Quantifying the multiple impacts of energy efficiency policies

Applying the MICATool to three German programmes

SEED MICAT
Support Energy Efficiency Deployment with the Multiple Impacts CAlculation Tool

THREE ENERGY EFFICIENCY PROGRAMMES ACROSS THREE SECTORS

Energy efficiency policies generate benefits beyond energy and greenhouse gas emission savings, including improvements in health, employment, energy security and economic activity. The MICATool provides a harmonised, comparatively low-data approach to quantifying, monetising and integrating these impacts into cost-benefit analysis.
Case studies were selected for **broad sectoral coverage, policy relevance and strong empirical basis through policy evaluations.**

Household sector: Federal funding program for energy efficient buildings (BEG)

Sector: Residential
Instrument: Investment grants and loans
Case study focus: Building-envelope improvements and heating-system installation or optimisation in existing residential buildings
Evaluation period: 2021-2023

Transport sector: The Directive to promote the sale of electric-powered vehicles (Environmental bonus)

Sector: Transport
Instrument: Government subsidies combined with manufacturer rebates
Case study focus: Fuel switching from oil-based transport to electricity through battery electric vehicles
Evaluation period: 2016-2023

Industrial sector: Federal funding for energy and resource efficiency in industry (EEW)

Sector: Industrial
Instrument: Grants, loans and a competitive tender scheme
Case study focus: Cross-cutting technologies, renewable process heat and fuel switching, process-specific improvements and electrification
Evaluation period: 2019-2023

KEY RESULTS: MULTIPLE IMPACTS AND COST-BENEFIT ANALYSIS

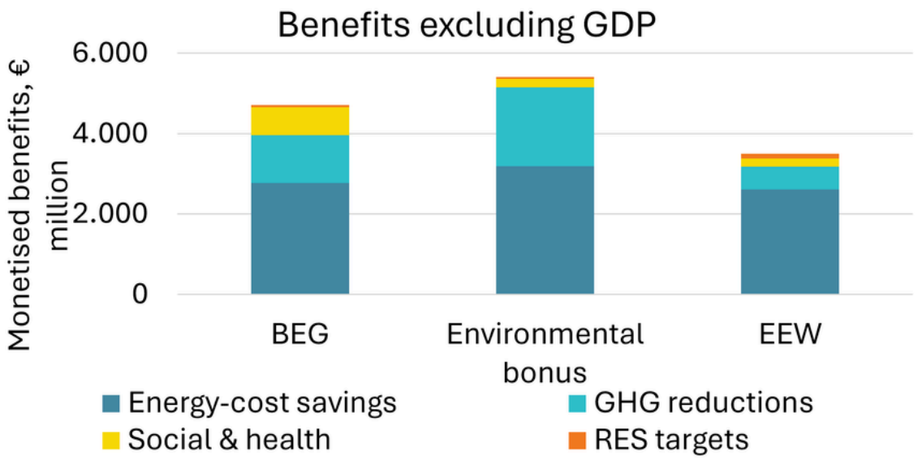
INDICATORS

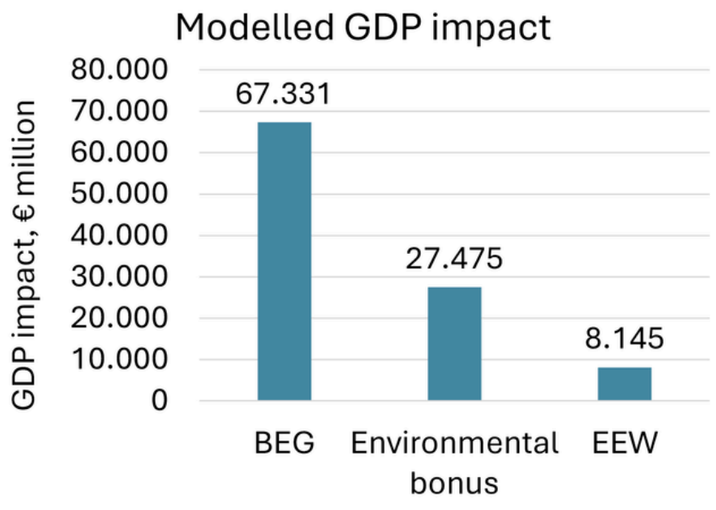
Social and health
- Avoided mortality and hospital admissions from reduced air pollution
- Avoided working days lost due to air pollution
- Avoided asthma cases and excess cold-weather mortality
- Reduced energy poverty

Economic and energy-system
- Energy intensity and import dependency
- Additional generation-capacity requirements
- GDP effects and additional employment
- Reduced energy costs

Environmental
- Primary-energy savings by fuel
- Greenhouse gas reductions
- Changes in SO_2, NOx and $PM_{2.5}$
- Contribution to renewable-energy targets

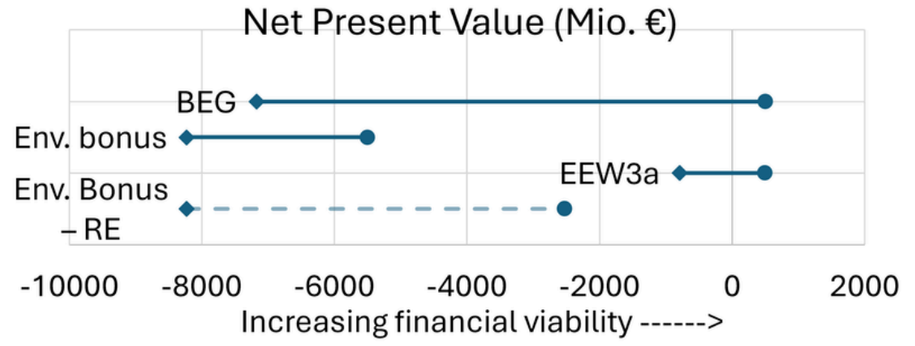
Monetising the multiple impacts





- All three programmes generate monetisable benefits beyond direct energy savings
- The modelled GDP impact is the largest monetised category in each programme-specific assessment period
- Energy-cost reductions are the second-largest category and make a particularly important relative contribution in EEW
- The composition of benefits differs by sector: While energy cost savings has the greatest share across all programmes, the BEG includes additional residential health and energy poverty effects, while the Environmental bonus derives a larger share of benefits from GHG reductions
- Some effects accrue annually over a measure's lifetime, while other effects, including the modelled GDP stimulus, are treated differently over time

Including the wider benefits of energy efficiency



- The left-hand side of the graphconsiders the impacts of energycostsavingsonly. The financialviability of the programmesimproveswhen the monetisedbenefits of all multiple impactsare included
- The Environmental bonusremainsfinanciallyinfeasible, but if the electricitysectorwere also decarbonised the performanceincreases (Env. Bonus – RE)

LESSONS LEARNED/ ACHIEVEMENTS

- **Broader evidence base:** The analysis captures health, energy poverty, employment, GDP, energy-security and environmental effects that are often missing from conventional programme monitoring
- **Cross-sector application:** A single framework was applied to residential buildings, electric mobility and industrial efficiency
- **Lower entry barrier:** Evaluation-report data can be combined with adjustable MICATool defaults where detailed programme inputs are unavailable
- **Improved cost-benefit assessment:** Monetisation shows how conclusions change when societal benefits are included rather than considering energy-cost savings alone
- **Scenario sensitivity becomes visible:** The Environmental Bonus results demonstrate the importance of electricity-supply assumptions
- **Policy relevance:** The framework supports broader reporting and practical implementation of the Energy Efficiency First principle

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