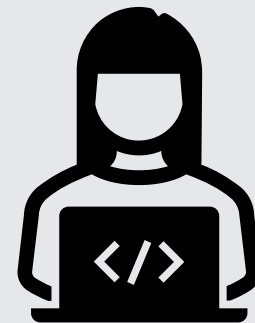
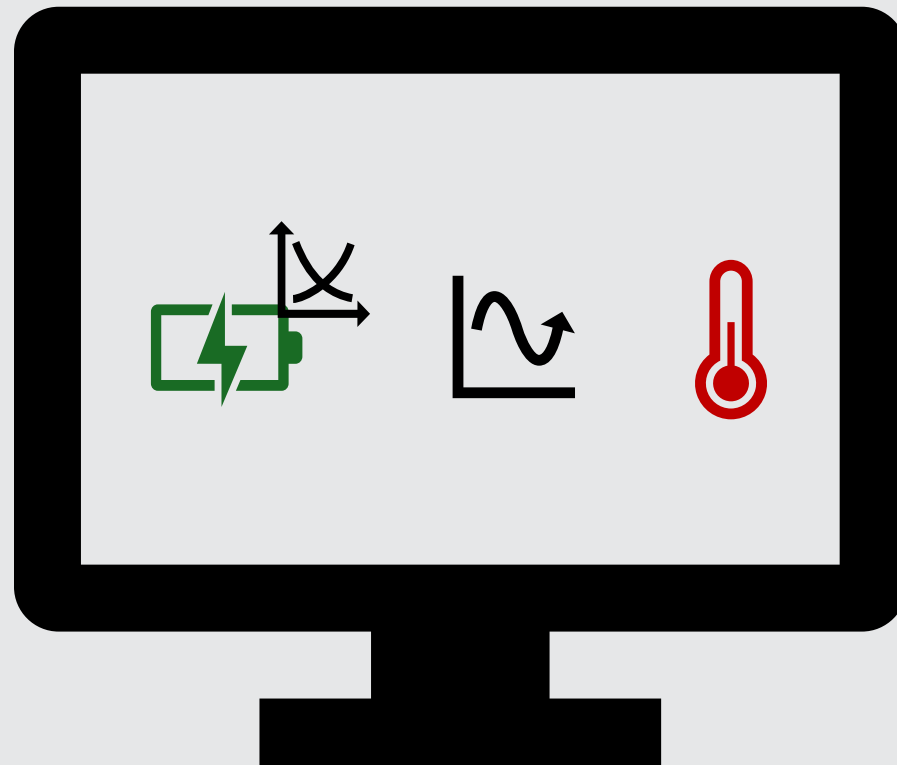
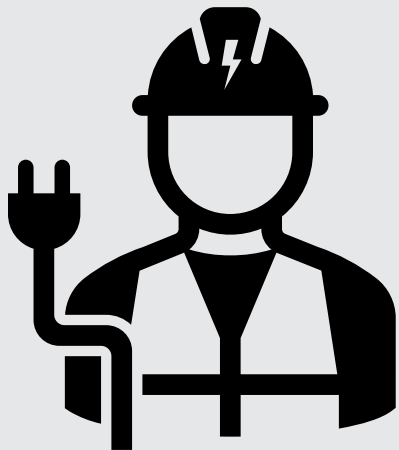
Grid reconfiguration

