

# Scenario Building Methodologies & Toolchain

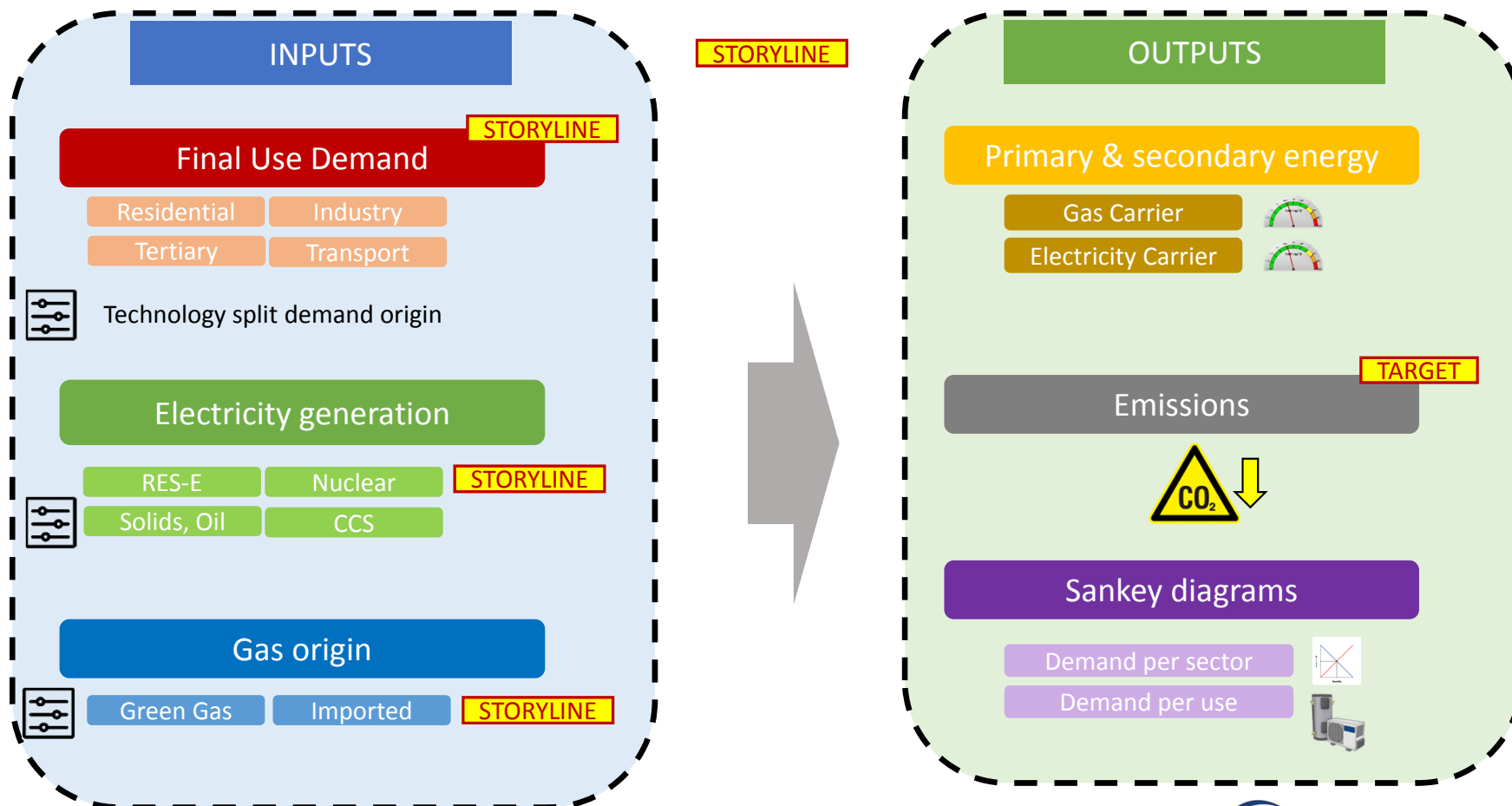
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# Contents

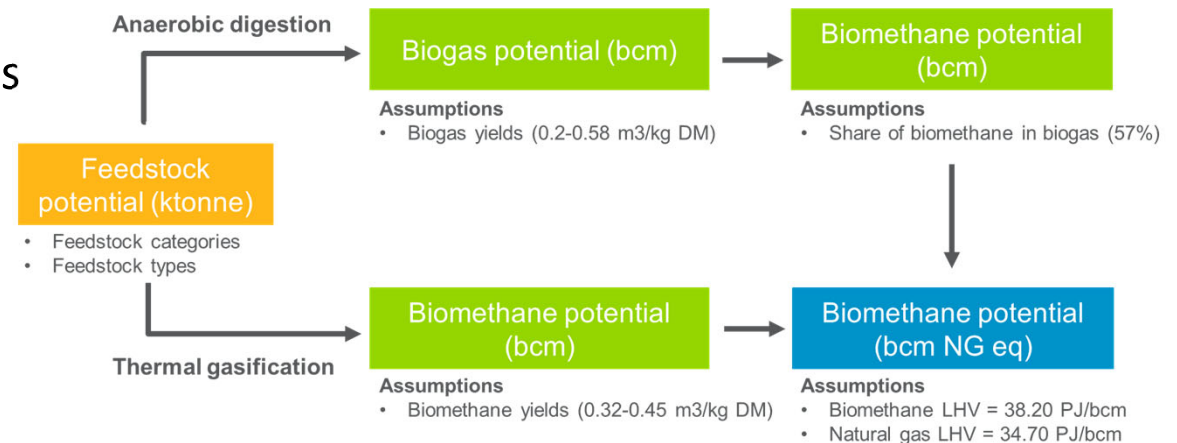
1. Ambition Tool
2. Biomethane Tool
3. Gas Demand Profile
4. Electricity Demand Profiles
5. Power System Optimization
6. Fuel & Technologies Prices
7. Power to Gas

