SUPPORT FOR THE PLANNING AND PREPARATION OF THE INTEGRATED NATIONAL ENERGY AND CLIMATE PLAN (NECP) FOR SELECTED CONTRACTING PARTIES OF THE ENERGY COMMUNITY

REGIONAL MODELLING EXCHANGE

Input Fraunhofer ISI

September 2, 2020

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Agenda

- Fraunhofer ISI
  - The institute and in-house modelling tools
  - Our role here and tools
- The German NECP
  - Overview
  - Modelling
  - Scenarios
- ASEAN Energy Outlooks
  - A similar experience?

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Fraunhofer Institute for Systems and Innovation Research ISI

- Competence Centers for Energy
  - Policy & Markets
  - Technologies & Systems
  - 70 colleagues
    - model
    - analyze
    - evaluate
    - advise
    - policies
    - technologies
    - systems
    - actor landscape

https://www.isi.fraunhofer.de/en.html

- We are currently working in the region
  - supporting the modelling of the NECPs
    - Albania
    - Montenegro
    - Using models TIMES and LEAP
  - Sharing experiences in regional exchange

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- We have two large in-house tools
  - Both are used to provide analysis to EU and German policy analysis

  - Forecast
    - detailed industry model
    - differentiates five major technology fields
    - delivers results on multiple levels of detail and in many dimensions
    - focus on decarbonisation of economic sectors

  - enertile
    - techno-economic optimization model
    - minimizes the costs of generation, transmission and storage of electricity
    - covers Europe, Middle East, and North Africa
    - hourly resolution up to 2050

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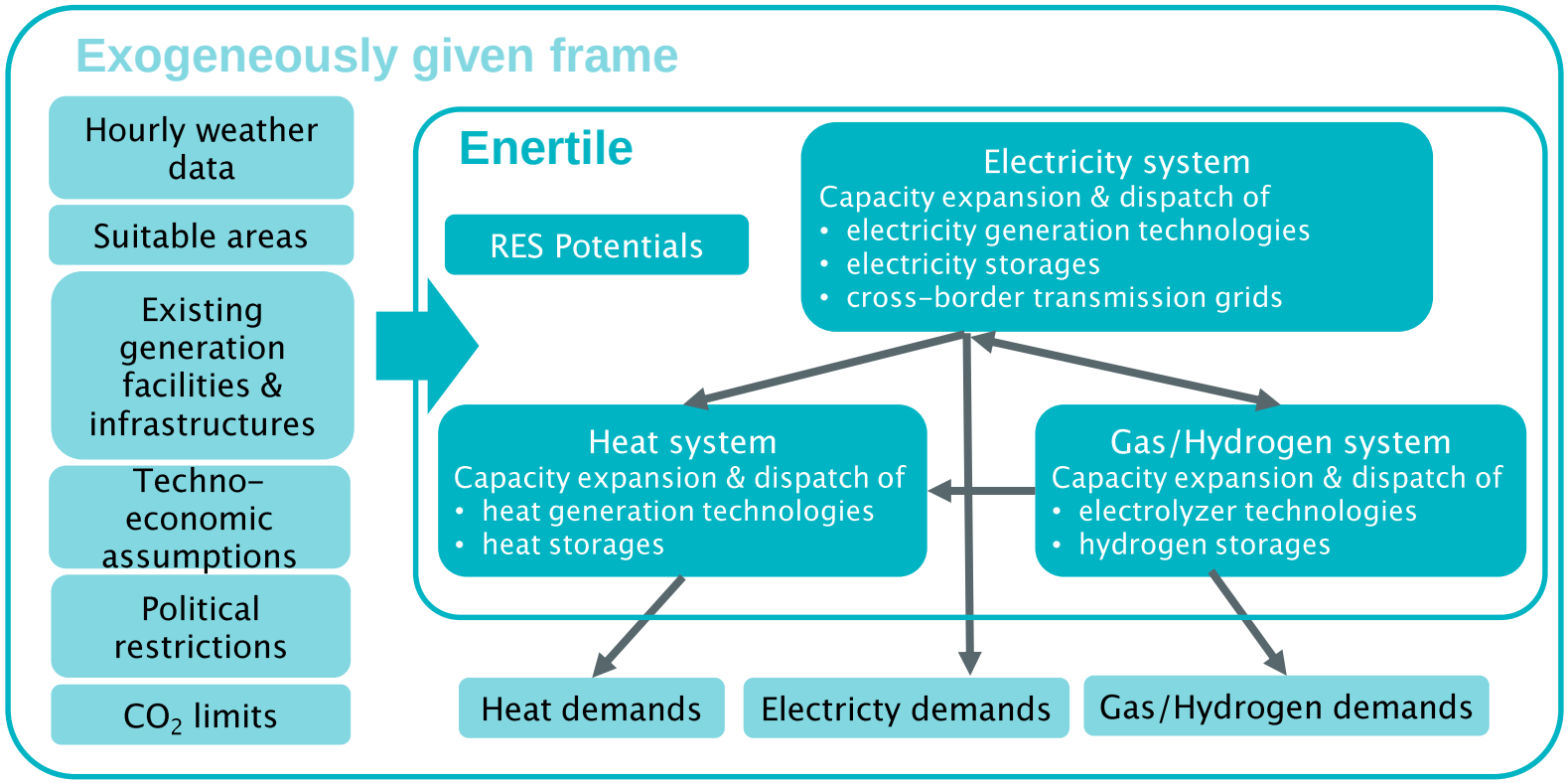
Enertile

