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Impact of energy and climate policies until 2030 – a detailed bottom-up modelling approach

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Overview

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- Framework Data
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Background

GHG emissions in Germany 1990-2008:

Decrease from 1232 to 959 Mt CO₂ eq., i.e. by 22.2 % →

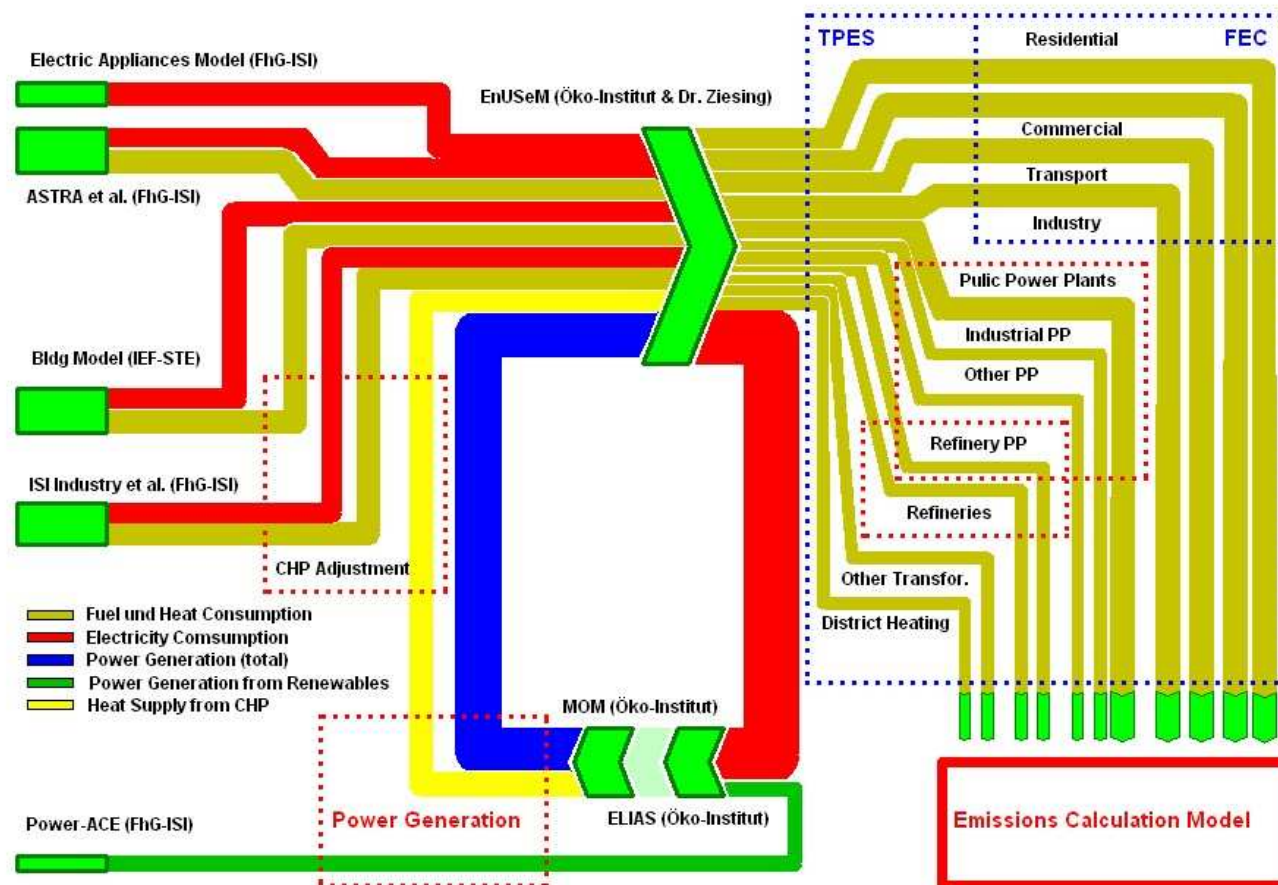
- ✓ German Kyoto target (-21% in 2008-2012) was fulfilled.
- National GHG target (-40% in 2020): further savings are necessary.

