Ganymed – Generating Synthetic Industrial Load Profiles

NEFI Conference 2022
13th Oct. 2022

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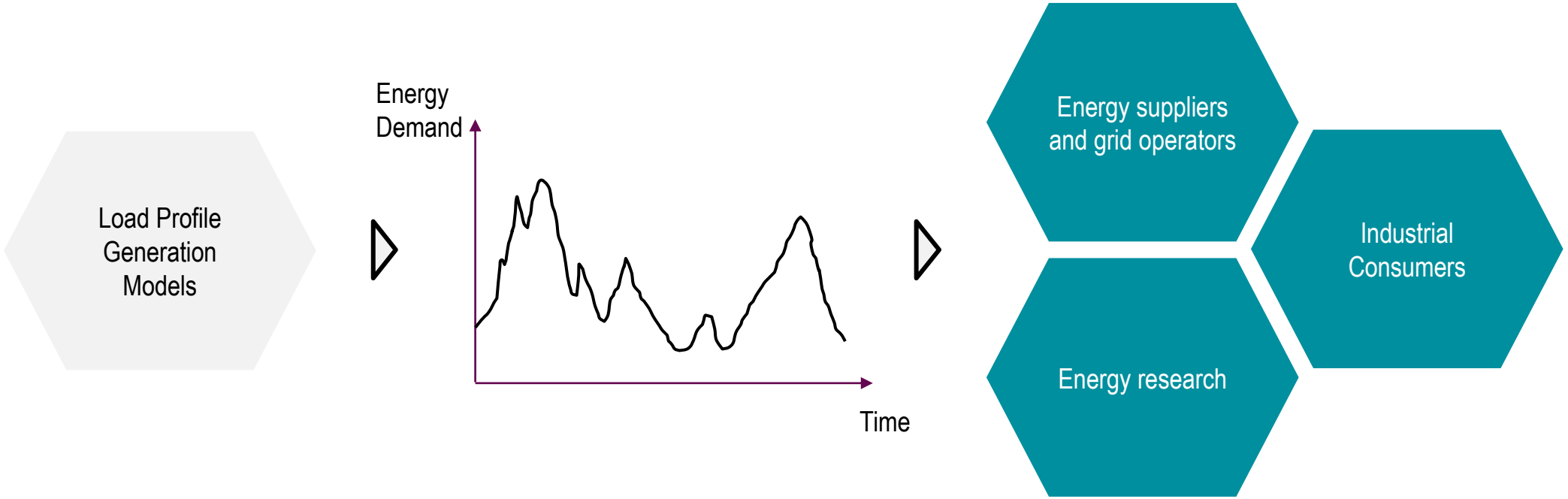
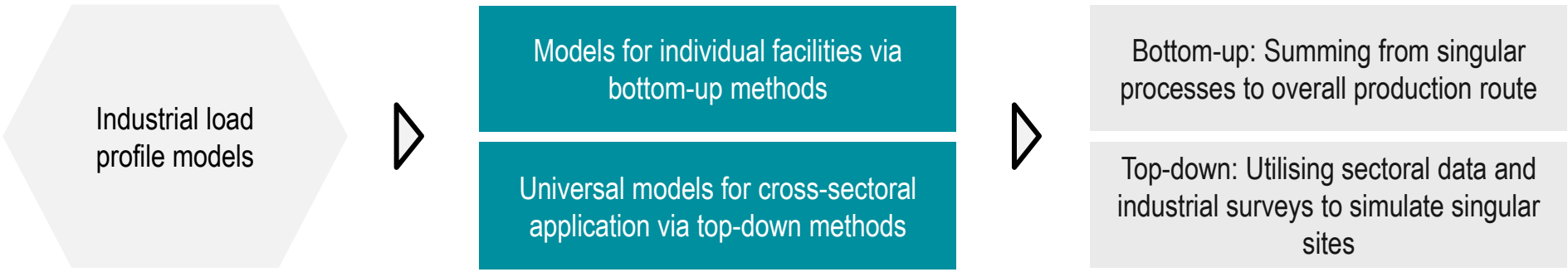
Motivation and Open Research Areas

- Increasing digitalisation and implementation of renewable energies demand the development of flexible and digitalised energy system models
- Time resolved load profile generation models are key for various challenges in energy related research areas



Motivation and Open Research Areas

- Recent holistic industrial load profile models are only developed within two categories:

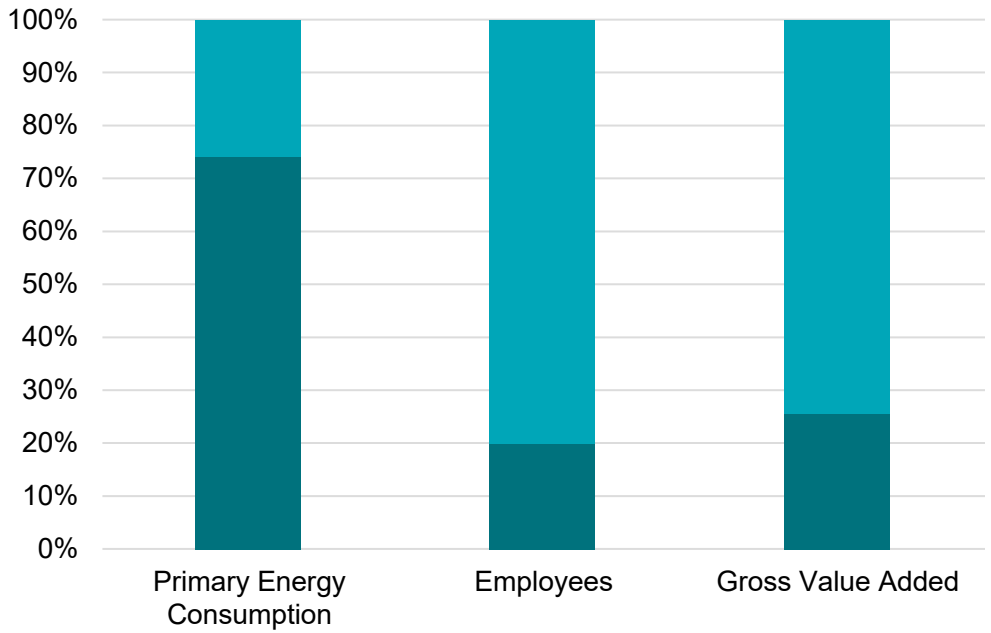


- Our Aim: Development of a standalone application for generating time resolved energy consumption profiles of all industrial subsectors including all necessary process, production and subsector specific data

[1]…P. Binderbauer et al., Synthetic Load Profile Generation for Production Chains in Energy Intensive Industrial Subsectors via a Bottom-Up Approach, Journal of Cleaner Production, 2021

The Industrial Sector in Austria

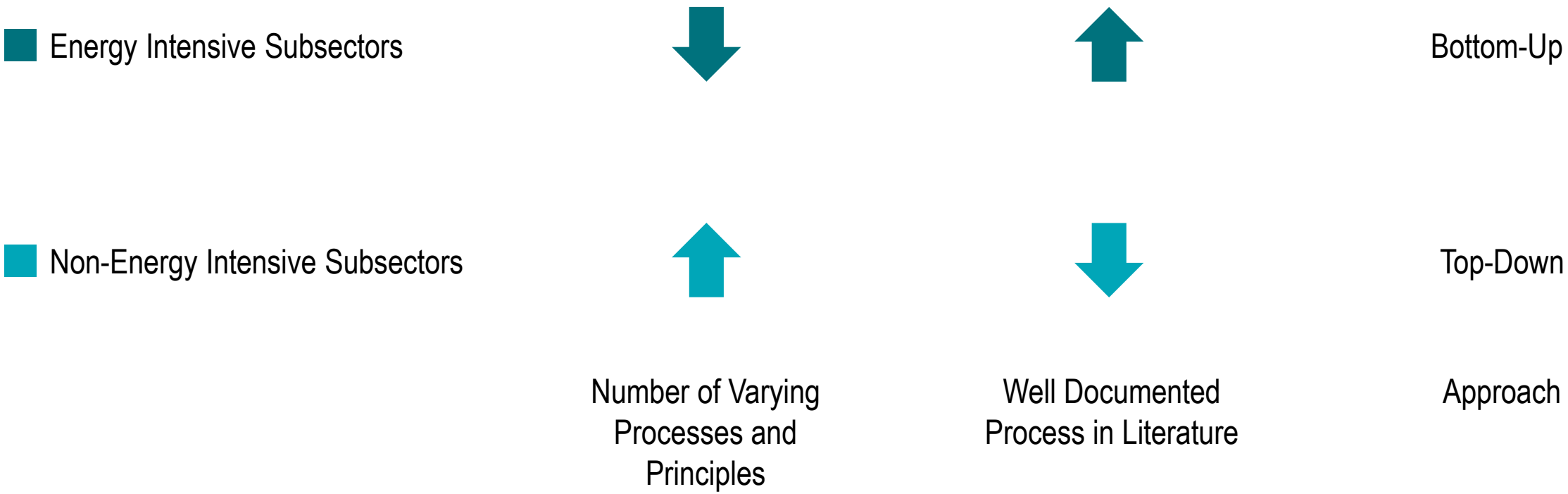
- Energy Intensive Subsectors
  - Iron & Steel
  - Pulp & Paper
  - Chemical & Petrochemical
  - Non-Metallic Minerals
- Non-Energy Intensive Subsectors
  - Wood & Wood Products
  - Machinery
  - Food, Beverages & Tobacco
  - Mining & Quarrying
  - Automotive
  - Textiles & Leather
  - Non-Ferrous Metals