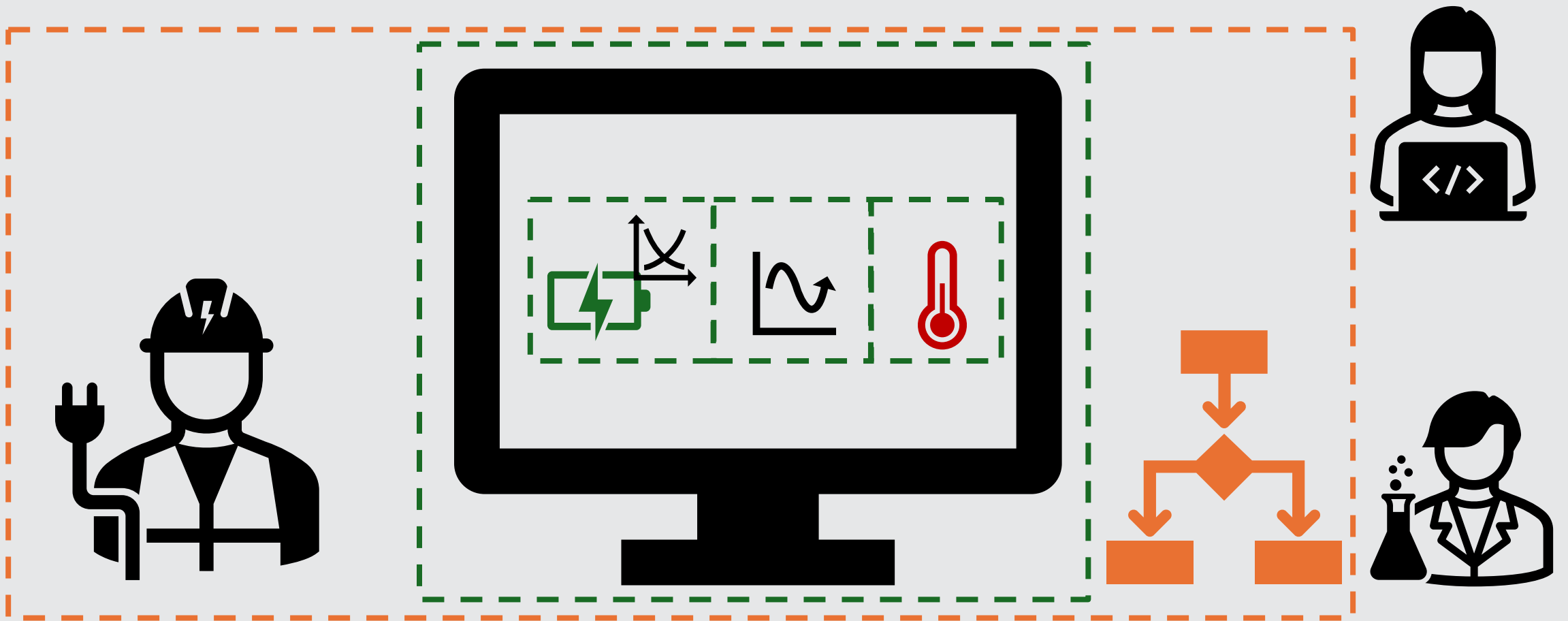




Problem solved

- Non-firm agreement activated
- Market flexibility traded
- Switches reconfigured





Testing operational planning

How to even test operational planning?



SoS must be maintained



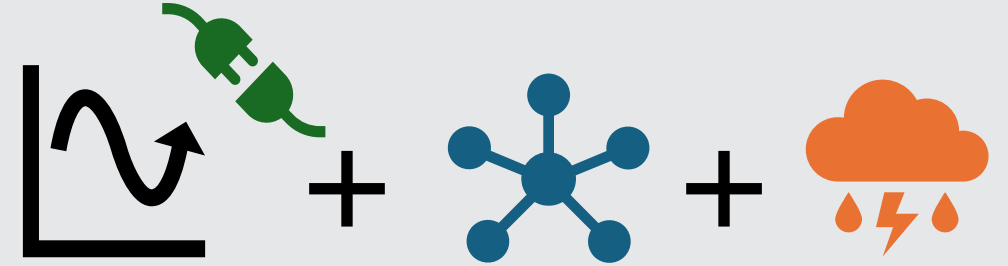
Some simulation is required



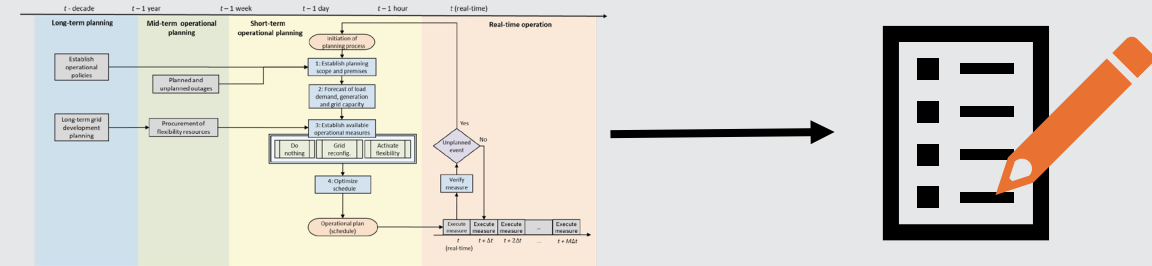
Need precise, directive procedure

What we landed on

1. Define operational scenario



2. Define use of tools of interest

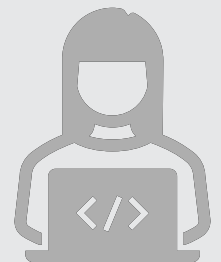
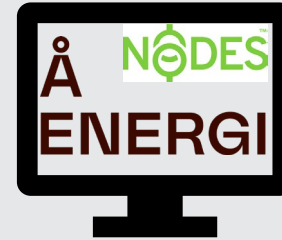


3. Define interview questions



Experimental setup

- Scenarios
 - Congested regional transformer
 - Congested regional lines
 - Planned outage
 - Unplanned outage



Results

- The actions were effective both alone and in combination
- Same decision support can be used both proactively and reactively
- Feedback from operators
 - Difficult manual process -> Automation in the long term
 - How to trust active grid measures?

Foreward for operational planning

- Need for modularity
 - Technologically
 - and methodologically
- Realistic testing
 - Chicken and egg
 - Safety requirements
- Organizational
 - 'Operational planner' role

Break