Since mid 1990s, regular GHG emissions projections for Germany, carried out by an independent research consortium on behalf of the Federal Environmental Agency (UBA). Latest study from Oct. 2009 (“*Policy Scenarios V*”):

- 2 Scenarios until 2030: **With-Measure-Scenario (WMS)** incl. all climate and energy policy measures introduced between 2000 and 2007/08 and a **Structural Change Scenario (SCS)** including additional measures.
- Ex-ante evaluation of single climate and energy policy measures. Results from ex-post evaluation studies are considered if available.

Methodological Approach

Combination of several sector specific bottom-up models for the different end-use sectors and the transformation sector which were compiled into a consistent and complete quantity structure for energy and GHGs.



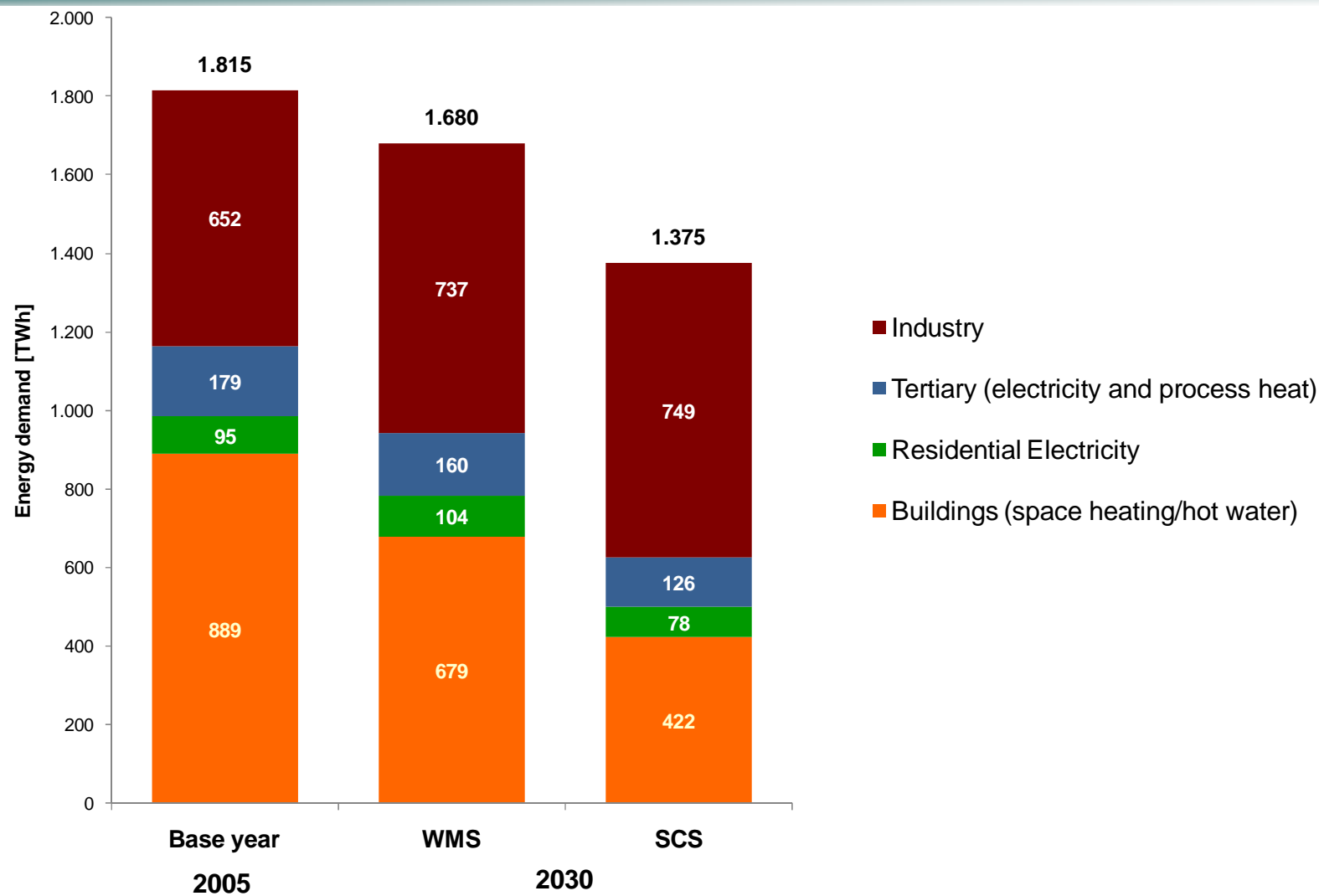
Framework Data

The 4 most important drivers for the scenario calculations:

	2005	2020	2030
Population [1,000 residents]	82,438	81,328	79,750
Economic Growth [%/a]	0.6	1.6	1.4
Crude Oil Price [\$ ₂₀₀₅ /barrel]	52.3	58.3	60.3
CO ₂ certification price (€ ₂₀₀₅ /t CO ₂)	18	30	35

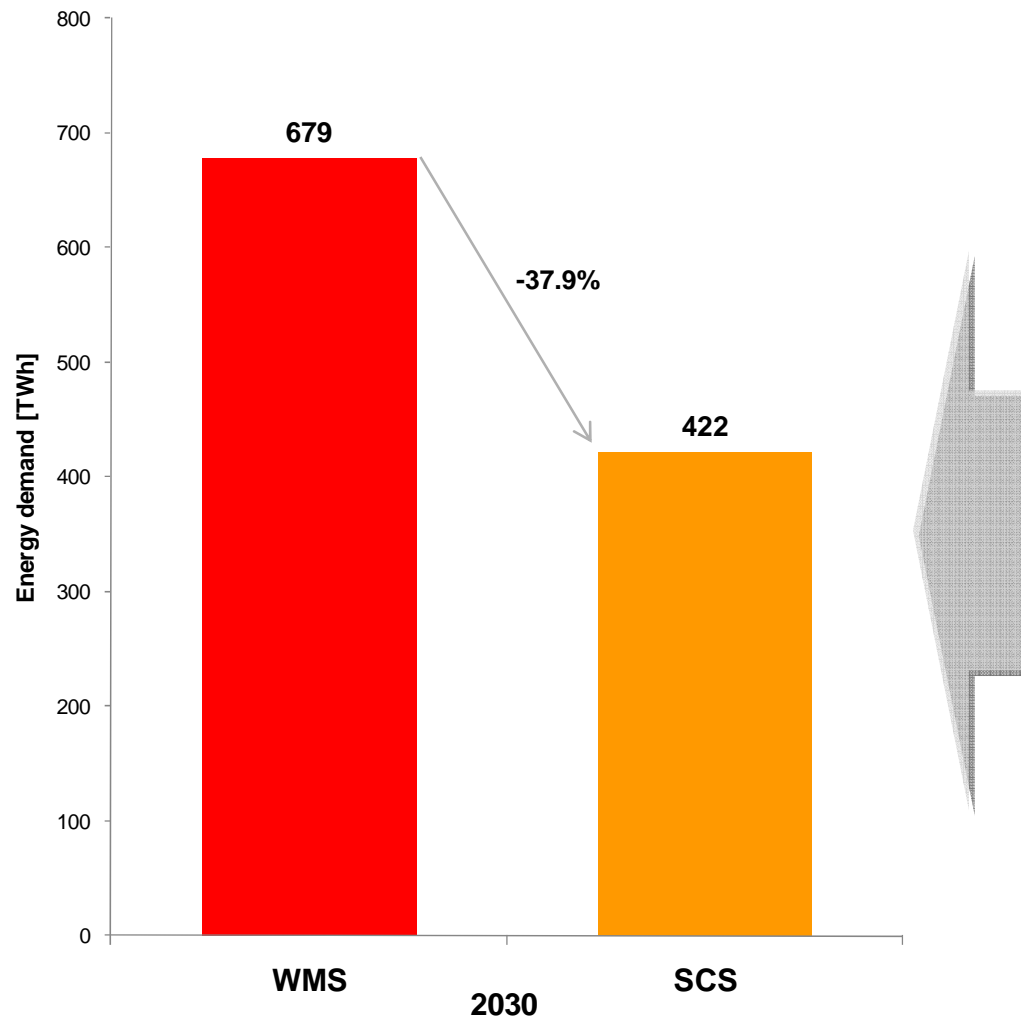
Source: Estimates DIW Berlin within Policy Scenarios V

