EEAP Conference 2019

Experiences of evaluating Energy transition policies in Europe

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Presented by: Chun Xia-Bauer

Johannes Thema, Felix Suerkemper, Florin Vondung, Thomas Götz

Wuppertal Institute for Climate, Environment and Energy

Evaluation approaches in Europe
Work from Wuppertal Institute and others

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Ex-post evaluations

- Example : Programme for heating optimization through efficient pumps and hydraulic balancing in Germany

Ex-ante evaluations

- Examples from the EU: Ecodesign Directive

Multiple impacts

- Ex-ante assessment
- Ex-post assessment

Ex-post evaluation

Example : Programme for heating optimization through efficient pumps and hydraulic balancing in Germany (I)

- **Programme duration:** 2016-2020
- **Target:** Incentivize replacement of old heating system circulators and warm water circulation pumps with highly efficient pumps and hydraulic optimization of heating systems

- **Subsidy level:** 30% of the net investment costs
- **Target groups:** Private owners, companies, self-employed, municipal bodies, legal persons under private law
- **Funding:** German Federal Ministry for Economic Affairs and Energy

Legal requirement to evaluate public subsidy programmes

→ Wuppertal Institut and Arepo Consult carry out programme evaluation (formative and summative ex-post evaluation)

Source: https://www.deutschland-machts-effizient.de/KAENEF/Redaktion/DE/Foerderprogramme/heizungsoptimierung.html