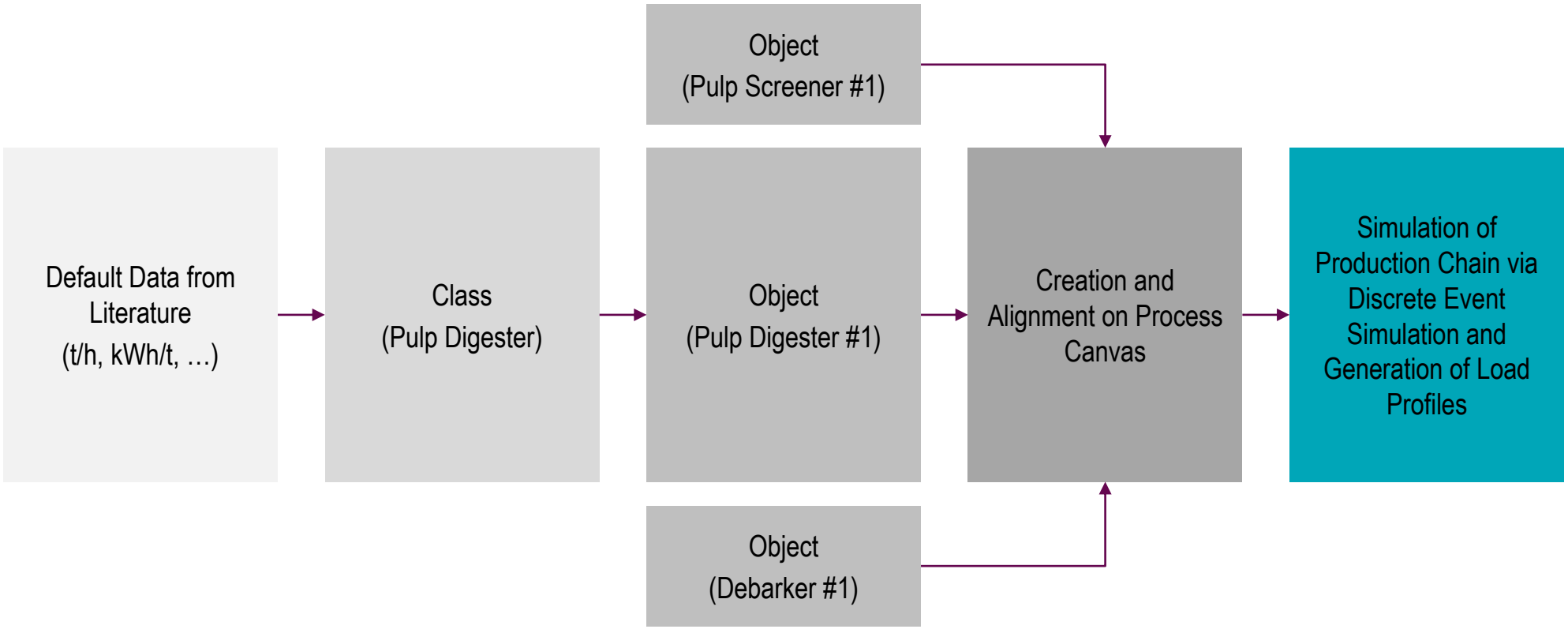
- Both subsectoral classes are to be included in holistic industrial energy system analyses

[2]…Statistic Austria, Useful Energy Analysis Austria, 2022
[3]…Statistic Austria, Structural Business Analysis Austria, 2022