https://www.enertile.eu/

enertile



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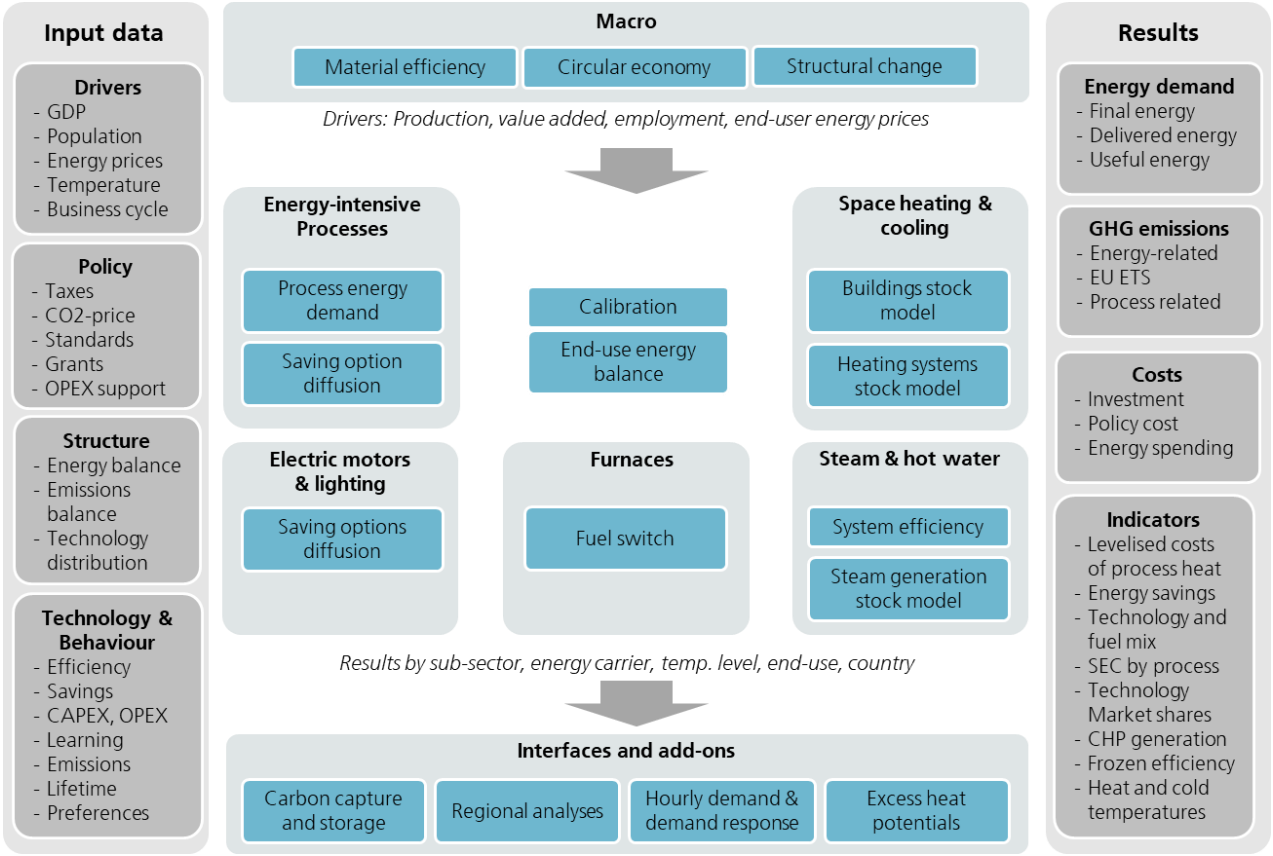
Fraunhofer ISI Forecast

https://www.forecast-model.eu/

FORECAST
FORecasting Energy Consumption Analysis and Simulation Tool



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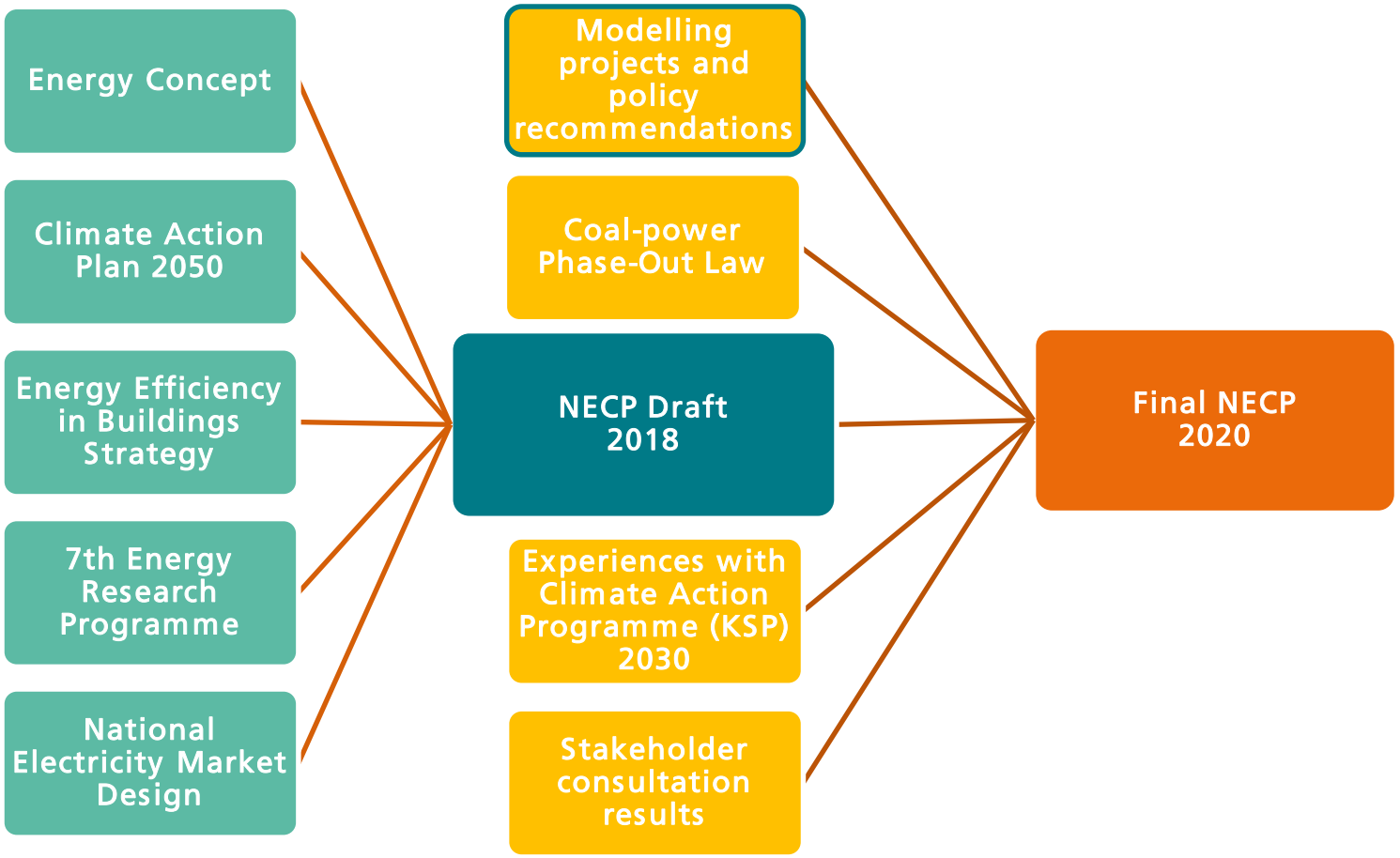
The German NECP Process