# Ambition Tool – Full Energy Scenarios



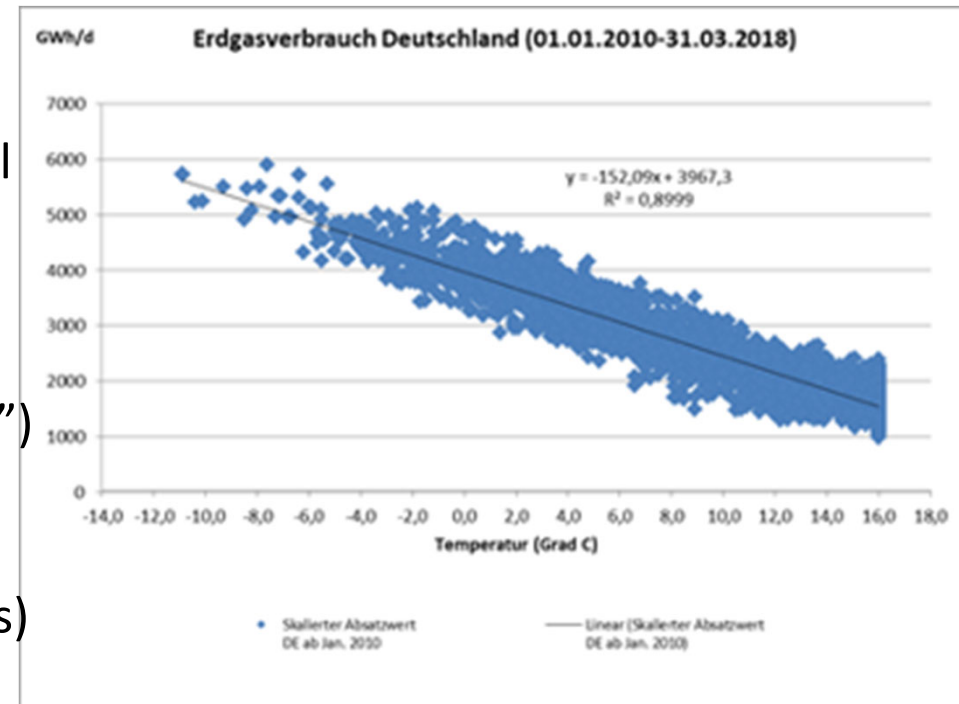
# Biomethane Production Tool

- In cooperation with Navigant (previously Ecofys) an inhouse tool was developed to quantify the biomethane production per country
- Based on “Gas for Climate” study with following features:
  - Technology: Anaerobic Digestion and Thermal Gasification
  - 14 feedstock categories
  - Regional climatic differences for sequential cropping
  - Sustainability criteria
  - Yield increase assumptions



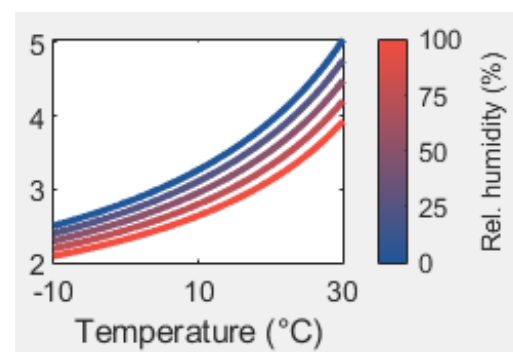
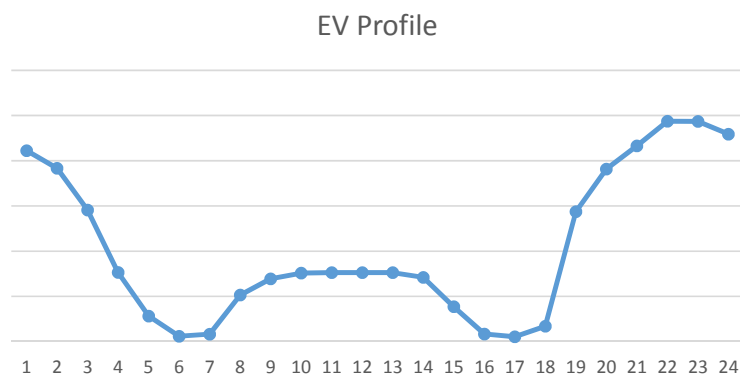
# Gas Demand Profiles