Scenario calculations – Overview



Source: Calculations Oeko-Institut, Forschungszentrum Juelich, Fraunhofer ISI within Policy Scenarios V

Scenario calculations – Buildings Space heating and Hot water



Most influential measures (SCS)

Tightening of the Energy Savings Ordinance

Expansion of the Energy Savings Ordinance to existing dwellings

Stricter control of the Energy Savings Ordinance

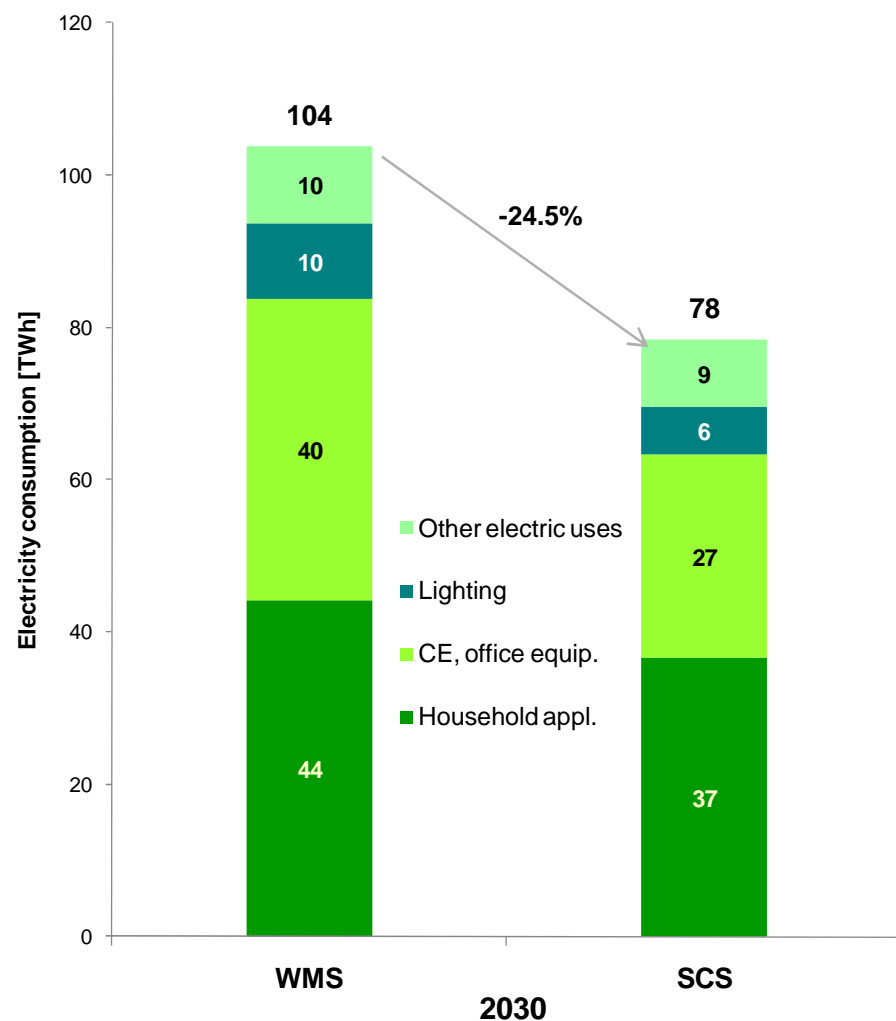
Tax reductions for energy-efficient renovation

Heat contracting

Expansion of the Renewable Energy Sources Act for Heat to existing dwellings

Source: Calculations Forschungszentrum Juelich within Policy Scenarios V

Scenario calculations – Residential Electricity



Most influential measures (SCS)