Overview



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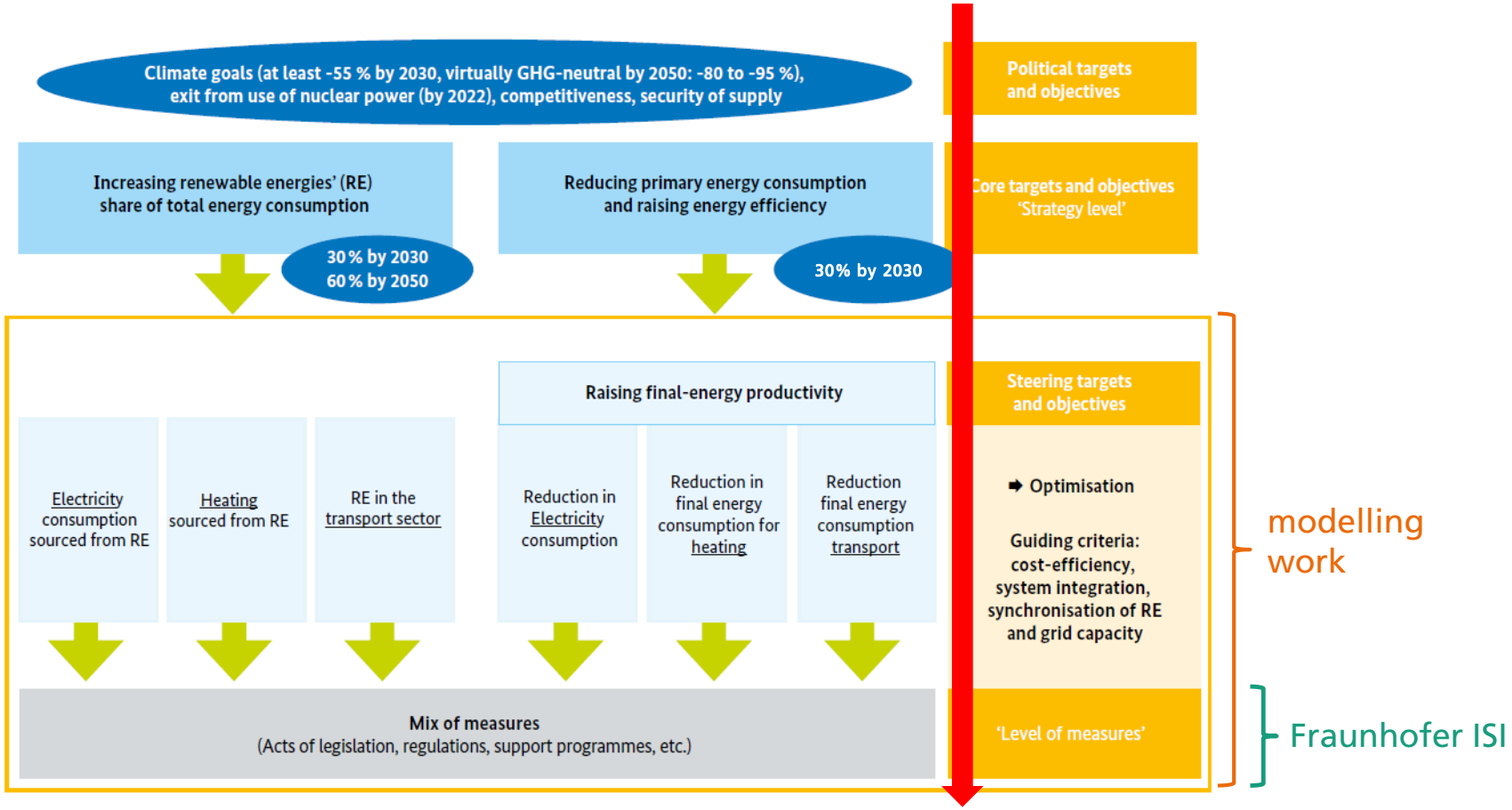
Overview