Developing *Ganymed*

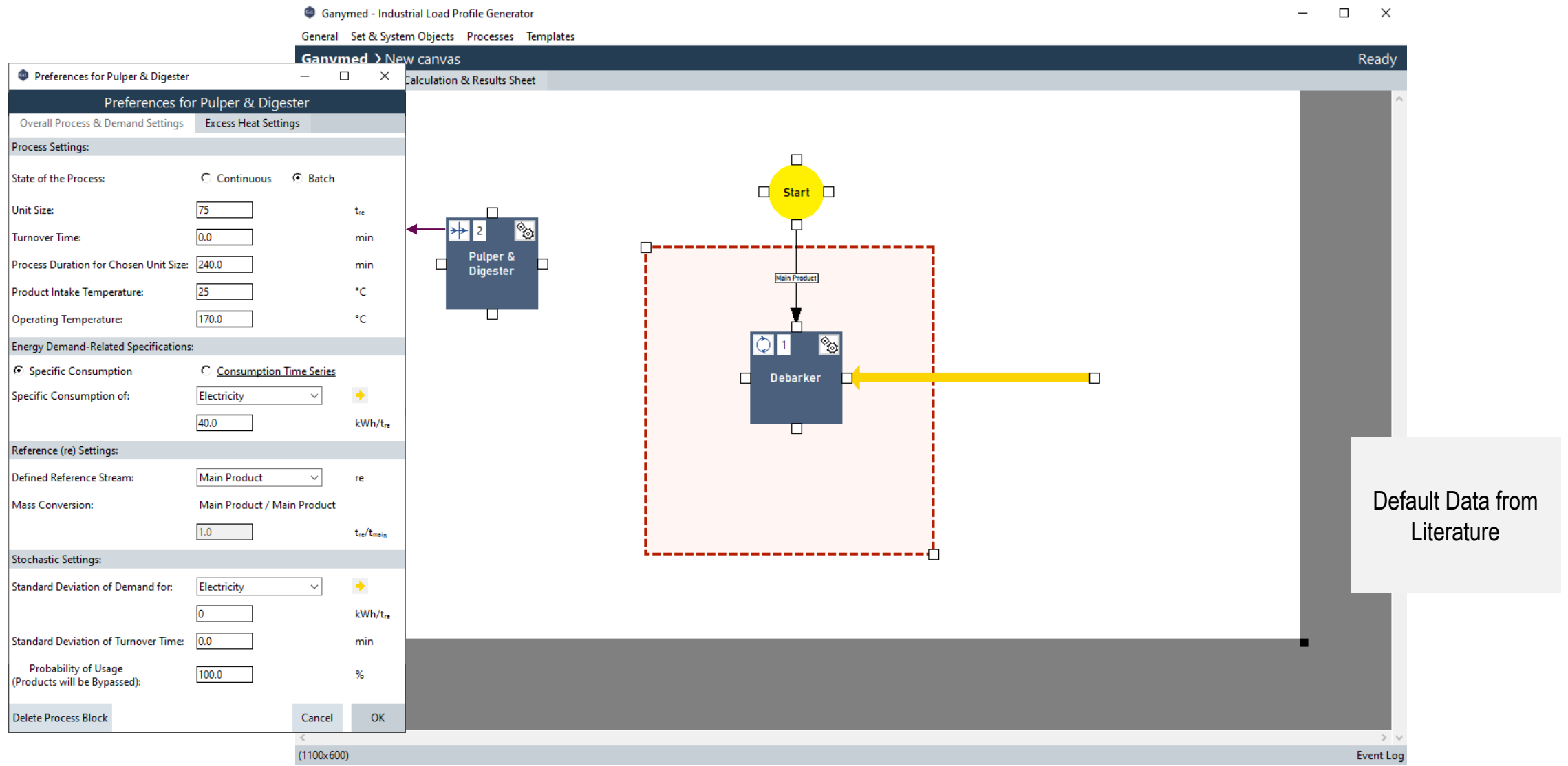


Handling Energy Intensive Subsectors Bottom-Up



[4]…Banks et al., Discrete Event Simulation, 2002

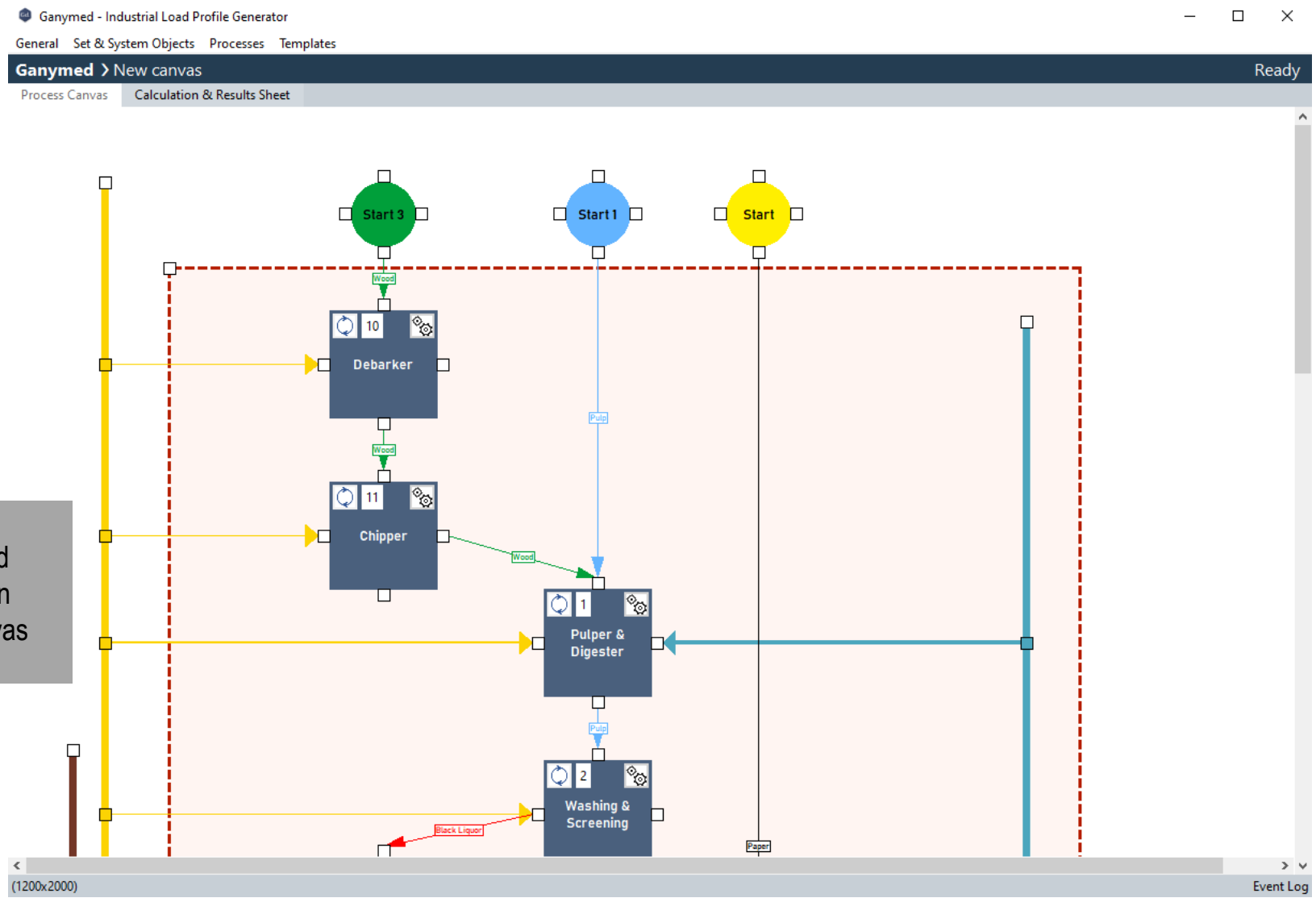
Handling Energy Intensive Subsectors Bottom-Up



