Energy Transition\2012\2020\2050

Strategies for the Transition to Low Energy and Low Emission Structures

WIFO, November 2009

Project funded by the Austrian Energy and Climate Fund
Homepage:
EnergyTransition.wifo.ac.at

EnergyTransition

WIFO

Wegener Center

TU Graz

Kuli Consultants & Engineers AG

MONTAN UNIVERSITÄT WWW.UNILEOBEN.AC.AT

Project data

Funding institution: **Klima- und Energiefonds**

Project start: **1. September 2008**

Project end: **31. August 2010**

Objectives: **Strategies to reform the Austrian energy system**

- 2012 – Kyoto
- 2020 – EU 2020-target
- 2050 – long term reduction targets

Projectpartners

WIFO

Austrian Institute of Economic Research; project lead

TUG-IPE

Technical University Graz

Institute for Process and Particle Engineering

KFU-WegC

University of Graz,
Wegener Center for Climate and Global Change

MUL-IWPK

University of Leoben
Institute for Material Science and Testing of Plastics

KWI Consultants GmbH

Guidelines:

low energy – low carbon – low distance

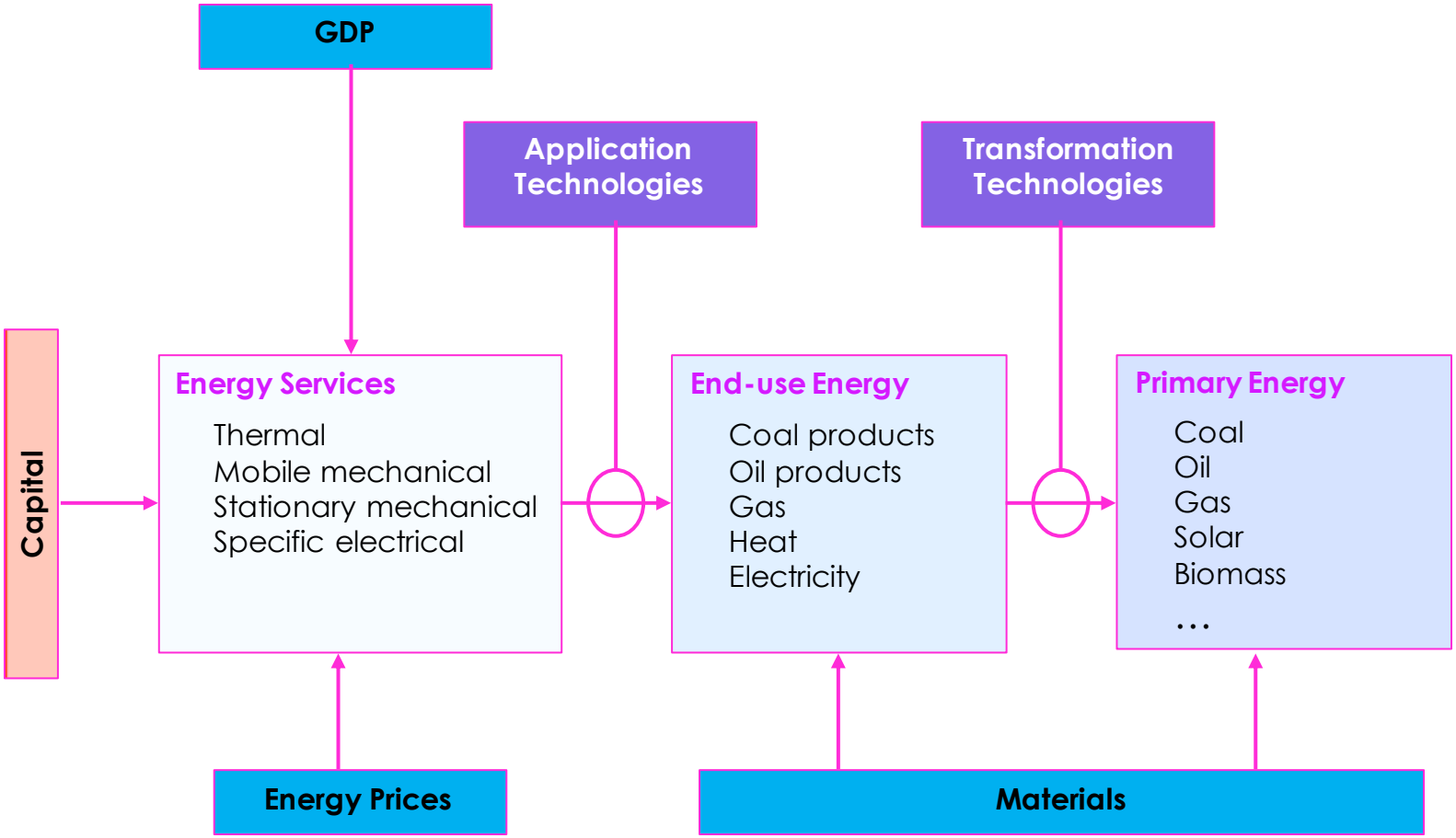
Technology perspective – technology wedges