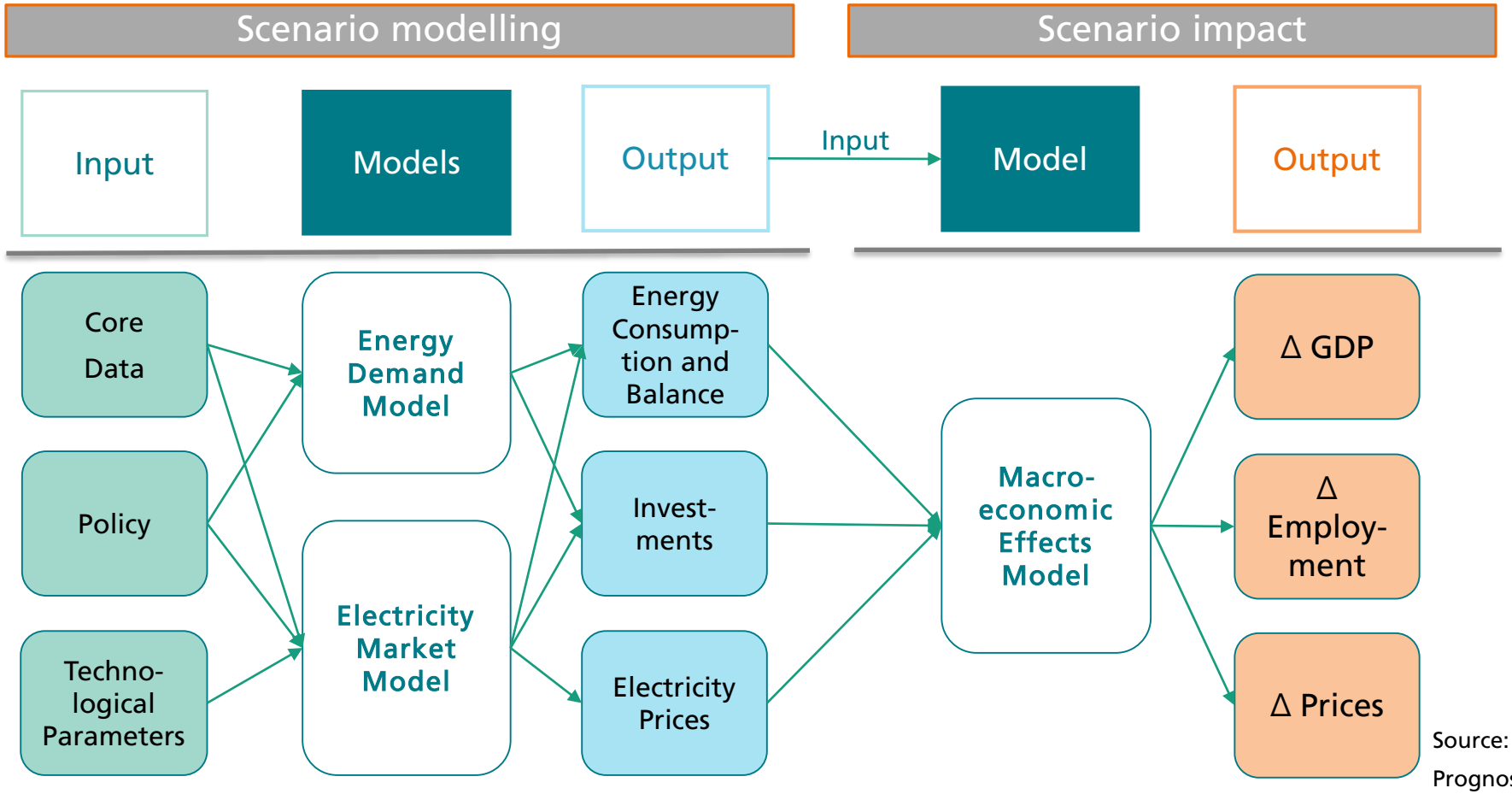
Strategy based on three target levels



Source:
NECP Germany

Modelling

Proprietary models by Prognos AG and GWS



Source: Prognos AG

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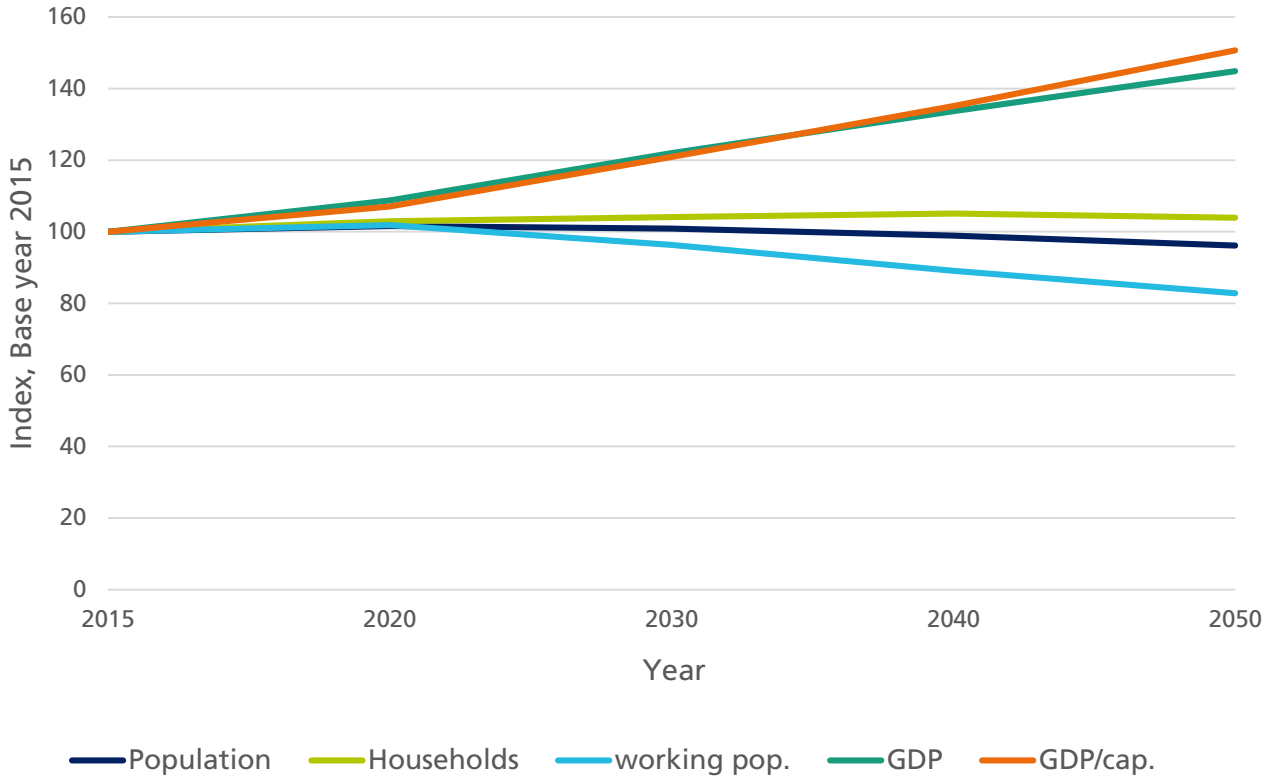
Scenarios

Base data projections aligned with other projects



Source: based on Prognos AG (2020)

Energiewirtschaftliche Projektionen und Folgeabschätzungen 2030/2050 -
Dokumentation von Referenzszenario und Szenario mit Klimaschutzprogramm 2030

https://www.bundesregierung.de/breg-de/service/publikationen/energiewirtschaftliche-projektionen-und-folgeabschaetzungen-2030-2050-1730266