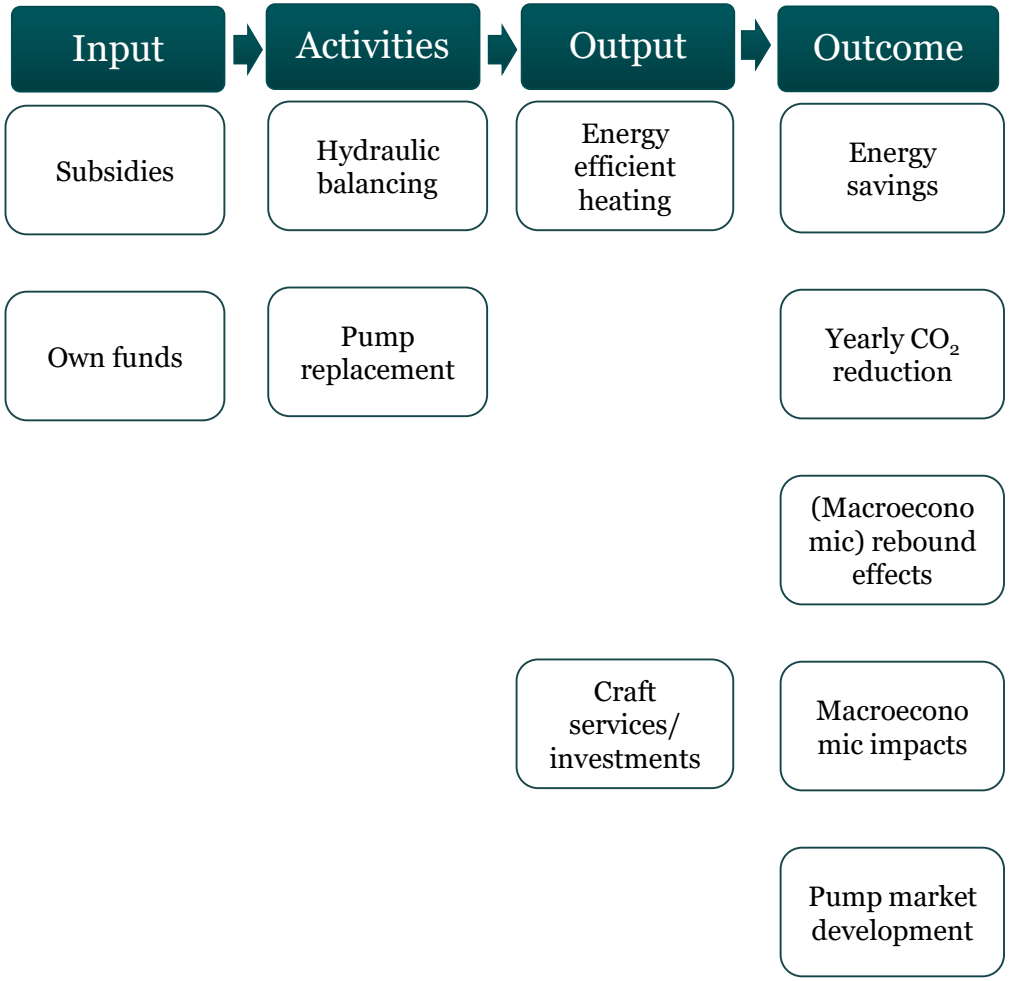
Ex-post evaluation

Example 1: Programme for heating optimization through efficient pumps and hydraulic balancing in Germany (II)

Evaluation Approach

- First step: development of programme theory to
  - understand causal chains and impacts and
  - identify suitable indicators and guide data collection
- Ex-post evaluation using engineering estimates and programme statistics to assess target achievement, effectiveness, cost-effectiveness
- Evaluation suppported by market analysis, stakeholder interviews and participant survey
- Continuous formulation of recommendations for programme improvement

Simplified causal chain guiding the evaluation design

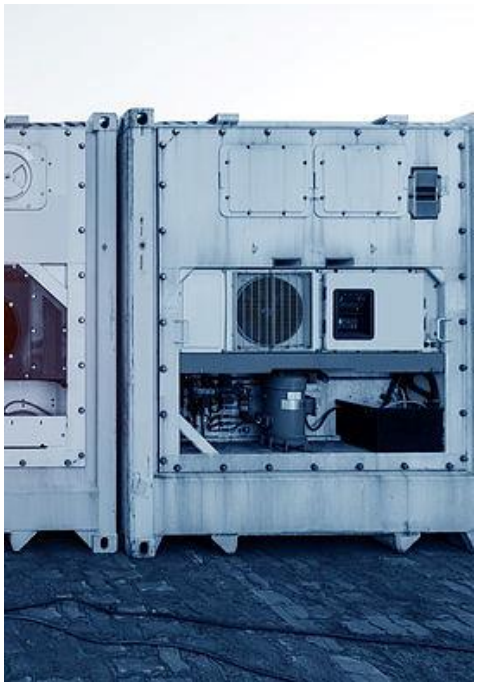


Ex-ante evaluation
Example: Ecodesign Directive

Ecodesign directive: provides consistent EU-wide rules for improving the environmental performance of products, sets out minimum mandatory requirements for the energy efficiency of these products. => 2019 extended to include **energy-related products (ErP)**

Example Ecodesign studies (with involvement by Wuppertal Institute):

- Smart appliances, Refrigerated containers, Local space heating products, Solid fuel small combustion installations, Thermal insulation in buildings, Household Refrigerators & Freezers, Networked standby losses of energy using products, etc.



Ex-ante evaluation
Example: Ecodesign Directive

Methodology for Ecodesign of Energy-related products (MEErP) 2011: allow *ex-ante evaluating* whether and to which extent various energy-related products fulfil certain criteria according the Ecodesign Directive.

- Task 1 – Scope (preliminary product definitions, identifying standards and legislation);
- Task 2 – Markets (market stock and trend, consumer expenditure for LCC);
- Task 3 – Users (Barriers to possible Ecodesign measures, user parameters influence the environmental impact);
- Task 4 – Technologies (features of existing products, BAT, BNAT);
- Task 5 – Environment & Economics (Base case LCA & LCC);
- Task 6 – Design options;
- Task 7 – Scenarios Modelling (policies, scenarios, impact assessment)