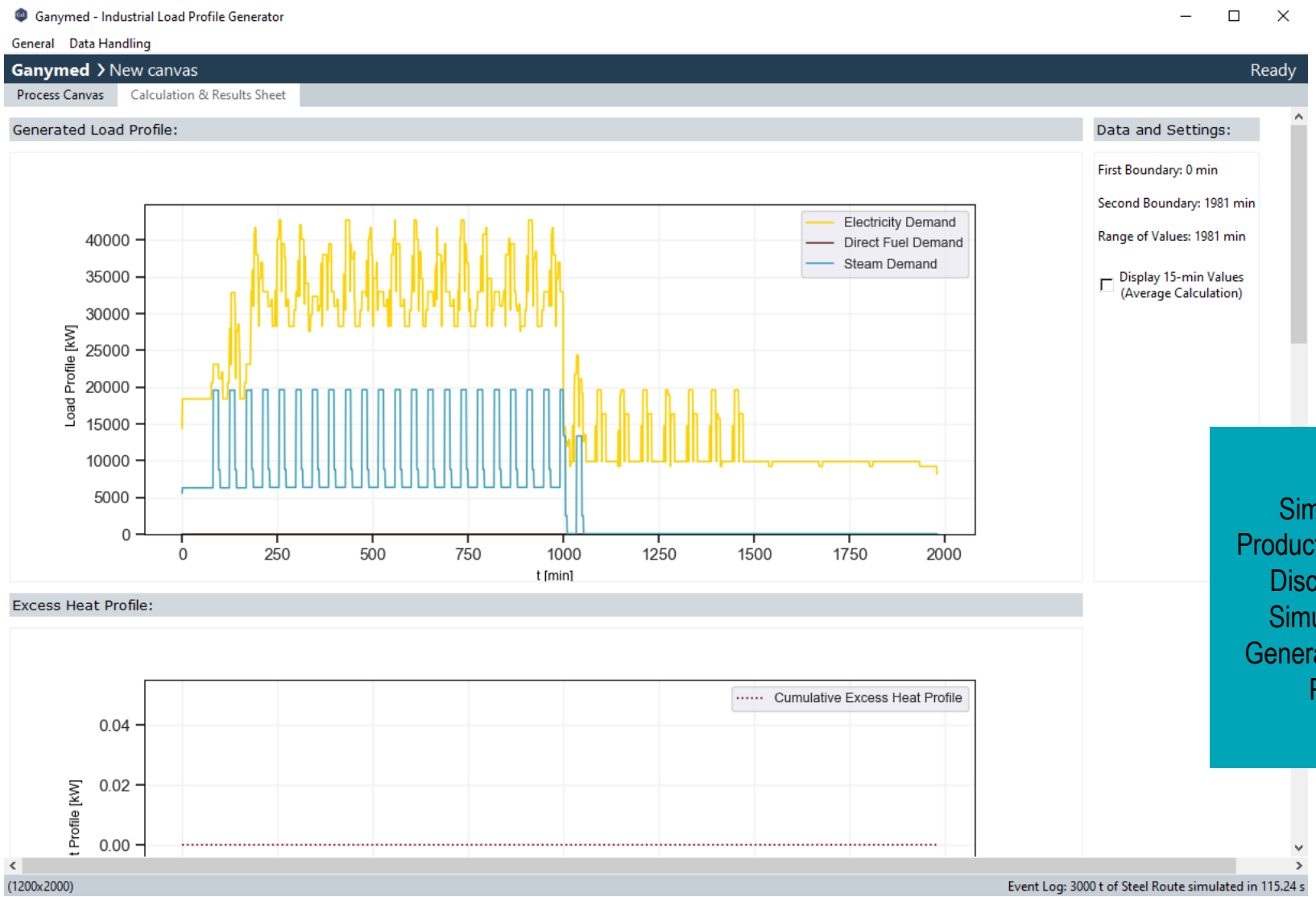
Default Data from Literature

Handling Energy Intensive Subsectors Bottom-Up

Creation and Alignment on Process Canvas

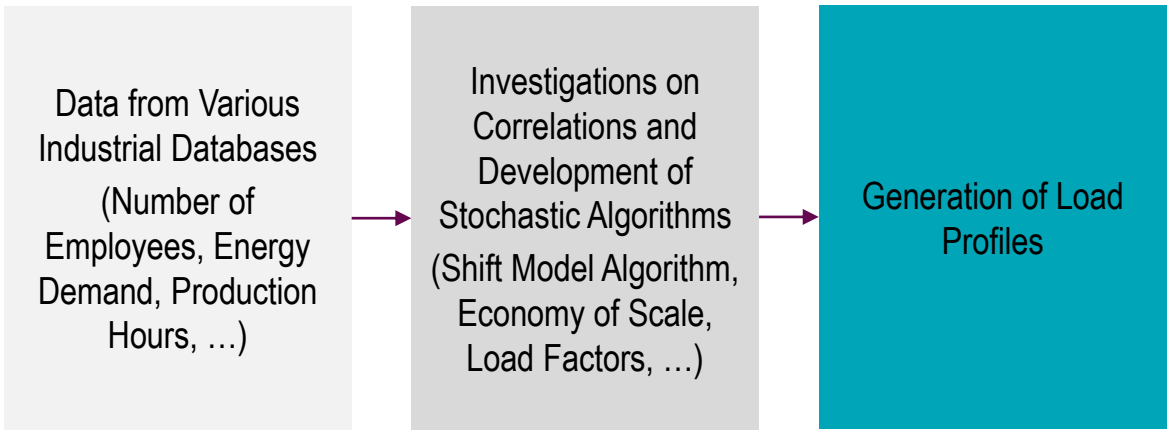