- From energy services to primary energy use
- The role of materials
- The role of technology choices

Methodology

- Model based
- Design of storylines for development path

Starting point: Energy services



Three key areas for energy services

Definition of energy services for:

- Mobility
- Buildings
- Production

Choice of application and transformation technologies (technology wedges) determine demand for final energy and primary energy sources

Focus on materials in specific areas: e.g. car production or solar technologies

The Concept of Technology Wedges

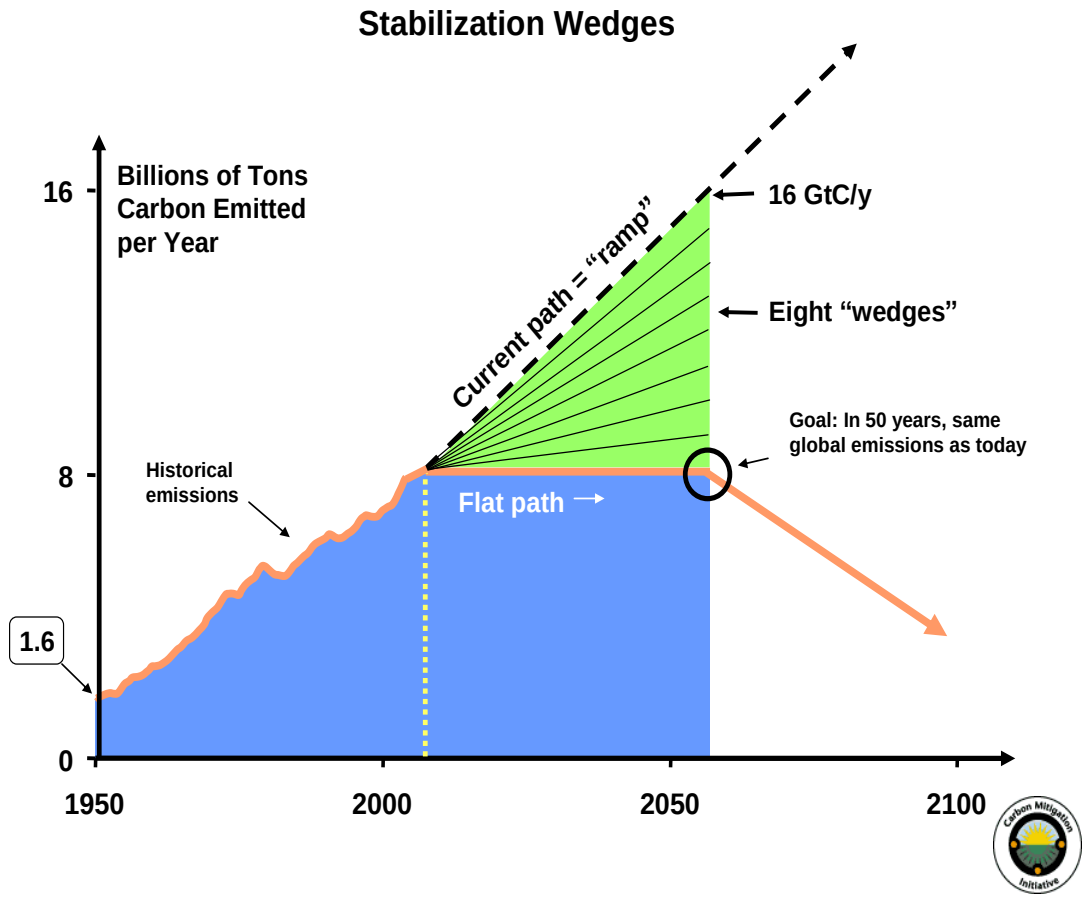
- Past emissions path
- Starting from emissions 2007 a likely reference path is developed
- the reduction target for 2020 (EU-target) and prospects to 2050

yields:

- Reduction Triangle

Q: R. Socolow, R. Hotinski, J. B. Greenblatt, and S. Pacala,. 2004

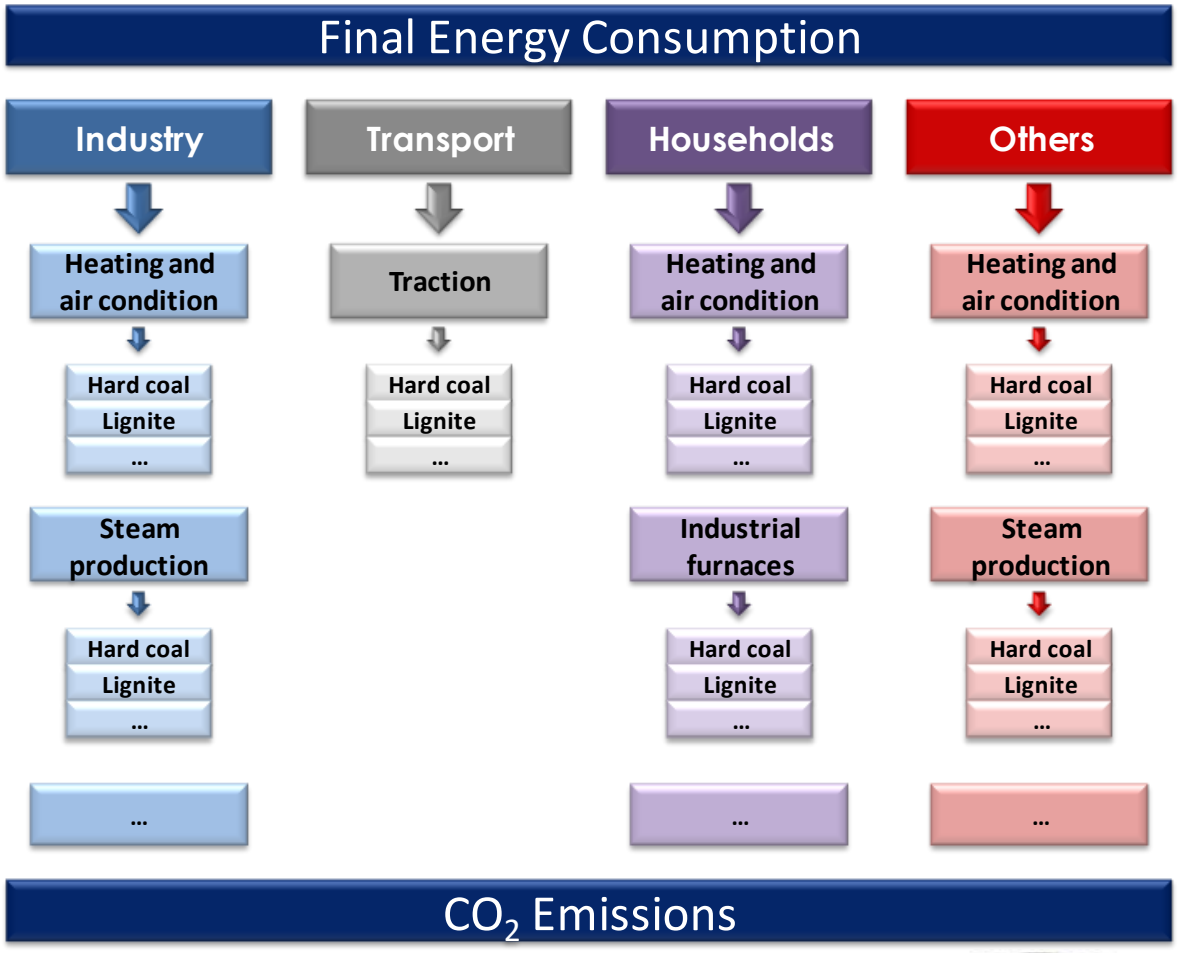
The Concept of Technology Wedges



Q: Pacala, Socolow, 2004.

