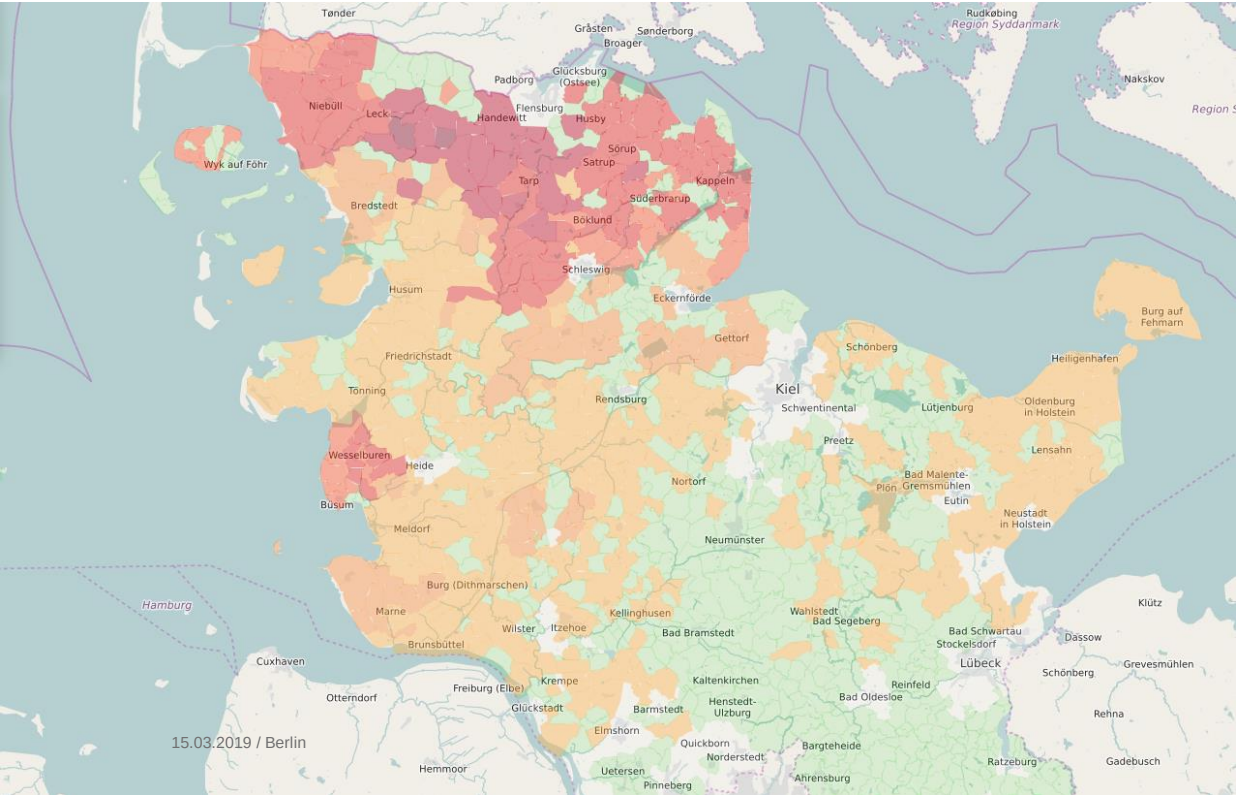
Using ENKO for infeed management – method and prediction capabilities

Dr. Clemens Gerbaulet 15.03.2018

Schleswig-Holstein Netz

Renewable curtailment in Schleswig-Holstein 2018
Distribution of intensity



15.03.2019 / Berlin

Infeed management in Schleswig-Holstein in 2017[1]

~3.300 GWh
Curtailment of renewable energy sources

~350 Mn €
Costs for grid customers

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[1] Values for 2017. BNetzA: Quartalsbericht zu Netz- und Systemsicherheitsmaßnahmen

