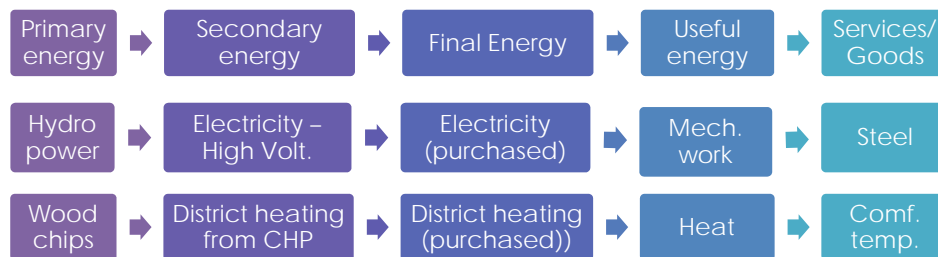
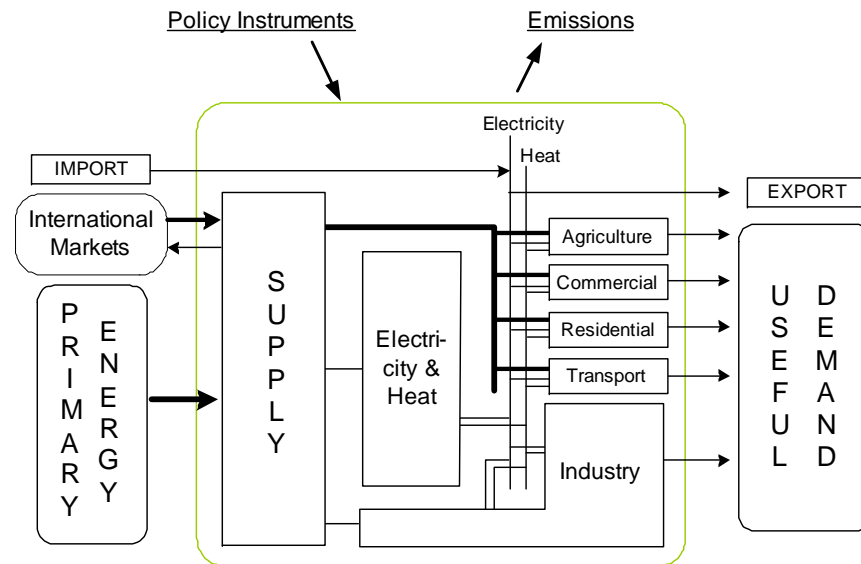


TIMES-Sweden

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TIMES: The Integrated MARKAL- EFOM System
Described by Loulou et al. (2005a, 2005b)