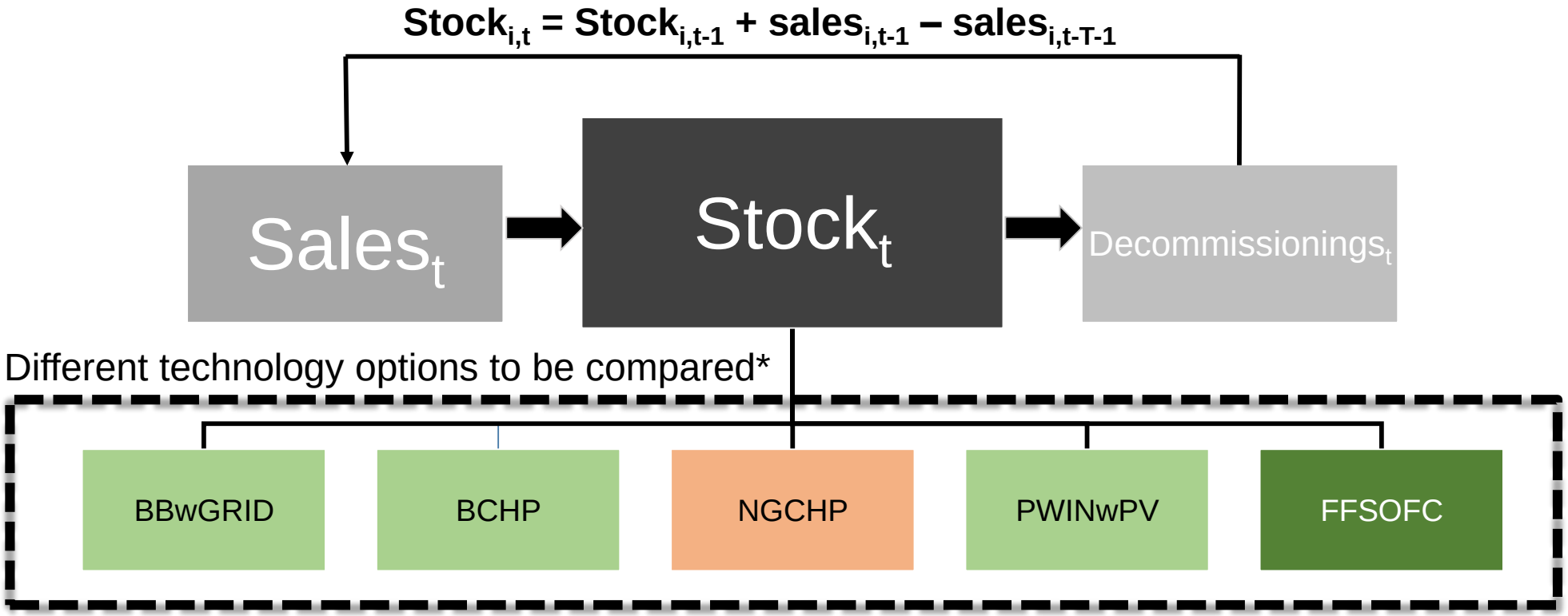
stakeholder involvement!

https://ec.europa.eu/docsroom/documents/26525

Ex-ante evaluation
Example 2: Ecodesign Directive

e.g. Task 7 - Example for ex-ante impact assessment / scenario analysis

→ Scheme of the WIKUE dynamic stock model used for Impact Assessments (simplified)



Source: Wuppertal Institute, (*here indicative examples / abbreviations for different combustion installations / CHP systems)

Ex-ante evaluation

Example 2: Ecodesign Directive

Task 7 - Example results, environmental impacts (excerpt)

		Technologies & high sales scenario				
		APPLICATION A1 2020-2050				
		BBwGrid	BCHP	NGCHP	PWINwPV	FFSOFC
ENVIRONMENT						
Solid Fuels	(GJ)	228.292.615	367.192.412	354.516.353	216.018.818	321.951.123
Electricity	(GWh)	586	-36.249	-49.601	-21.080	-21.081
GHG	(t CO_2-eq.)	1.079.522	-8.828.560	5.408.250	-5.124.172	-4.700.647
CO	(t)	59.273	1.474	6.848	-947	-1.088
OGC	(t)	1.681	-70	1.095	-38	-57
TSP	(t)	19.647	-593	-1.146	-314	-329
NO_x	(t)	39.597	49.882	-4.564	19.196	20.043