EnergyTransition

Reference Scenario: Final Energy Consumption

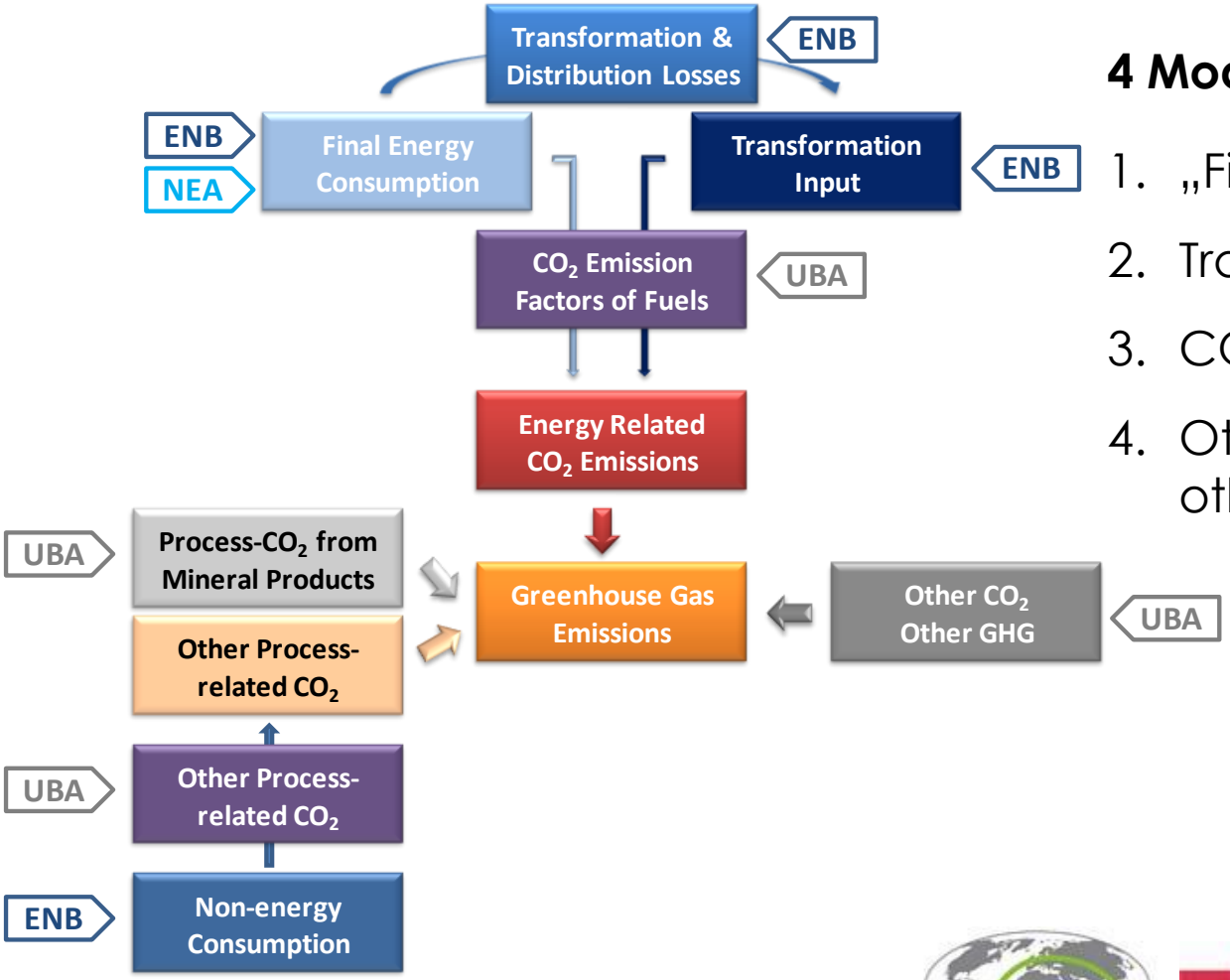


3 steps:

1. Extrapolation of final energy use on sectoral level based on GDP projections
2. Extrapolation of useful energy on sectoral level
3. Extrapolation of final energy use and useful engery by energy sources

EnergyTransition

Calculating greenhouse gas emissions



4 Modules:

1. „Final energy-module“
2. Transformations-module
3. CO_2 Process emissions
4. Other CO_2-emissionen and other GHG

EnergyTransition

From Storylines to Technology Options

Impacts on useful energy and useful energy categories by energy source

EnergyTransition

From storylines to technology options in five steps

Step 1: Storyline – definition of services and expected developmemnt path

Step 2: Quantitative indicator for services (S)

Step 3: Indicator for energy intensity of services (u=U/S)

Step 4: Determination of useful energy need by useful energy category (U=u.S)

Step 5: Breakdown of useful energy (U) by energy source (f_{ij})

i=energy source, j=useful energy category