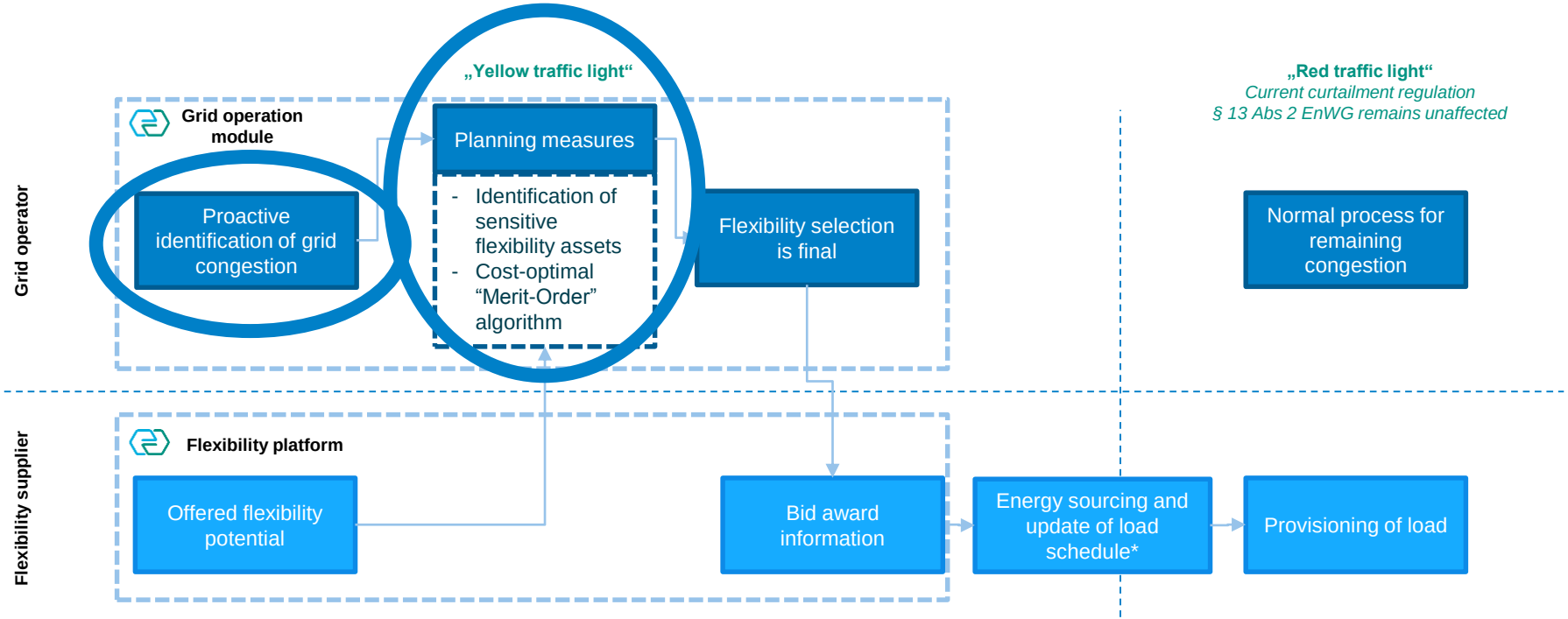
Today I will talk about ENKO

ENKO is part of the SINTEG-project NEW 4.0

NEW 4.0 goal: 100% renewable energy supply for the Region Hamburg and Schleswig-Holstein until 2035

- Increase local renewables usage: sector coupling, smart-grid approaches
- ENKO (by ARGE Netz and SH Netz) uses voluntary demand flexibility
  → More green electricity, less grid congestion and less infeed management
- The ENKO-platform is live since January:
  → Q3 & Q4 2018: Live-simulation of ENKO with pilot-customers
  → During simulation: Feedback, process optimization, technical feasibility
  → Since January 2019: Real operation

Using Flexibility for congestion management in ENKO



* In the framework of the research project balance compensation by the grid operator is not done.