Ambitious implementation of the Eco-Design Directive

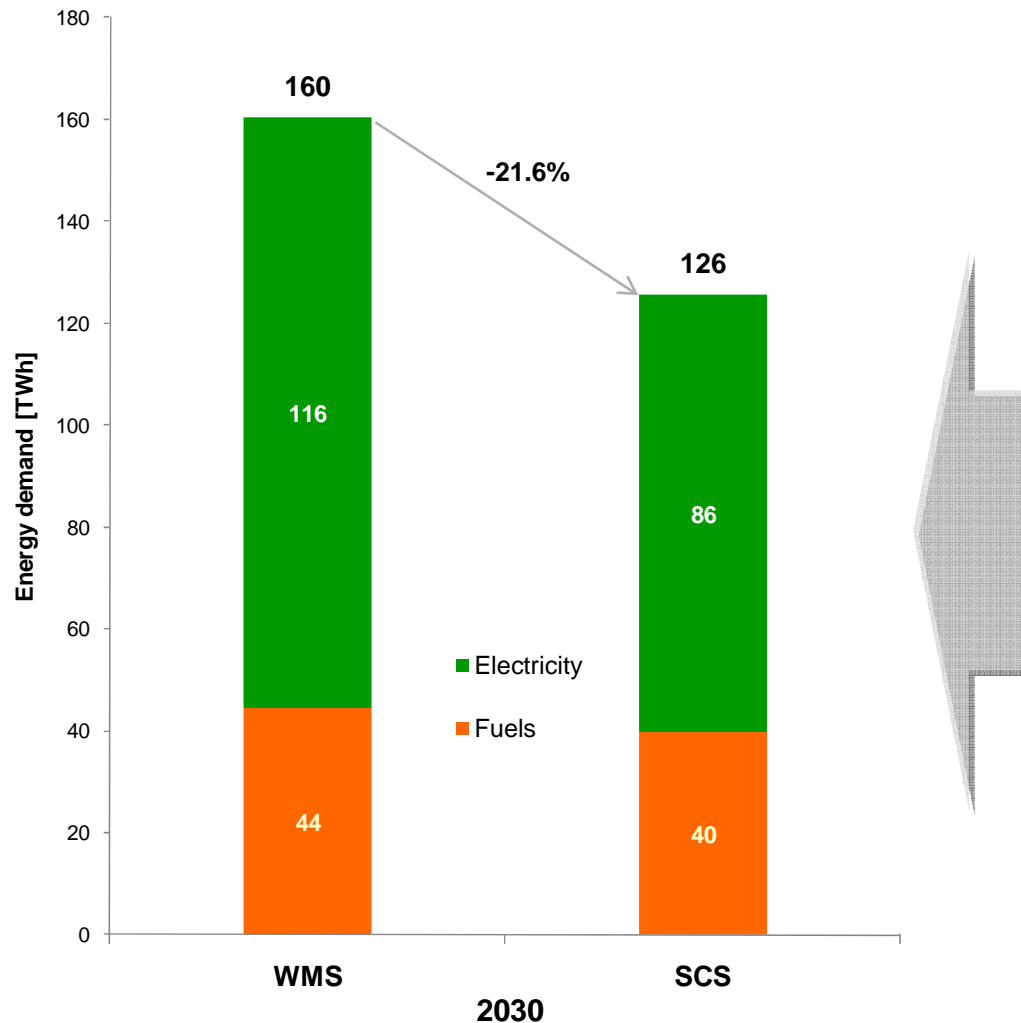
Tightening and extension of the Energy Labelling Directive

Smart metering

Financial incentives for highly efficient household appliances

Source: Calculations Fraunhofer ISI within Policy Scenarios V

Scenario calculations – Tertiary (electricity and process heat)



Most influential measures (SCS)