Handling Energy Intensive Subsectors Bottom-Up

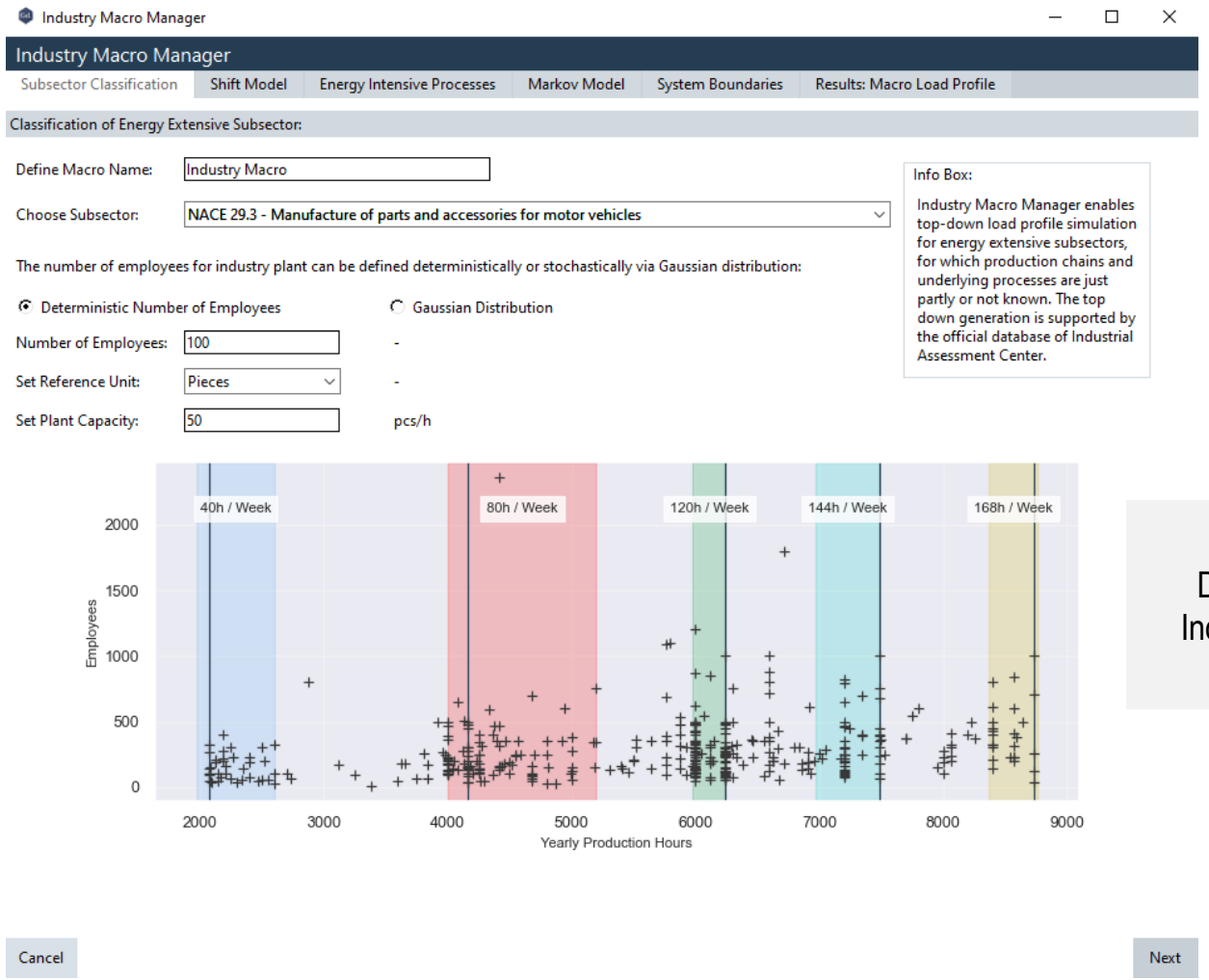


Simulation of Production Chain via Discrete Event Simulation and Generation of Load Profiles