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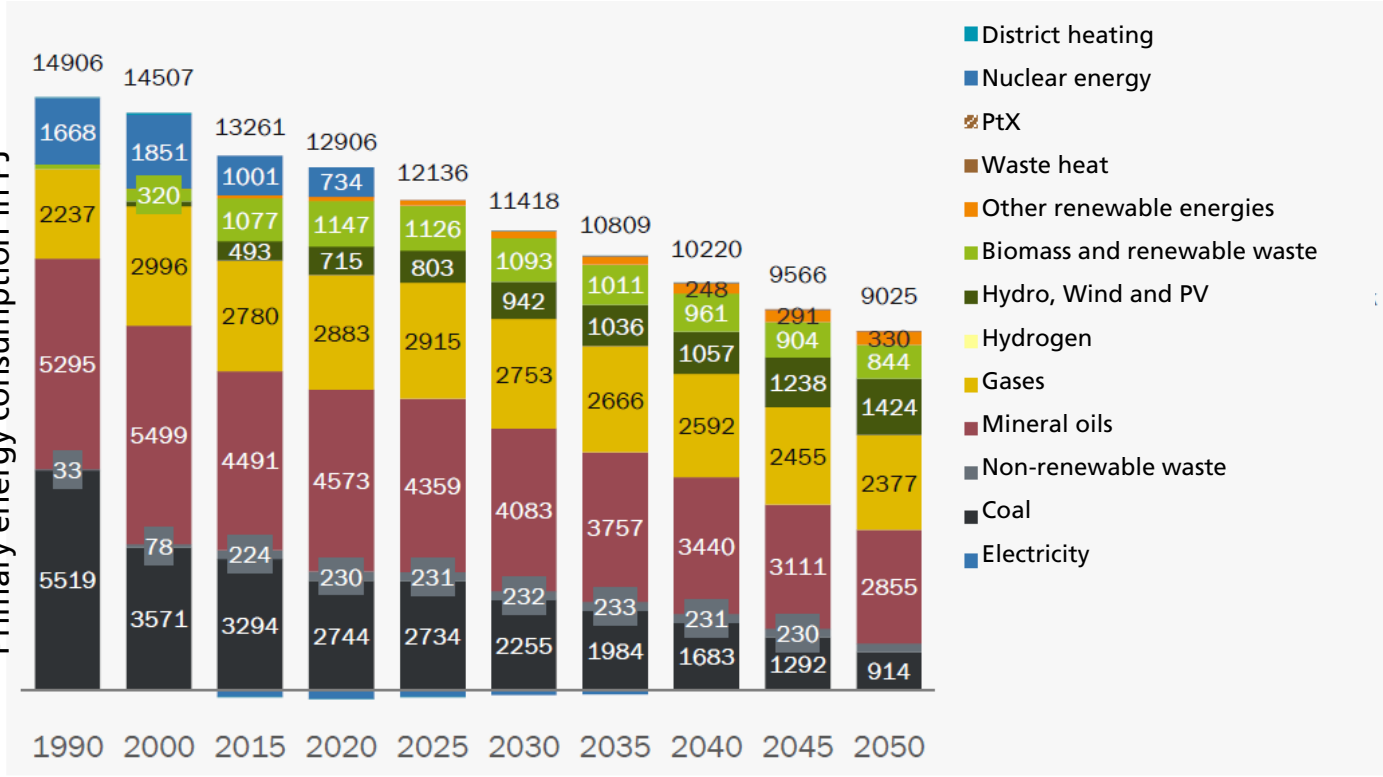
Reference Scenario

- First draft presented in May 2018
  - Modification needed for higher world market energy prices
  - Cooperation with parallel scenario development projects
- Includes implemented and passed policy measures until End 2017
  - Projection of existing trends
  - Moderate autonomous technological progress
  - Energy efficiency grows due to replacement of old by new buildings, machinery and facilities
- No binding energy and climate targets considered

Reference Scenario – Primary Energy

Primary Energy by fuel type

- 2015: Fossil share: 80%, RE: 12%, 8% nuclear energy
- until 2030: -21% vs. 2008, Fossil share: 81%, RE share 19%
- until 2050: -37% vs. 2008, Fossil share: 72%, RE share 28%

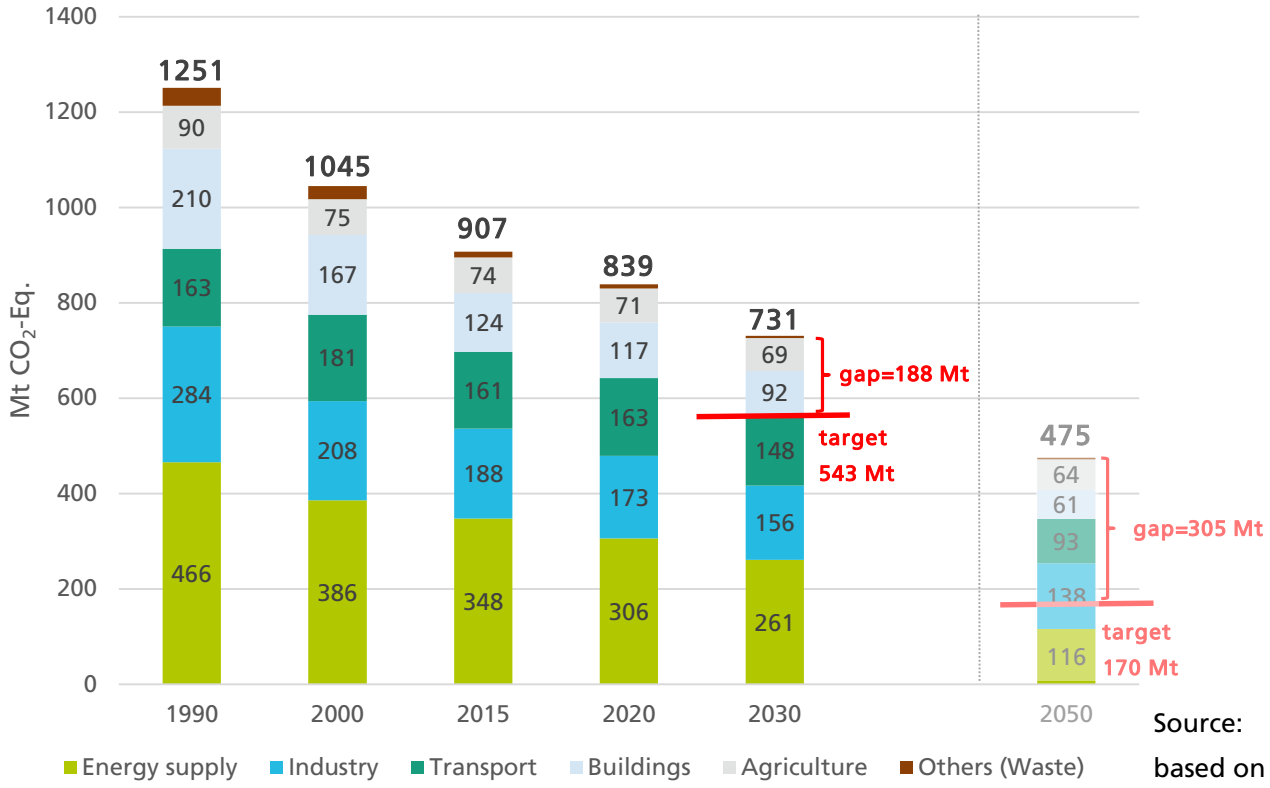


Source:
Prognos AG (2020)