Ambitious implementation of the Eco-Design Directive

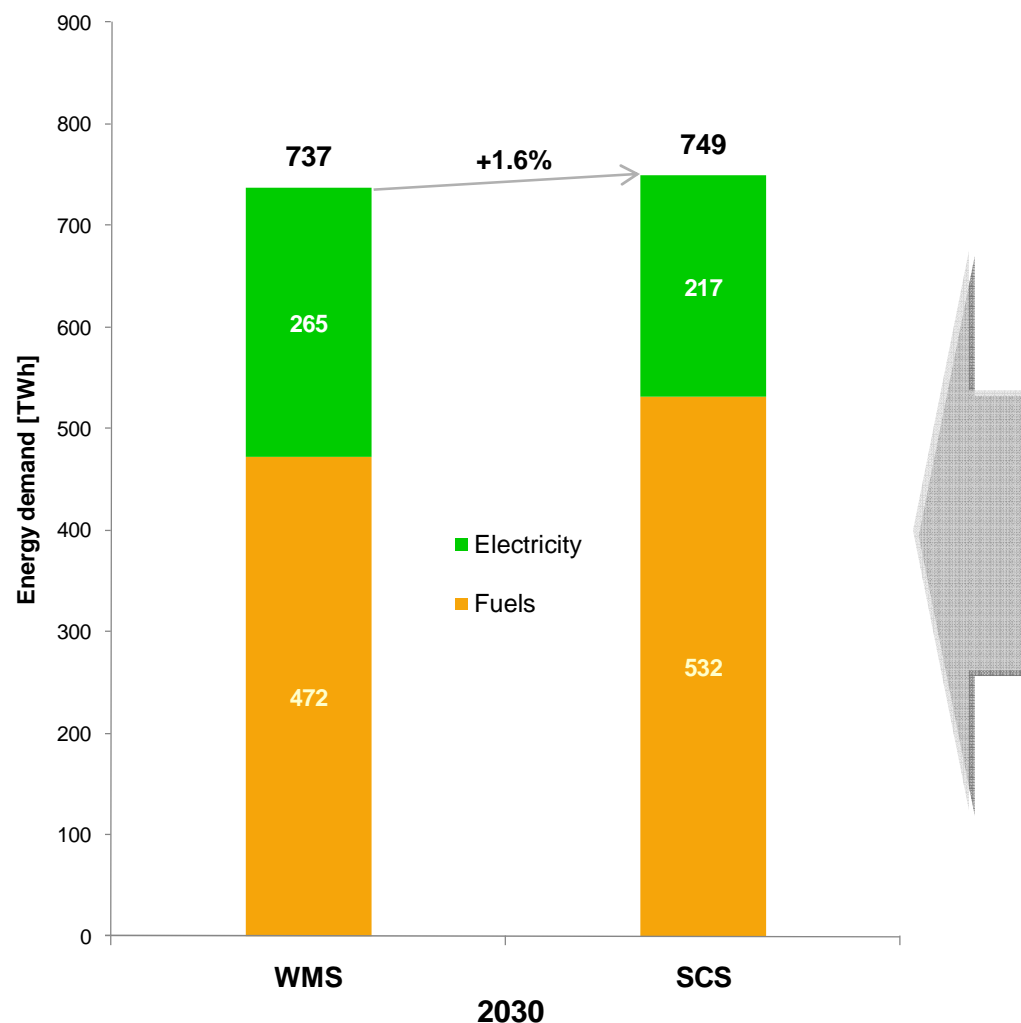
Energy efficiency fund

Energy efficiency contracting

Mandatory energy management systems

Source: Calculations Fraunhofer ISI within Policy Scenarios V

Scenario calculations – Industry



Most influential measures (SCS)