Handling Non-Energy Intensive Subsectors Top-Down



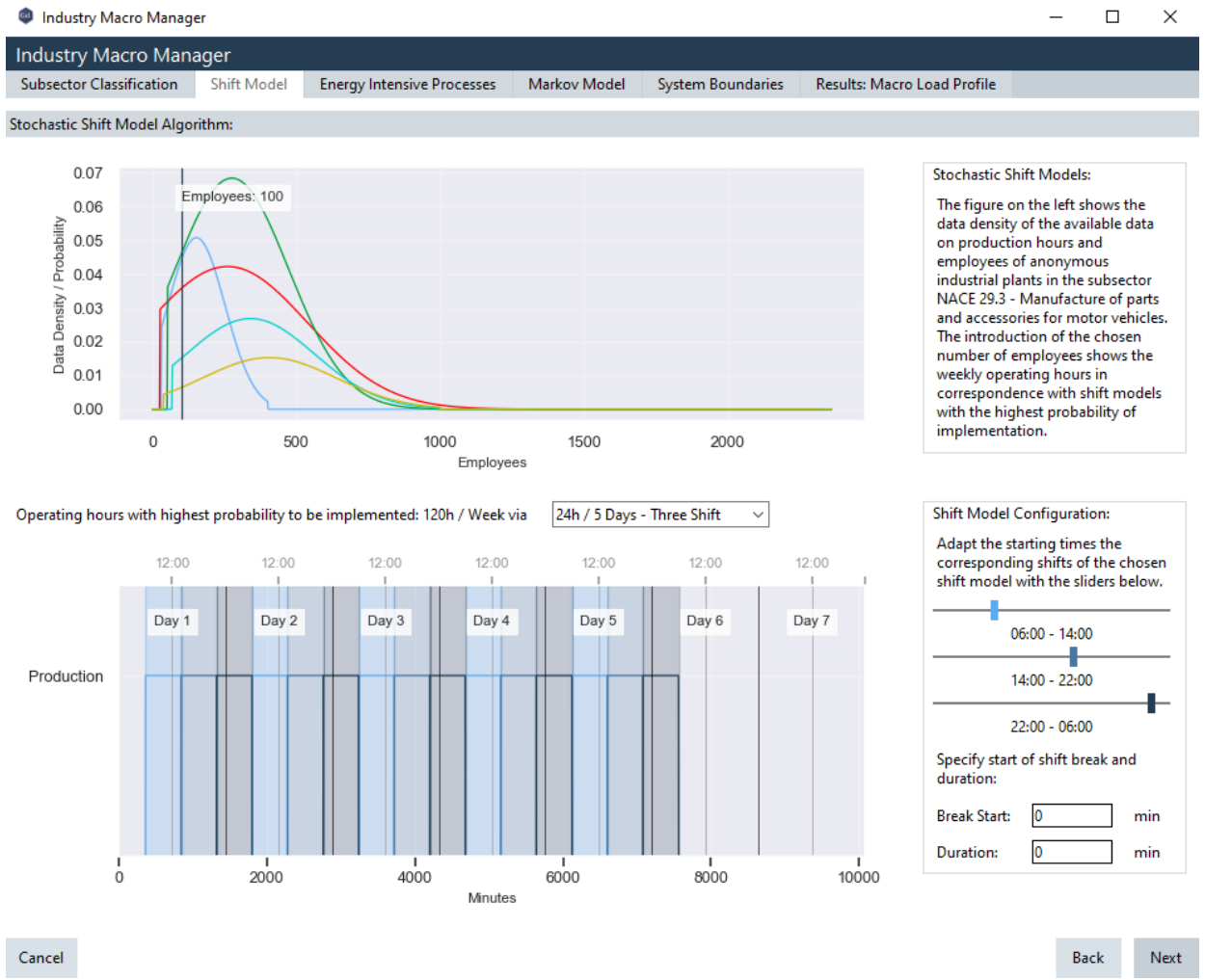
Handling Non-Energy Intensive Subsectors Top-Down