		Technologies & medium sales scenario				
		APPLICATION A1 2020-2050				
		BBwGrid	BCHP	NGCHP	PWINwPV	FFSOFC
ENVIRONMENT						
Solid Fuels	(GJ)	117.228.141	188.553.117	182.043.967	110.925.553	165.321.738
Electricity	(GWh)	300	-18.540	-25.369	-10.782	-10.782
GHG	(t CO_2-eq.)	554.173	-4.523.478	2.790.793	-2.625.454	-2.407.974
CO	(t)	30.437	765	3.529	-481	-554
OGC	(t)	863	-35	564	-19	-29
TSP	(t)	10.089	-303	-586	-160	-168
NO_x	(t)	20.333	25.637	-2.313	9.870	10.305

Source: Wuppertal Institute, (*here indicative examples / abbreviations for different combustion installations / CHP systems)

Ex-ante assessment multiple impacts (societal perspective)

Example: COMBI project

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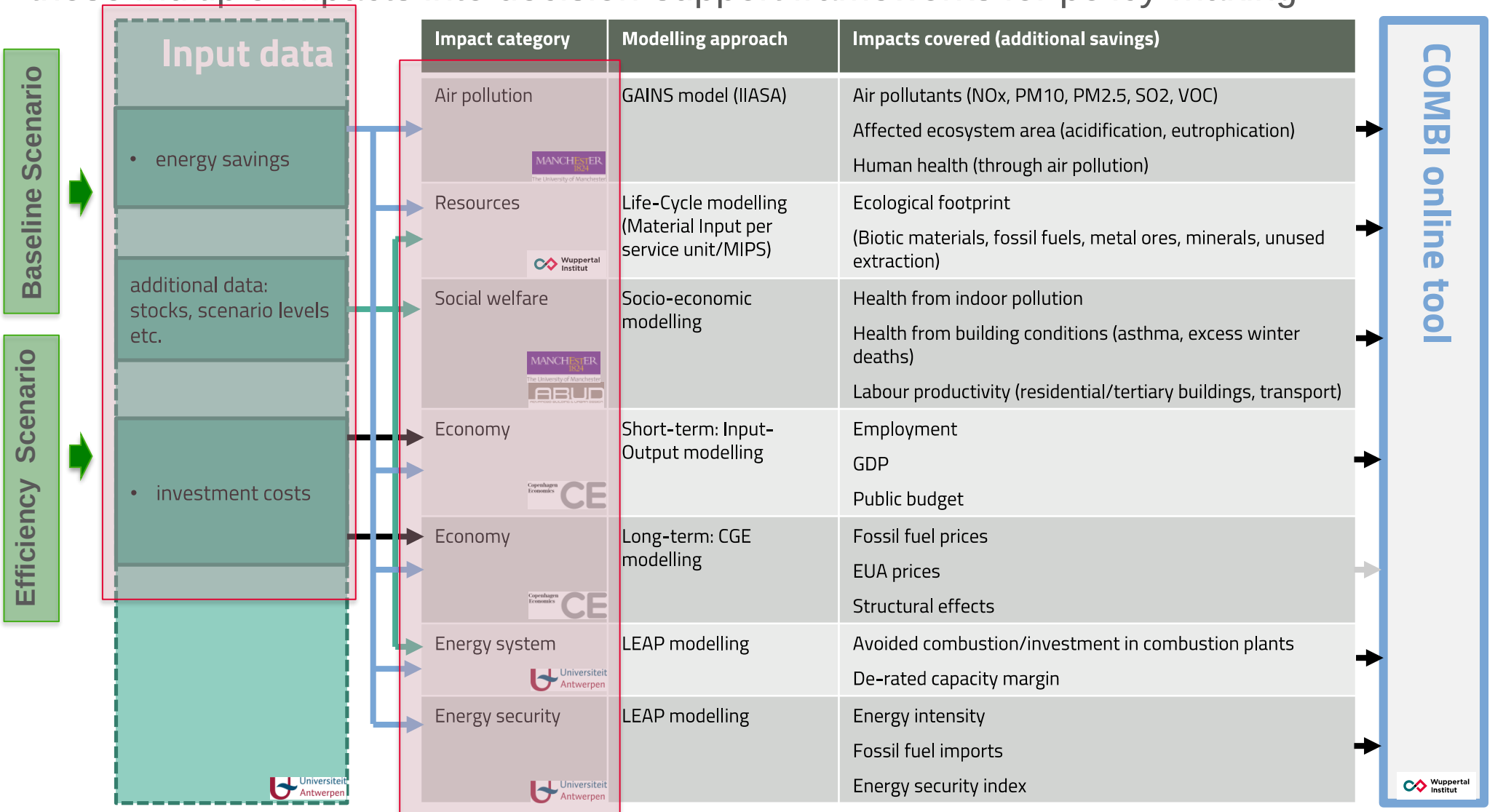
COMBI aimed at quantifying the **multiple non-energy benefits of energy efficiency** (building, transport and industry) in the EU-28 area and incorporate those multiple impacts into decision-support frameworks for policy-making