- Computation of Daily Peak, Cold Spell (2-Week) and Dunkelflaute profiles following temperature regression curves and sectoral full load hours
- Introduction of Dunkelflaute as a new simulation case
  - 2 week cold spell (“Beast from the east”)
  - Low variable electricity generation
    - Higher gas demand for power generation (back-up for variable Res)
    - No gas production via electrolysis (P2G)

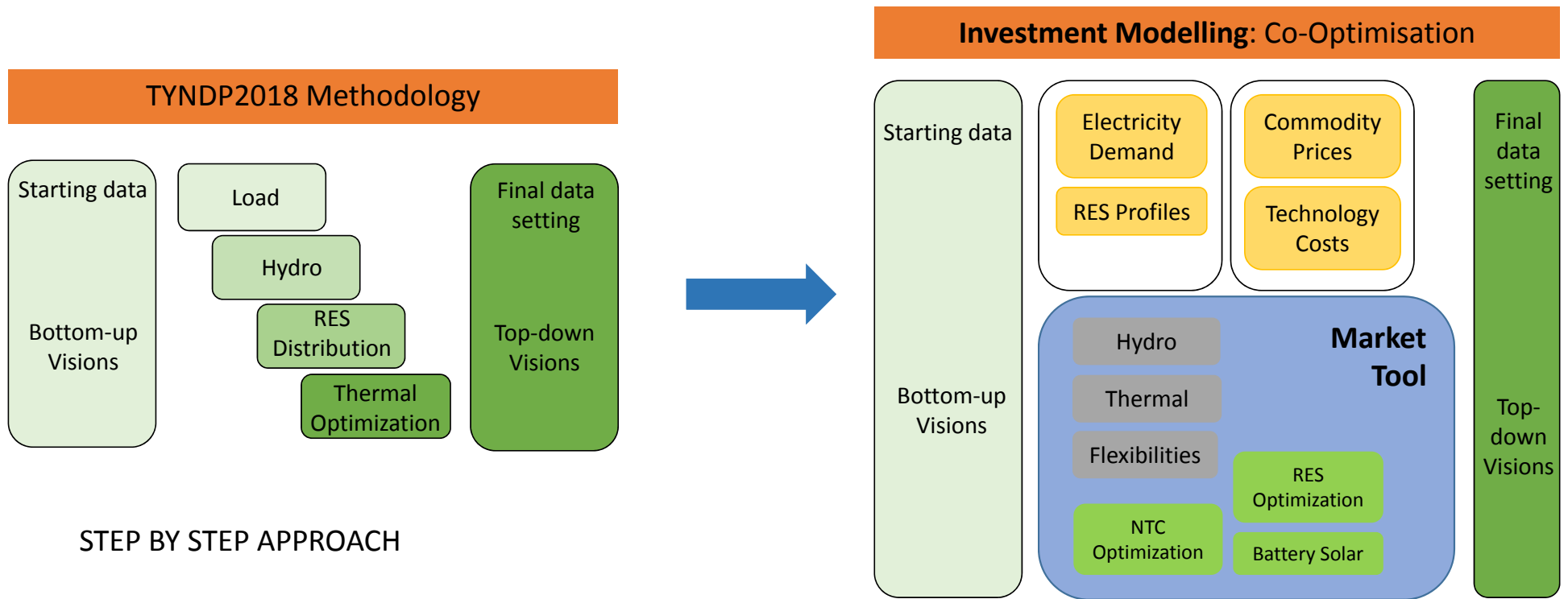


# Electricity Hourly Demand Profile Projection

- Developed by an in house Temperature Regression and Demand forecasting tool called TRAPUNTA
- Model are trained based on 2012 – 2016 demand
- Demand Profiles can be projected based on the last 34 climates
- Demand is then projected into the future based on the uptake of EVs, Heat Pumps, Batteries and efficiency gains
- Efficiency drop of Electric Heat Pumps are considered



# Power Sector Optimisation – TYNDP 2018 vs. 2020



# Fuel & Technology Prices

## Fuel Prices

- Nuclear & Lignite prices have little variation
- Bio Fuel prices are country dependent
- Coal, Gas and Oil are based on Primes

## CO<sub>2</sub> Prices

- **National Trends** uses primes reference
- For top-down scenarios, the price is endogenously given to meet CO<sub>2</sub> target

## Technology Costs

Renewable technology costs are taken from Primes

- In **Distributed Energy**, Solar PV is discounted to meet storyline
- In **Global Ambition**, Offshore Wind is discounted to meet storyline
- Prices for **National Trends** are kept as referenced in primes



# Power to Gas

## Global Ambition & Distributed Energy – Dedicated RES outside the electricity market

- Dedicated demand for P2G developed through Ambition Tool
- Country specific demand for Hydrogen and Methane is given using distribution keys
- Curtailed energy for the electricity market are used to produce Hydrogen and Methane
- Capacities are optimized outside the electricity market using large scale RES

## National Trends – Market Approach

- No specific demand for P2G, the approach is to use only curtailed energy
- Full load hours are calculated to ensure that P2G plants are profitable in relation to Natural Gas
- Optimization is not required