Data from Various Industrial Databases

Handling Non-Energy Intensive Subsectors Top-Down

Investigations on Correlations and Development of Stochastic Algorithms

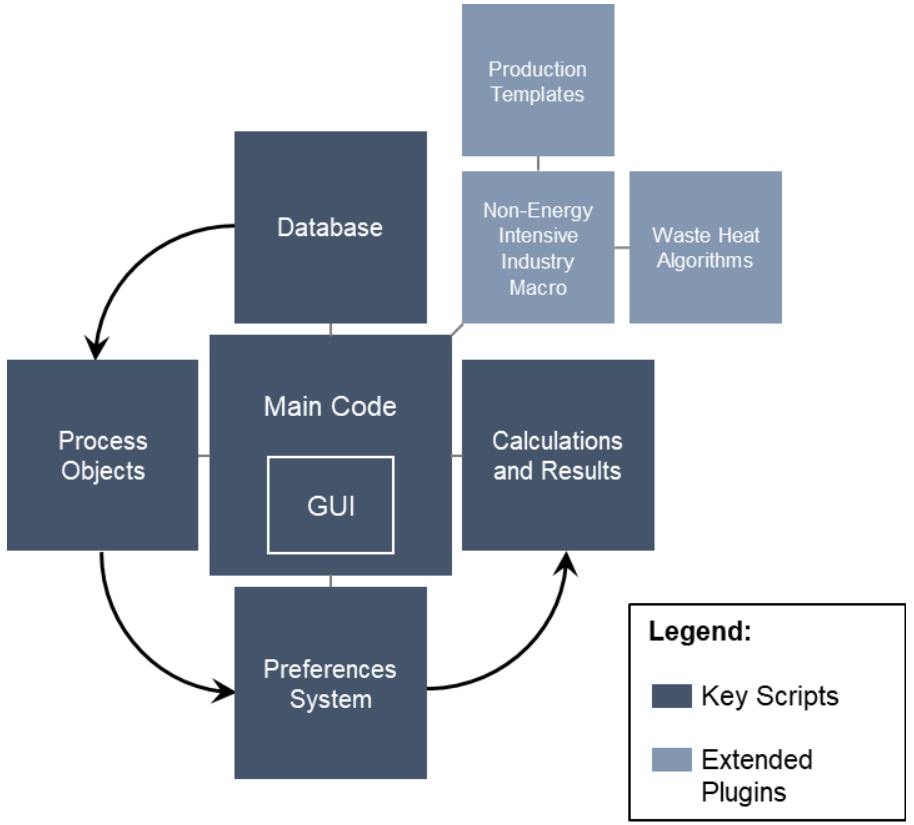


Handling Non-Energy Intensive Subsectors Top-Down

Generation of Load Profiles

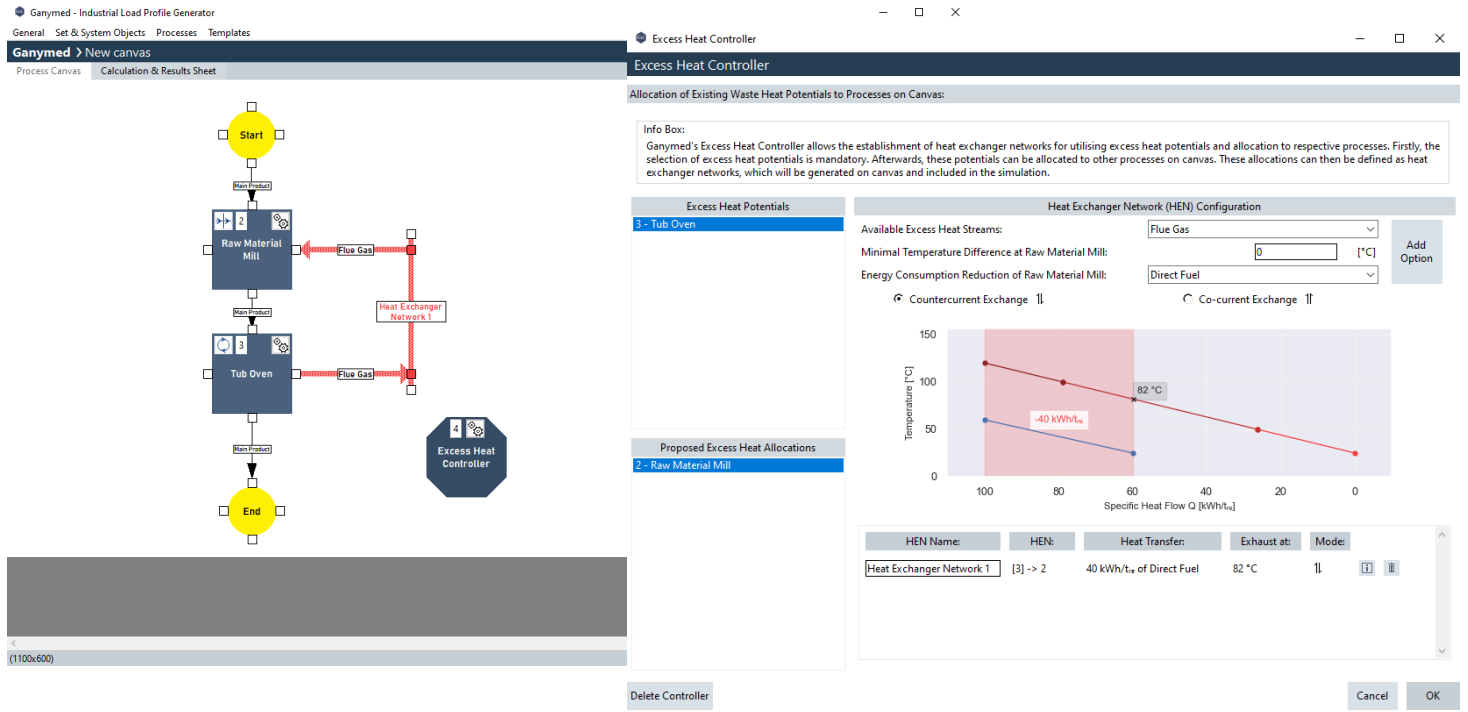
Building *Ganymed*

- *Ganymed* based upon programming language Python
- Main Code connects auxiliary scripts and is responsible for visual representation in GUI
- Processes are created via object-oriented programming logic
- Methodology for non-energy intensive subsectors and stochastic methods realised as plugins
- .exe-File including all necessary databases



Ganymed in the Future

- Methodology for calculating time resolved waste heat profiles is now implemented in *Ganymed*



- Updated software versions will be made available online as free-to-use
- Beta Website and more information at ganymed.ga

Thank you for your attention!

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