Reference Scenario – GHG Emissions

GHG emissions by sector

- Reduction by 42% until 2030 **(target 55%)** (vs.1990), by 62% until 2050 **(target net-zero)**
- **Gap to 2030 and 2050 targets to be closed using policy interventions**



Source:
based on Prognos AG (2020)

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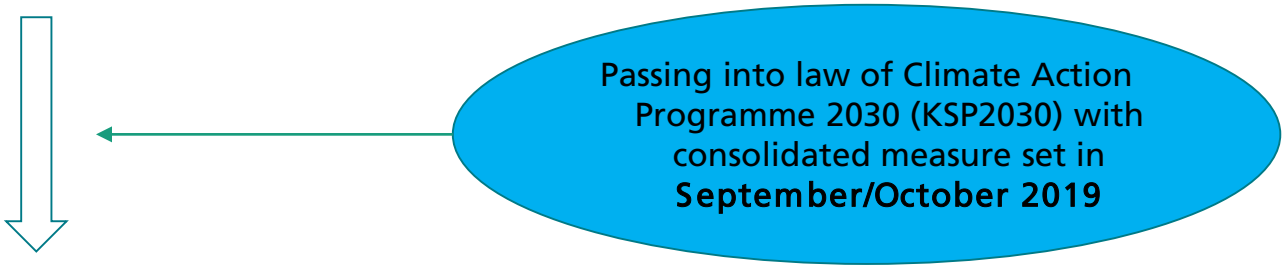
Target scenarios - Concept

- Modelling of two target scenarios with different policy sets **in late 2018**
- Comparison of outcomes according to model results by Federal Government and decision for NECP

Target scenario 1	Target scenario 2
• EU-wide measures after 2017 • National Policy mix 1 (after 2017) • **CO_2-tax** as overarching measure	• EU-wide measures after 2017 • National Policy mix 2 (after 2017) • **National ETS** for transport and heating as overarching measure



Target scenario 3 (Climate Action Plan 2030 measures)
• Additional scenario after passing of law • EU-wide measures after 2017 • National Policy mix according to KSP 2030 • **National ETS** for transport and heating as overarching measure

Policy set KSP

- Overarching measures
  - National ETS for transport and heating
  - Reduction of EEG apportionment to reduce electricity price
- Transport sector (examplary)
  - Incentive payment for electric vehicles
  - Truck road toll based on energy efficiency
- Industrial sector (exemplary)
  - Industrial Energy efficiency investment support programme
  - Energy efficiency competitive tender
- Buildings sector (exemplary)
  - tax deduction of energetic building renovation
  - investment incentive for efficient buildings
- Energy supply sector (exemplary)
  - Reduction of coal usage
  - Expansion of renewable energy
  - Expansion and modernisation of co-generation

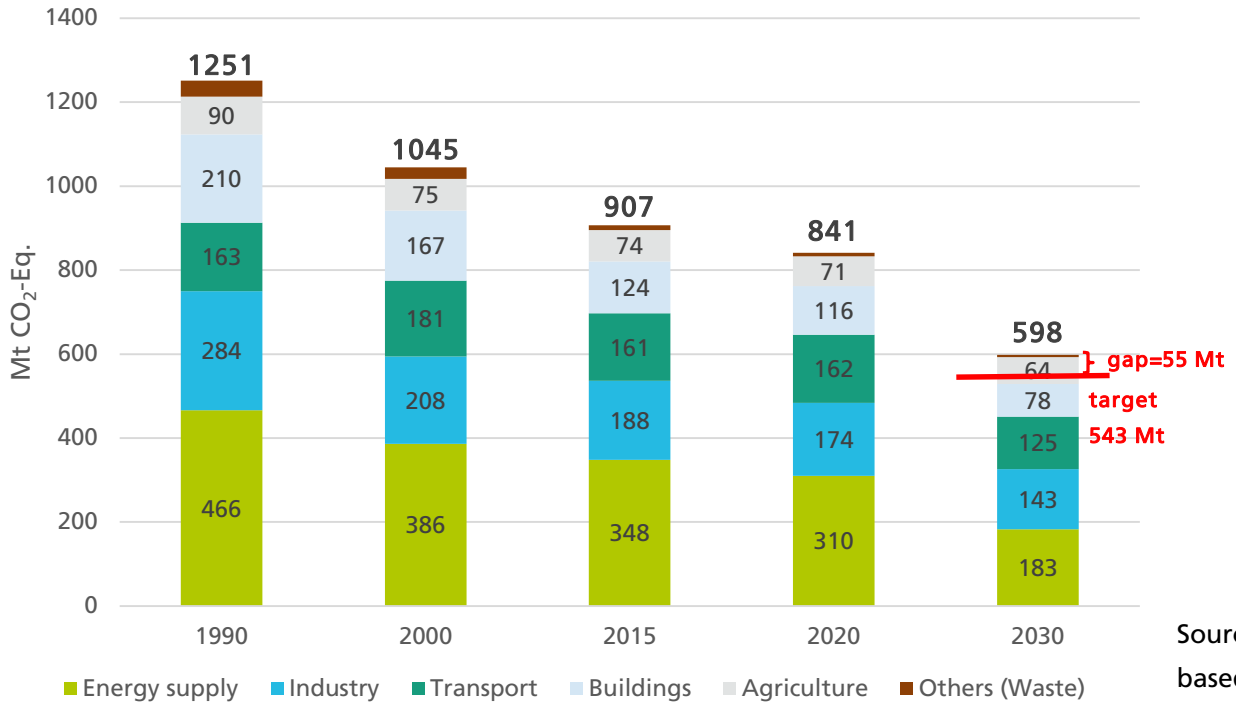
PaMs impact evaluation in modelling

- In the Energy Efficiency Dimension, 27 measures have been evaluated
- Example: Industrial Energy efficiency investment support programme
  - Update and streamlining of several former policies
    (waste heat, cross-cutting technologies, production processes, energy management systems and renewable process heat)
  - Bottom-up evaluation of former policies estimate gross FE savings of 11 PJ/year by 2030
  - Better conditions and streamlined process increases savings estimate to 12.8 PJ/year by 2030
  - Because renewable process heat does not lead to FE savings, PE and GHG savings are expected significantly higher in scale
- Estimates of all measures in the KSP scenario measure set enable modelling of target achievement