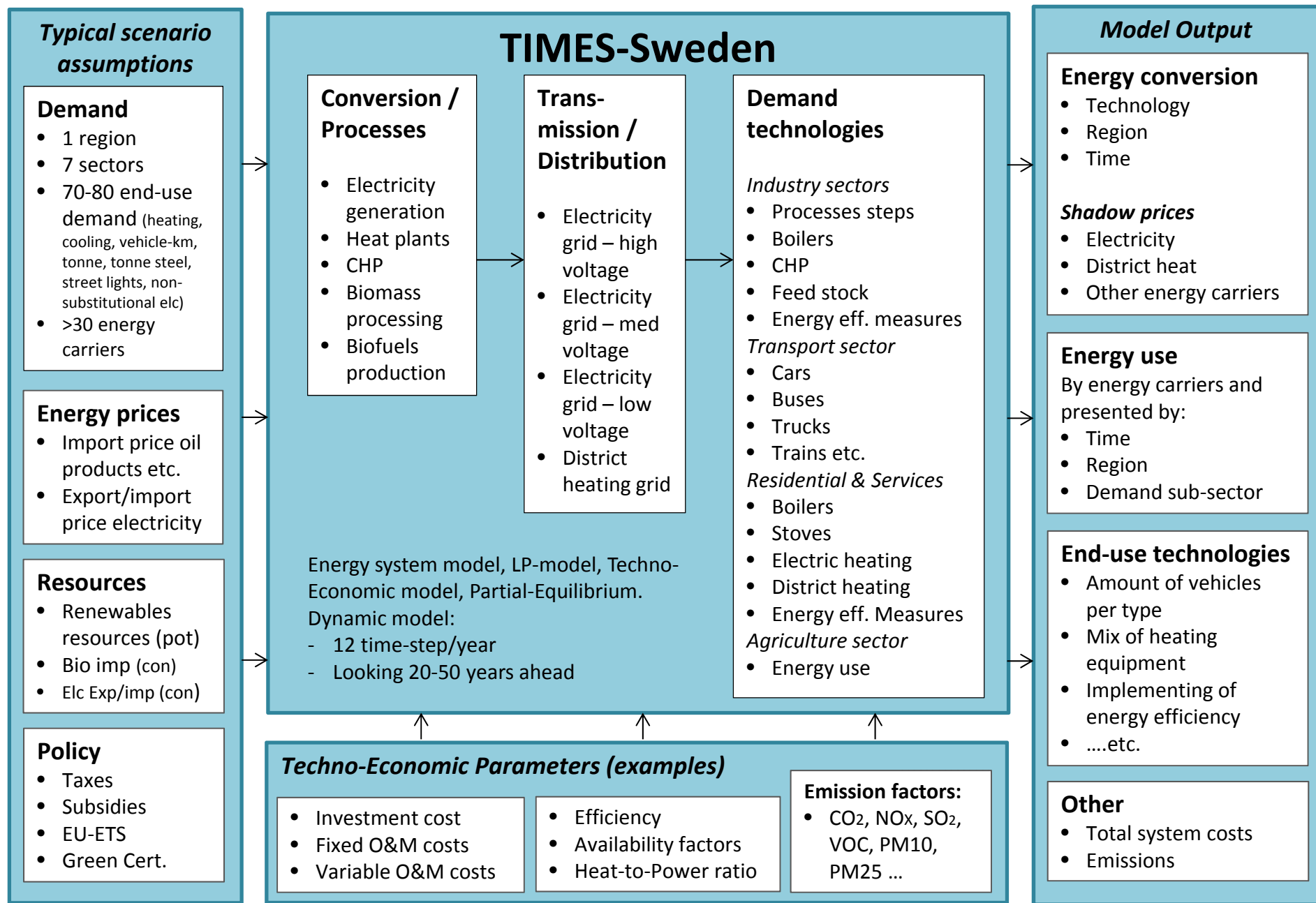
TIMES-Sweden identifies how limited resources can be allocated in order to minimize the **total system costs**.

TIMES-Sweden is used to analyse how the development of the Swedish energy system change under different scenarios, e.g. different emissions targets, different taxes or other energy or environmental policies.
Policy analysis! Environmental analysis!

TIMES-Sweden is a comprehensive energy system model represented by 7 main sectors: Industries, Residential, Services, Agriculture, Transports, ELC&DH and Energy supply and fuel production. The model is driven by a given demand which either is represented by useful energy (PJ/year) or by services or commodities (pers km/year, ton/year, etc).

TIMES-Sweden is based on the TIMES-platform (IEA-ETSAP) and share the main structure with the JRC-EU-TIMES etc.

- **Energy system model**
- Dynamic LP-model (12 per/year, 50 years)
- Bottom-up/**Tecno-economic model**
- Cost minimisation
- Partial equilibrium model
- Technology rich



TIMES: The Integrated MARKAL- EFOM System (www.iea-ETSAP.org)
 TIMES-Sweden: Anna Krook Riekkola (anna.krook-riekkola@LTU.se)

TIMES-Sweden

- **Based on the TIMES platform (The Integrated MARKAL- EFOM System):**

TIMES-Sweden was initially developed as a part of the Pan European TIMES model (**PET model**), within two EU funded projects (NEEDS and RES2020). In the model each country is represented as one model, and all the country models are then hard-linked into one big model. There are several European models still being used, e.g. the JRC-EU-TIMES model (**JET model**) documented by Simoes et al. (2013).
- **The national models share the same:**
 - RES-structure (Reference Energy System) and naming convention
 - Techno-economic data-base
 - Approaches/Methods to estimate underlying assumptions such as: Base-year calibration, demand projections, potential of biomass, emission-factors etc.
- **TIMES-Sweden has been further developed to better represent Swedish conditions:**
 - Emissions-factors/Ancillary benefits (Krook-Riekkola et al. 2011),
 - Iron- and steel industry (2012)
 - District heating (Krook-Riekkola & Söderholm, 2013), (Pädam et al., 2013)
 - Demand through soft-linking with EMEC (Krook-Riekkola et al. 2013a, 2013b)
 - Residential sector (2015)
 - Biomass (2015)

TIMES-Sweden is further described in Chapter 5 in (Krook-Riekkola, 2015)

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