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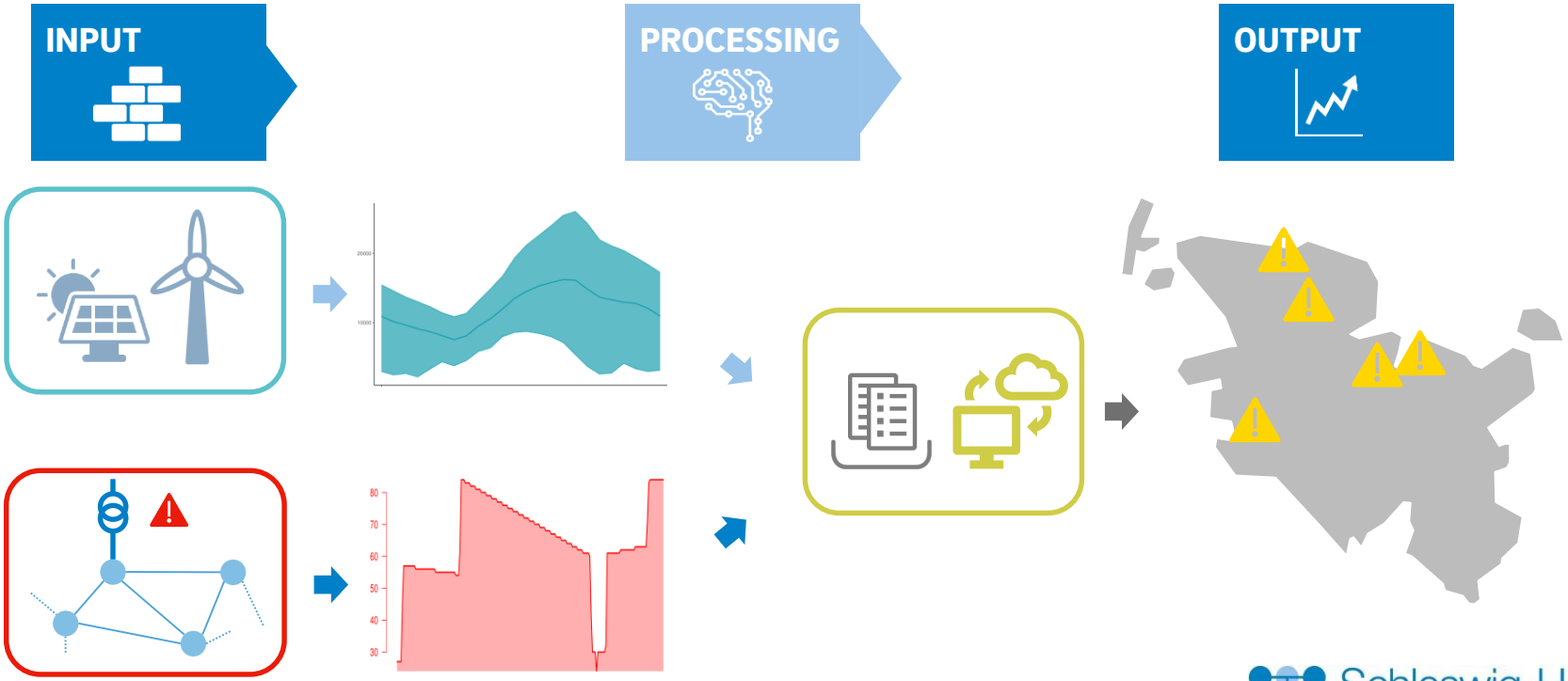
Predictions using sophisticated artificial neural networks



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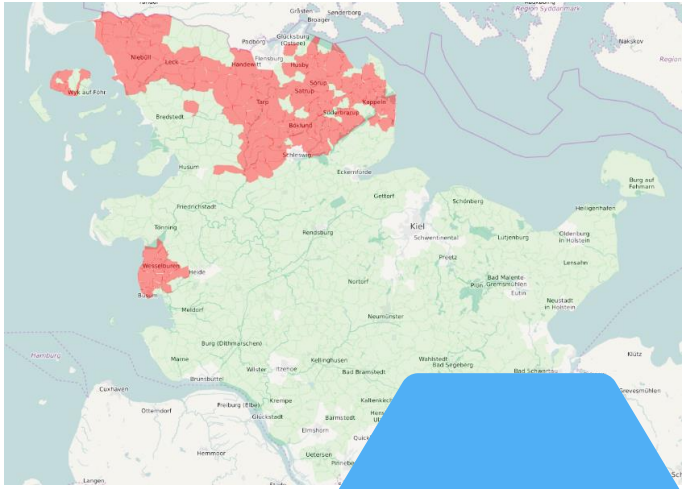
Prognoses published on netzampel.energy (after ENKO gate closure)