Target Scenario KSP – GHG Emissions

GHG emissions by sector

- Reduction by 52% until 2030 **(target 55%)** (vs.1990)
- **Gap to 2030 target is still 3%-pts (=55 Mt CO_2-eq.)**
- Additional measures are expected until 2030 that can close the gap
- Policy recommendations were given



Source:
based on Prognos AG (2020)

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Policy recommendations to close 2030-gap

- Additional use of biomass / biomethane
  - for heating (5.5 Mt potential in buildings)
  - as Bio-LNG in trucks (5 Mt potential in transport)
  - for industrial processes (3 Mt potential in industry)
- Hydrogen
  - potential in H_2-vehicles (5 Mt potential in transport)
  - for industrial processes, e.g. in steel
  - Programme for hydrogen use in industry was decided
- Power-to-Liquid
  - for combustion vehicles (4.4 Mt potential in transport)
- Heating apportionment

FRAUNHOFER ISI´S SUPPORT TO THE DEVELOPMENT OF SOUTH EAST ASIAN ENERGY OUTLOOKS

Input Fraunhofer ISI

September 2, 2020

More Info: https://www.isi.fraunhofer.de/en/presse/2017/presseinfo-24-2017-asean-energy-outlook.html

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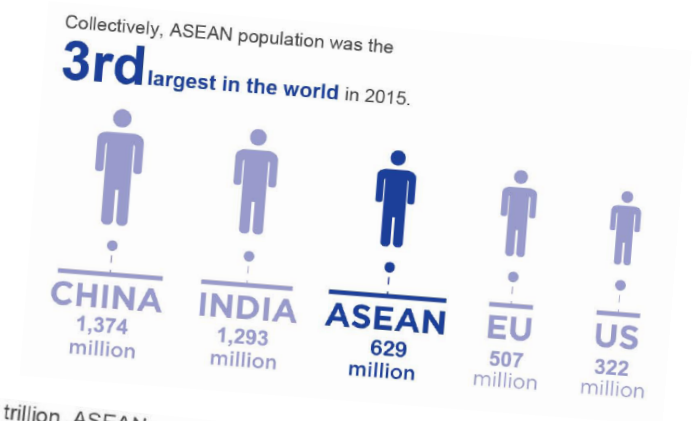
ASSOSIATION OF SOUTH EAST ASIAN NATIONS (ASEAN)

- The Association of Southeast Asian Nations (ASEAN) was established in 1967 to strengthen economic cooperation, social progress and cultural development
- Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Singapore, the Philippines, Singapore, Thailand, Vietnam
- 630 million people live in the ten member states of the Association of Southeast Asian Nations (ASEAN).

107 million no grid-quality electricity

86% Fossil Fuels



Development of ASEAN Energy Outlook 4&5 (AEO4 & AEO5)

- Development of AEO was accompanied scientifically by Fraunhofer ISI
- Outlook was developed in strong cooperation with representatives from energy ministries of ASEAN Member States.
- Developed by Fraunhofer ISI, ASEAN Centre for Energy, Fraunhofer ISI and GIZ.

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Modelling philosophy

Cooperative approach	Harmonized approach	Controlled approach
Strong contact with and across ASEAN Member States	Comparable top-down models for all 10 countries Initiated data collection for future bottom-up	Regional model controlling to sum-up of 10 countr models

Considering heterogeneity in socio-economic characteristics of the region

Energy Landscape - Projections

Business-as-Usual Scenario (BAU)

No significant changes

√ Fossil 79% vs RE 14%

AMS Targets Scenario (ATS)

National targets are fully attained

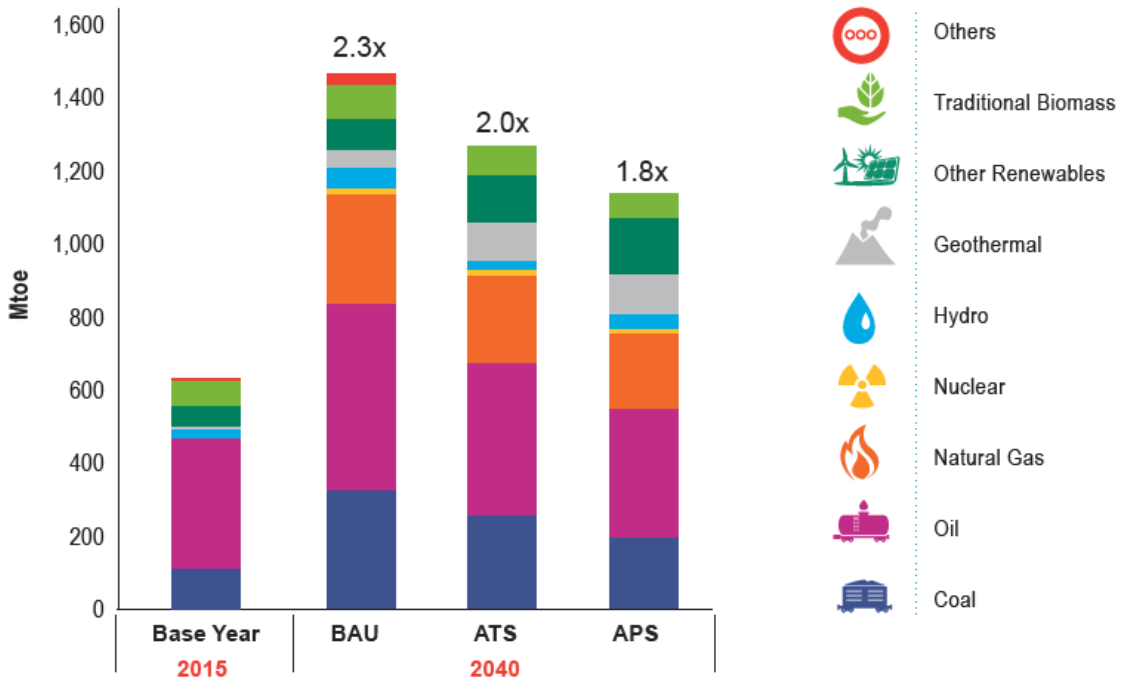
√ 14% lower, Fossil 79% vs RE 14%

ASEAN Progressive Scenario (APS)

Higher ambition level in clean tech

√ 23% lower, Fossil 63% vs RE 32%

Projections of Total Primary Energy Supply (TPES)