Mandatory energy management systems

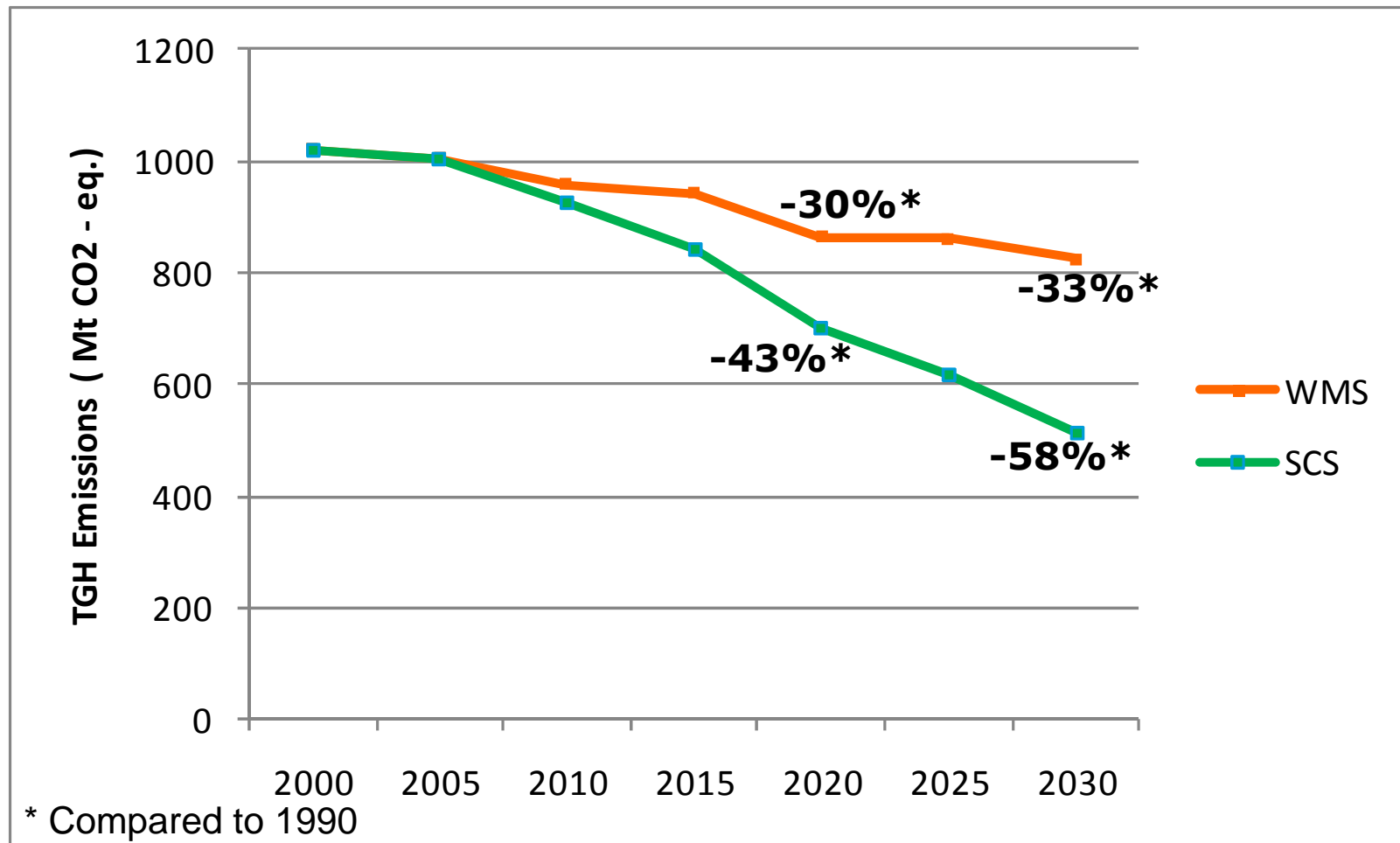
Energy efficiency fund

White certificates

Ambitious implementation of the Eco-Design Directive

Source: Calculations Fraunhofer ISI within Policy Scenarios V

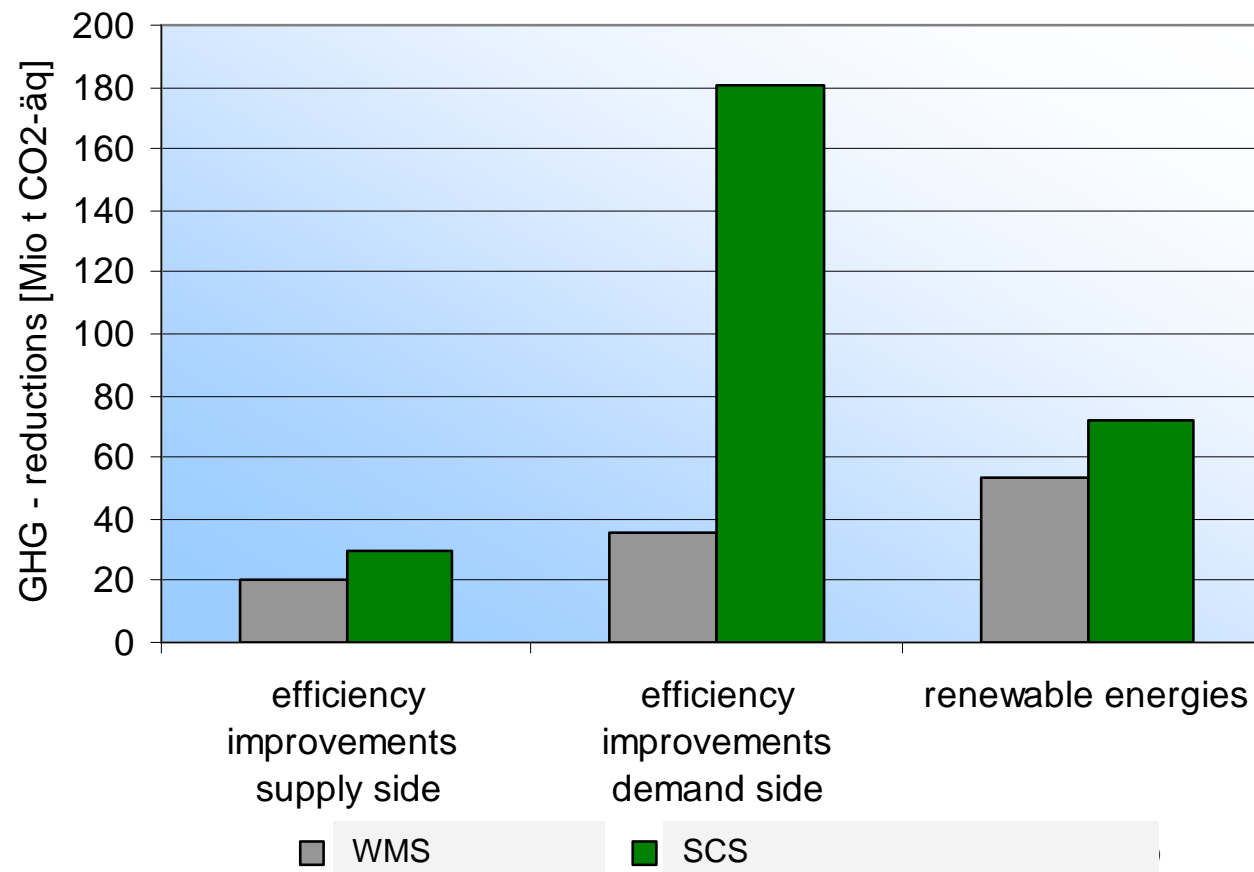
Scenario calculations – Total development



Source: Calculations Oeko-Institut, Forschungszentrum Juelich, Fraunhofer ISI within Policy Scenarios V

The Role of Energy efficiency and Renewable energies

GHG reductions in 2020: highest contribution of energy efficiency improvements on the demand side in the Structural Change Scenario



Source: Calculations UBA based on Policy Scenarios V

Key Messages

- In the ambitious *Structural Change Scenario*, a GHG emission reduction of 43 % by 2020 and 58 % by 2030 is possible compared to the base year 1990 → the national GHG reduction target of 40 % in 2020 can be reached, but only with substantial additional efforts.
- Energy efficiency on the demand side has the biggest potential for additional GHG reductions.
- Most influential policy measures in the Structural Change Scenario:
 - ✓ **Space heating buildings:** further tightening of the Energy Savings Ordinance (incl. expansion on existing dwellings) and better control.
 - ✓ **Electricity demand and industry:** Ambitious implementation of the Eco-Design Directive, mandatory energy management systems and introduction of an energy efficiency funds in Germany.

Conclusions and Outlook

- The Policy Scenarios for Climate Protection will go on in Germany, relying on the same methodological approach.
- Using specific bottom-up models for each sector instead of one macroeconomic top-down model seems to be more appropriate to integrate the impact evaluation of sector-specific energy and climate policy measures into the scenarios.
- The availability of ex-post evaluation studies to substantiate the model assumptions will become better in Germany in the next years.
- The next “Policy Scenarios” will include the framework data and measures from the new “Energy Concept” for Germany, announced by the Federal Government for autumn 2010.

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