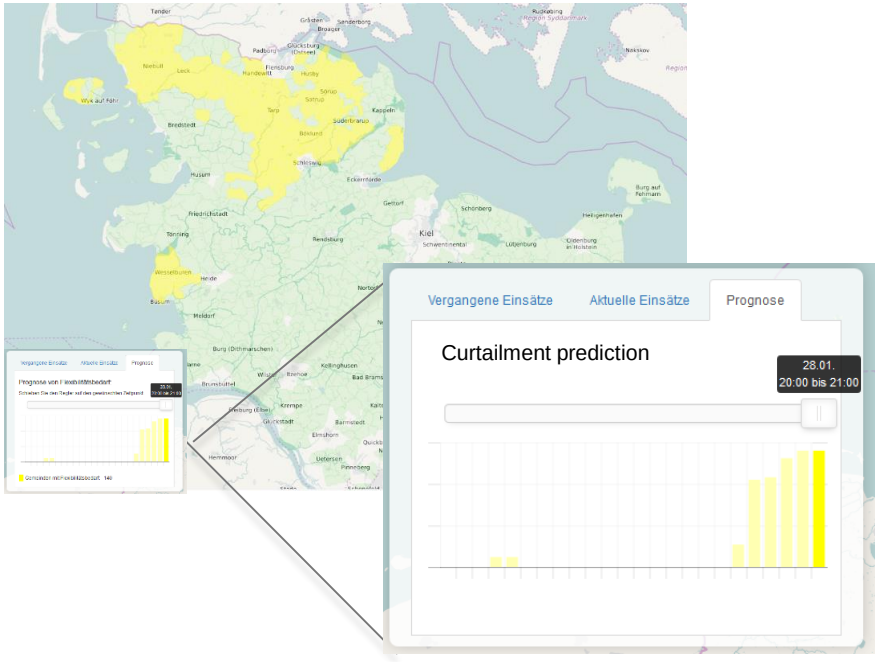
Actual renewable curtailment



13. November 2018 , 14:00

www.netzampel.energy

Prediction of renewable curtailment



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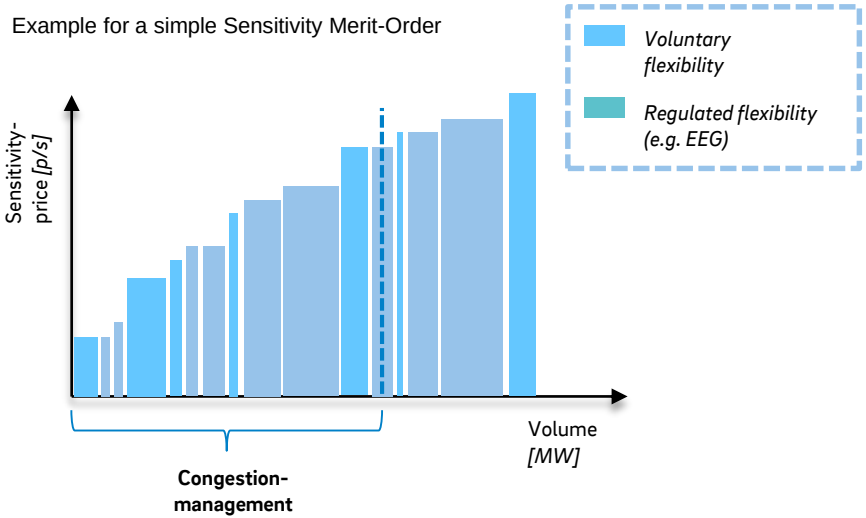
Cost & sensitivity-based algorithm → cost-efficient selection

Cost-efficient „sensitivity merit order“: Selection is based on costs to relieve congestion for all grid congestions simultaneously

Example for a simple Sensitivity Merit-Order



Example calculation for price-sensitivity merit order with a single congestion (1,5MW) and only 0% and 100% regulation steps also for renewables

Asset	Power (MW)	Sensitivity	Price (€/MWh)	Price-sensitivity (€/MWh)	Congestion-reduction (MW * Sens)	Cost 1h	Awarded?
EEG 01	3	0,3	90 €	300 €	0,9 MW	270 €	Yes
EEG 02	2	0,25	90 €	360 €	0,5 MW	180 €	Yes
Flex 01	1	0,23	95 €	413 €	0,23 MW	95 €	Yes
Flex 02	1	0,23	97 €	422 €	0,23 MW	97 €	No
EEG 03	2	0,21	89 €	424 €	0,42 MW	~~178 €~~ Savings 83 €	No

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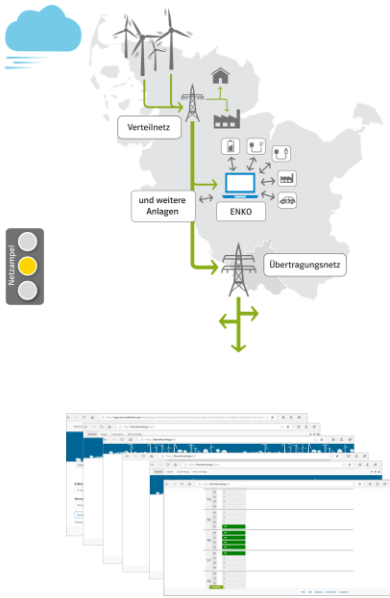
Lessons learned from live operation and live-simulation



The ENKO concept generally works and amends existing processes

- Voluntary participation of flexibility providers generally works
- Processes are transparent
- Extension to Einsman, does not influence safe grid operation
- Validation of load-provisioning based on meter data

Status

- Live operation based on SINTEG VO since January 2019
- Both API and Web-interfaces are important – standards necessary
- New capabilities developed that can be built upon in the future if needed:
  - Prediction structure works well for ENKO process
  - New algorithms such as sensitivity based merit order optimization algorithm

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Thanks!

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