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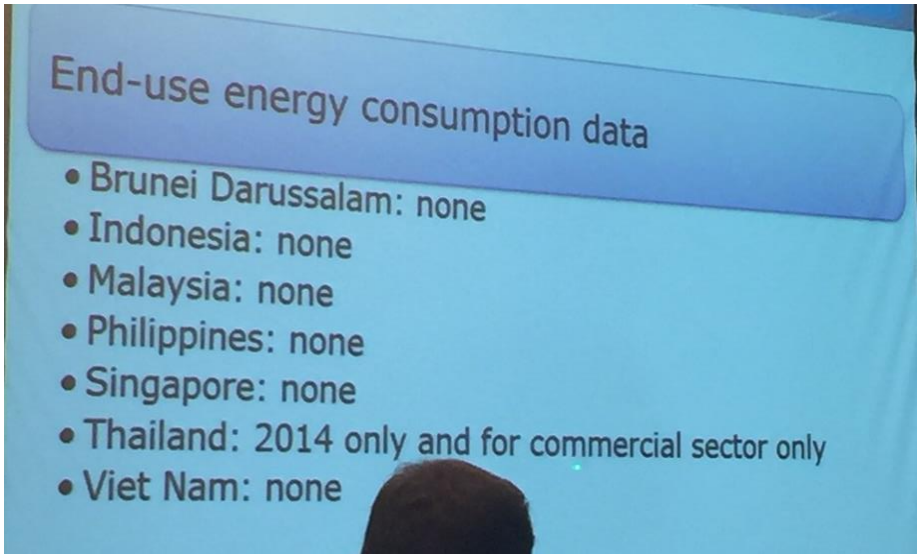
Development of ASEAN Energy Outlook

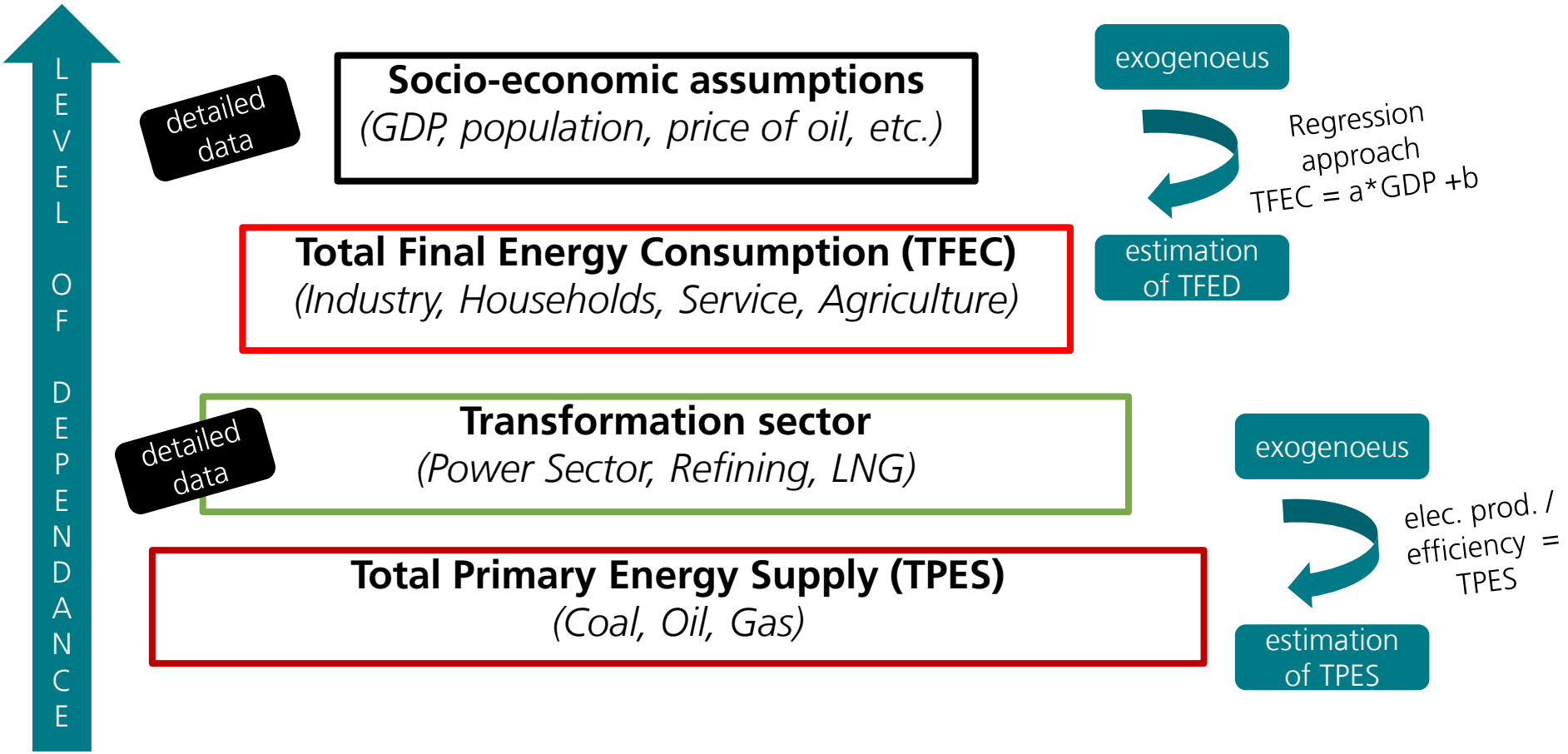
- **Experience in development of ASEAN Energy Outlooks**
  1. Data availability
  2. Modelling approach
  3. Lessons learnt from discussions of topics and mutual learning
     - *Key assumptions (GDP, population, value added by sectors, price of oil)*
     - *Scenario definition*
     - *Policies in different countries*

Data availability in ASEAN

- **Data for detailed modelling in ASEAN rather limited**
  - **Key assumptions**: politically endorsed (GDP, population, etc.)
  - **Final Consumption** Sectors: No detailed data for final energy consumption
  - **Transformation sector**: good data availability on power sector



Modelling logic for each country model in absence of detailed data



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Lessons Learnt

- **Data availability**
  - Little data for final energy consumption sectors (industries, vehicular park, households, commercial sector, agriculture)
  - Little time resoluted data → limit possibilities for detailed optimization
  - Data needs initiated and institutionalized
  - Little data for detailed policy impact modelling
- **Modelling approach**
  - Harmonized approach: same software, comparable structure
  - Simulation models, no optimization
  - More complexity not necessarily superior
- **Scenario definition**
  - Same approach and harmonized key assumptions: future GDP, population, value added by sectors, price of oil)
  - Target based scenario: easier to harmonize, lack of data for policy definition