Ex-ante assessment multiple impacts
Example: COMBI – key results (EU-wide figures)

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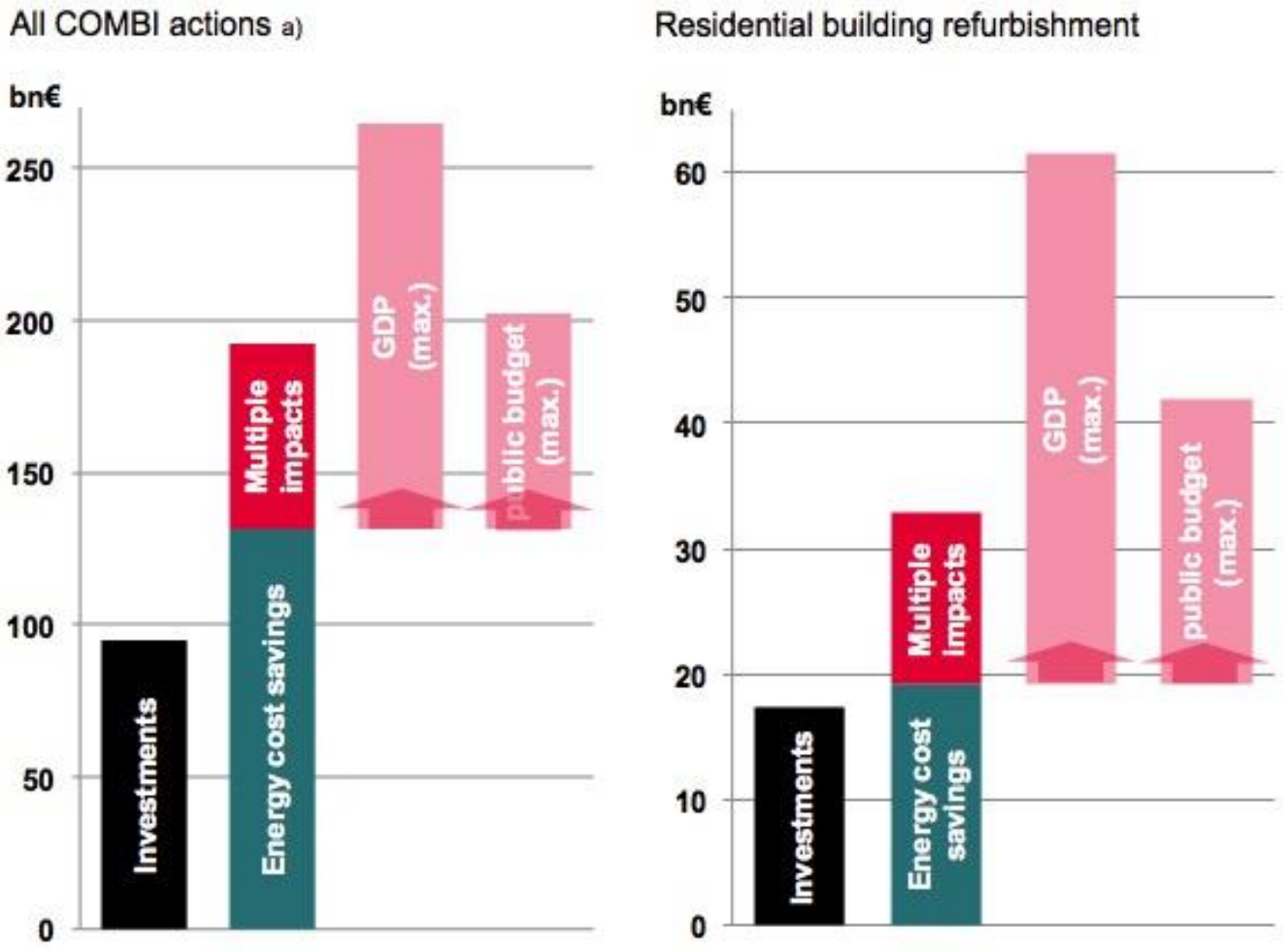
Investments, energy cost savings and multiple impacts (bn€ annual in 2030)



