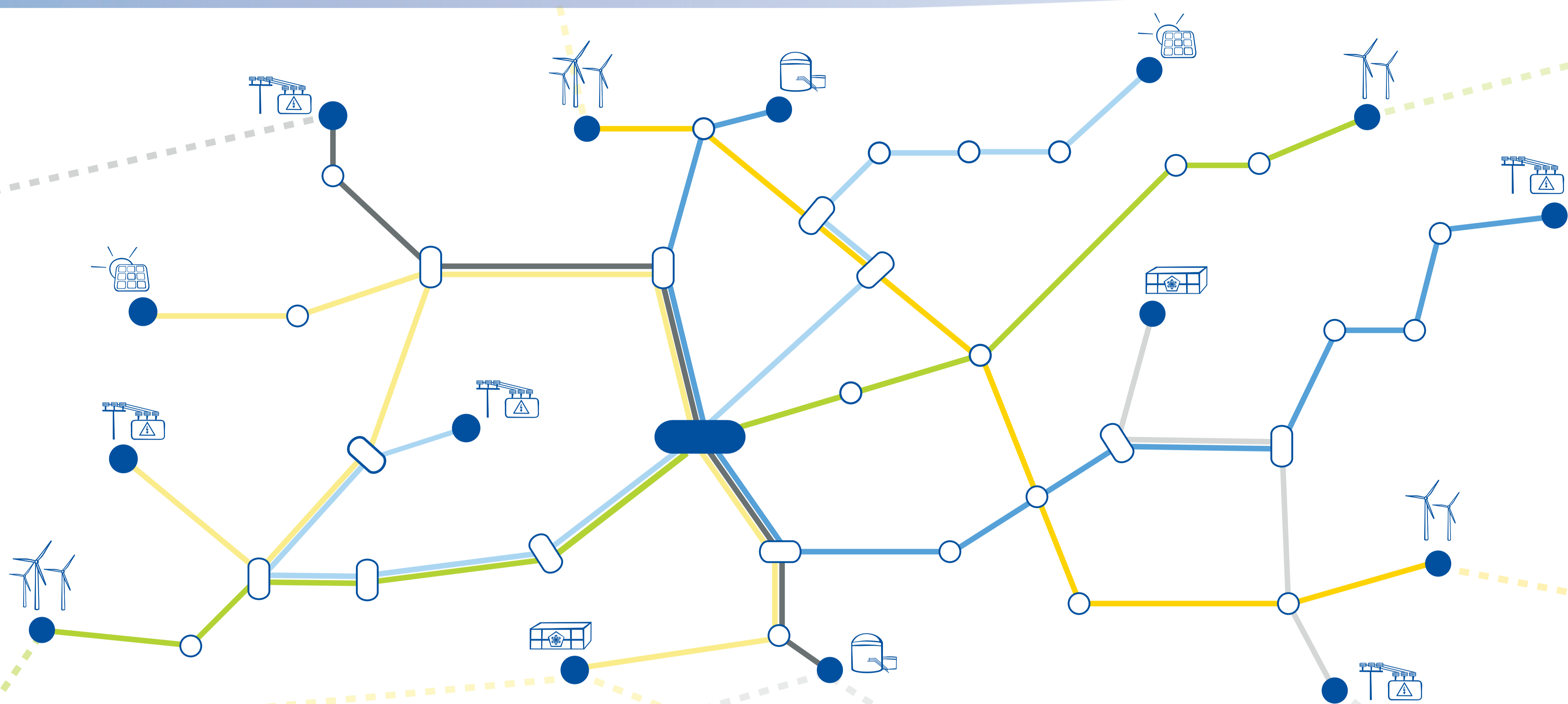


# Transformer Monitoring for cost-efficient and robust Smart Grids

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## Facing the Future Energy System

Due to the ongoing installation of renewable energy sources the degree of capacity utilization of distribution grids is constantly rising and especially in rural regions component capacity thresholds are often reached. The high volume feed-in of electricity generated from wind and photovoltaics calls more and more for fast reaction to changes in power flow direction and high load gradients. At the same time, assets need to be used more efficiently. Moreover, in many countries reducing feed-in from renewables is penalized by law.