COMBI online tool
Calculating and Operationalising the Multiple Benefits of Energy Efficiency in Europe

combi-project.eu/tool

a) all EEI actions except modal shifts which cannot be included to CBA due to no availability of infrastructure investment costs and trucks due to unreliability of out-dated investment costs

Ex-ante assessment multiple impacts
Example: COMBI – key results (EU-wide figures)

- Bringing all quantifiable multiple impacts together in **one unified database**
- Many impacts **could not, or not comprehensively, be quantified** due to insufficient data and evidence
- While COMBI covers the sectors of building, transport and industry, they are **not covered in all possible detail.**
- Almost half of monetised impacts have **potential overlaps** with other impacts=> **Exclusion**
- Input data based on the state of knowledge and latest available data on energy efficiency improvement (EEI) actions, **NOT including technology development and costs reduction**

[a)] all EEI actions except modal shifts which cannot be included to CBA due to no availability of infrastructure investment costs and trucks due to unreliability of out-dated investment costs

Thank You
For Your Attention

Ex-ante assessment multiple impacts

Example: COMBI – key results (EU-wide figures)

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#	End-use energy efficiency action – improving energy efficiency in or through:
Action 1	residential refurbishment of the building shell + space heating + ventilation + space cooling (air-conditioning)
Action 2	residential new dwellings
Action 3	residential lighting (all dwellings);
Action 4	residential cold appliances (all dwellings);
Action 5	non-residential refurbishment of building shell + space heating + ventilation + space cooling (air-conditioning)
Action 6	non-residential new buildings
Action 7	non-residential lighting (all buildings)
Action 8	non-residential product cooling (all buildings)
Action 9	passenger transport – modal shift
Action 10	passenger transport – motorized two-wheelers
Action 11	passenger transport – cars
Action 12	passenger transport – public road/buses
Action 13	freight transport – modal shift
Action 14	freight transport – light duty trucks (LDT)
Action 15	freight transport – heavy duty trucks (HDT)
Action 16	industry (7 sectors) - high temperature process heating
Action 17	industry (7 sectors) - low and medium temperature process heating
Action 18	industry (7 sectors) – process cooling
Action 19	industry (7 sectors) – specific process electricity
Action 20	industry (7 sectors) – motor drives
Action 21	industry (7 sectors) – HVAC in industrial buildings

[a)] all EEI actions except modal shifts which cannot be included to CBA due to no availability of infrastructure investment costs and trucks due to unreliability of out-dated investment costs