## Why Transformer Safety Monitoring?

Nowadays, actual transformer loads are not well known because of fluctuating feed-in from renewables. Therefore transformers are operated based on a high safety margin. Increasing transformer capacity to support the fluctuating feed-in is a major cost driver and today's grid operation based on short-term assumptions is both error-prone and costly.

## BTC TSM: Our future-oriented Approach

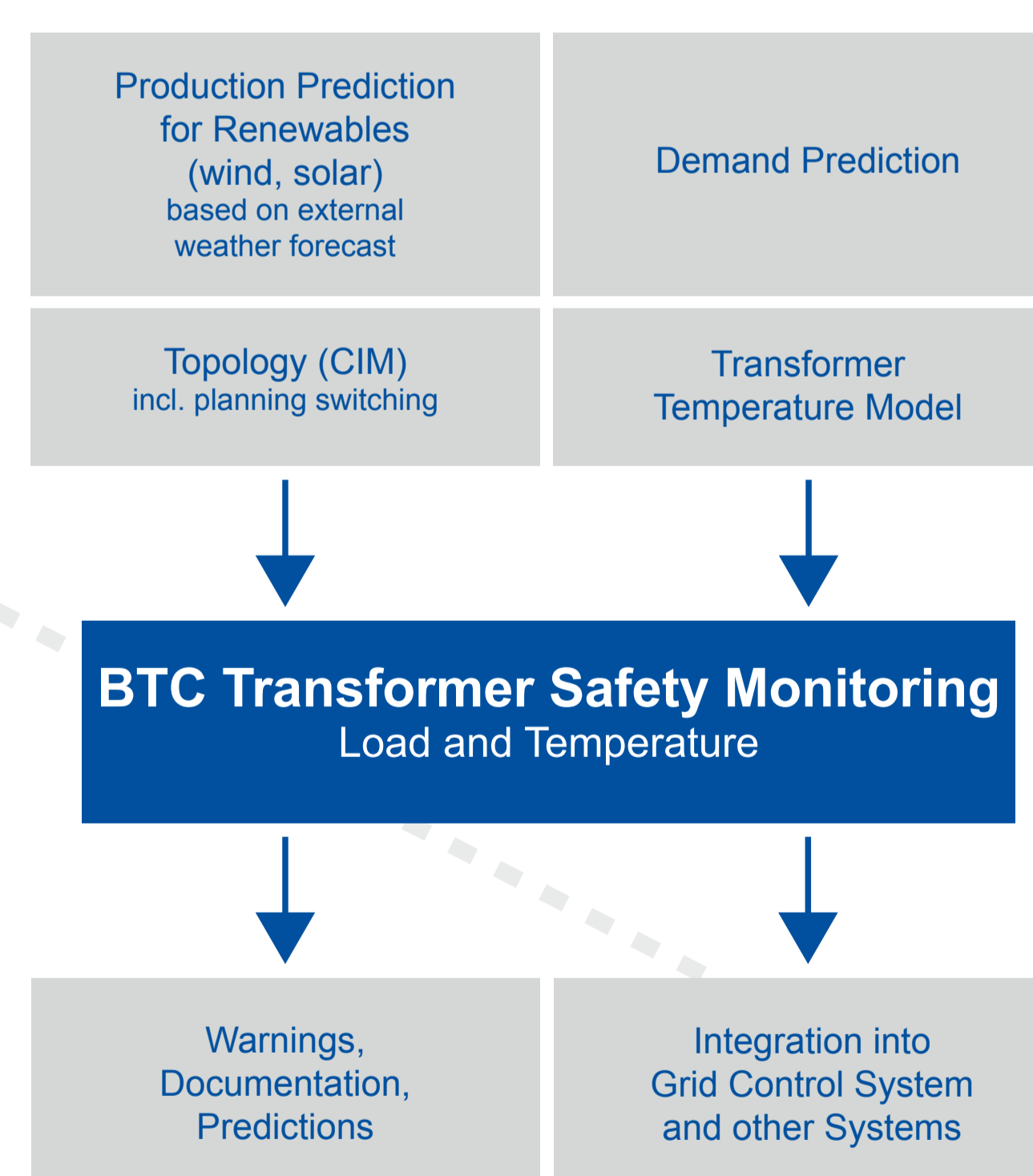
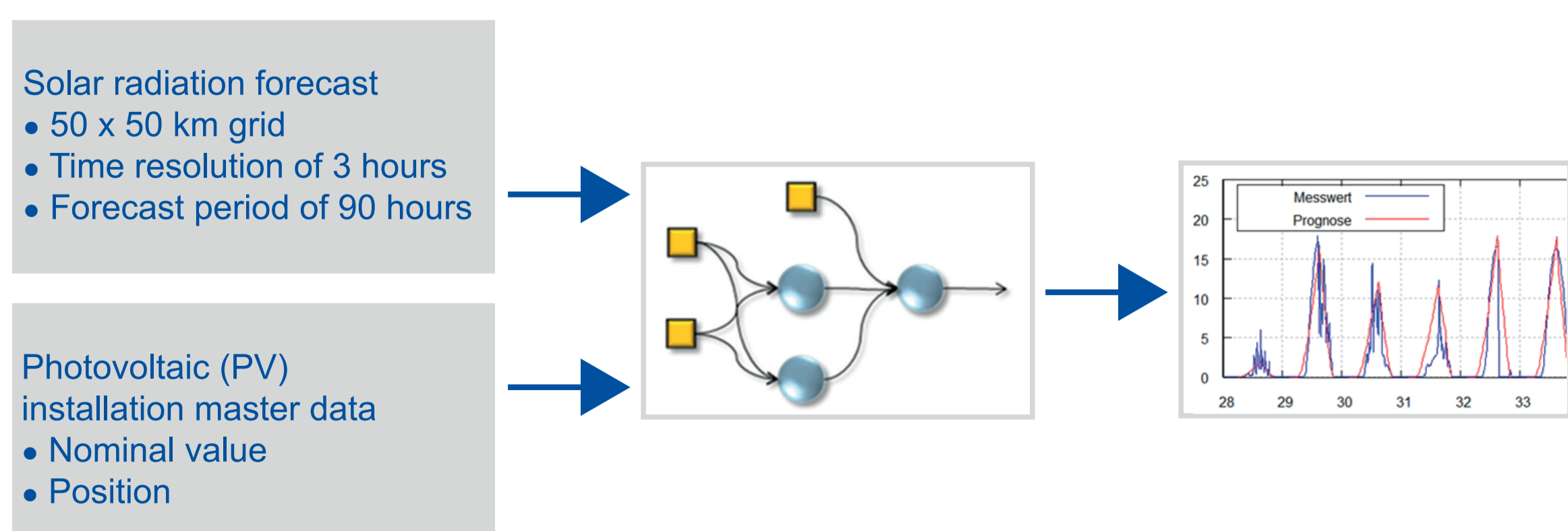
BTC Transformer Safety Monitoring (BTC TSM) is based on a transformer temperature model and forecasts grid overloads.

BTC TSM...

- ...forecasts upcoming transformers loads based on prediction of renewables feed-in and prediction of consumption
- ...predicts transformer hot-spot temperature and thereby reduces it

## Added Value for our Customer

Users benefit from various advantages of BTC TSM: Reducing the risks of overloads, avoiding early transformer aging, averting damage to grid components, and reducing costs for grid expansion and compensations paid to renewable energy generators.



## Pilot Installation in North-West Germany

The TSM concept has been implemented in the grid of EWE NETZ, a distribution grid operator located in north-west Germany next to the North Sea. The pilot was installed in 2011 and has been subsequently extended to 60 power transformers (110 kV) in 2012.

Highlights at a glance:

- Power lines can be switched to adjacent substations in case of predicted overloads
- Maintenance related cut-offs can be planned the day ahead of maintenance
- Curtailments can be avoided

## Outlook: Transformer Safety Monitoring & Virtual Power Plants (BTC VPP)

**Idea:** Bringing together Smart Grid and Smart Market using BTC TSM and BTC VPP.

Grid operators could cooperate with VPP operators to maximize grid component utilization and thereby reduce the costs for grid expansion. This can be achieved by taking predicted transformer loads from BTC TSM into account during VPP scheduling.

### Contact

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