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RELIEF OR RETROFIT?DESIGNING ETS2 REVENUE RECYCLING TO REDUCE ENERGY POVERTY IN POLAND

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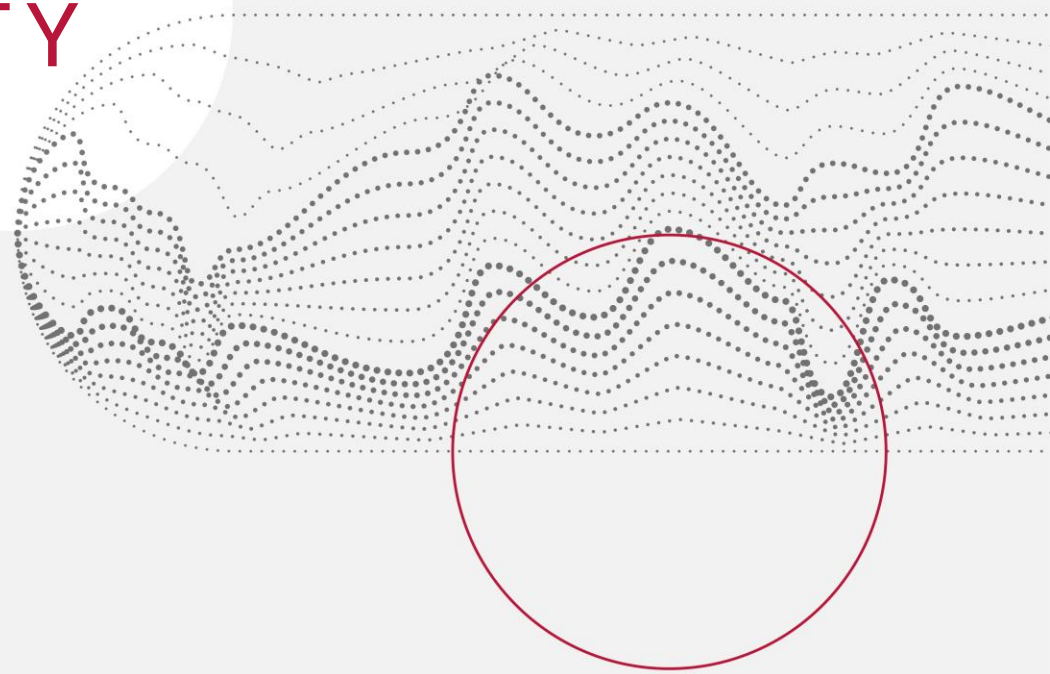


FREECE WORKSHOP *THE ECONOMICS OF INEQUALITY AND THE ENVIRONMENT*, 28/11/2025

During the energy transition, transfers and investments are complements, not substitutes

Main findings:

- After the introduction of the ETS-2 transfers provide immediate relief → Energy poverty 0.3pp lower in 2027
- Investments deliver larger, lasting reductions → Outperform transfers after 2030
- Optimal policy = sequenced mix of both

Contributions:

1. First empirical micro-level assessment of the EU's ETS2 + Social Climate Fund
2. Systematic comparison of transfer vs. investment strategies
3. Quantifies temporal dynamics of policy sequencing

Institutional Setting: ETS2 and the Social Climate Fund

ETS2 (starting 2027/2028):

- Extends carbon pricing to buildings and road transport
- Costs passed through to households → affordability concerns

Social Climate Fund (2026/2027–2032):

- +/-€80 billion EU-wide
- Up to 37.5% for direct transfers; the rest for investments
- Poland receives largest share: ~20% (€10+ billion)

Why Poland?

- Heavy reliance on coal for heating
- High per-household emissions
- Leader in residential decarbonisation programs (Clean Air)

Research questions: How should the Social Climate Fund be spent?

1. What are the impacts of different transfer and investment mechanisms on energy poverty?
2. How does the temporal sequencing of immediate transfers vs. long-term investments affect outcomes?
3. Are there trade-offs between short-term relief and long-term solutions?

We evaluate three scenarios:

- **Baseline (BAU):** ETS2 prices, no SCF support
- **Transfer:** SCF per government plan: €5.7bn direct aid + €3.1bn investments
- **Investment:** Direct aid reallocated → €8.8bn total for green investments

Microsimulation model on Household Budget Survey data from 2023 (~28,000 hh) + NECP macro projections

- **Energy carriers**

$$S = \{electricity, gas, oil, coal, wood, district\ heat\}$$

- **Income update** (ΔY = agg. growth; T = SCF transfer)

$$Y_t^h = \Delta Y_t \, Y_*^h + T_t^h$$

- **Fuel switch: fossil → heat pump**

$$E_{ele,t}^{h,v} = E_{ele,*}^h + E_{s,*}^h \, c_{s,ele}$$

- **Coal/gas/oil consumption set to zero**

$$E_{s,t}^{h,v} = 0$$

- **Non-fossil consumption change**

$$E_{s,t}^h = E_{s,*}^h \, \Delta V_t^s$$

- **Price pass-through (including ETS2)**

$$E_{s,t}^h = E_{ele,t}^{h,v} \, \Delta P_t^s .$$

Energy poverty metric (Low Income, High Cost) - required energy costs + low income

- **Electricity** $H_g^E = \bar{e}_{S(g)} N_g$ Per capita norm × household size
- **Heating** $H_g^H = \bar{c}_{S(g)} A_g^{heat}$ Per m² norm × heated area
- **Total (equivalised)** $H_g^{eq} = H_g / s_g^{FP}$
- **LIHC Classification (household is energy-poor if ALL three hold):**

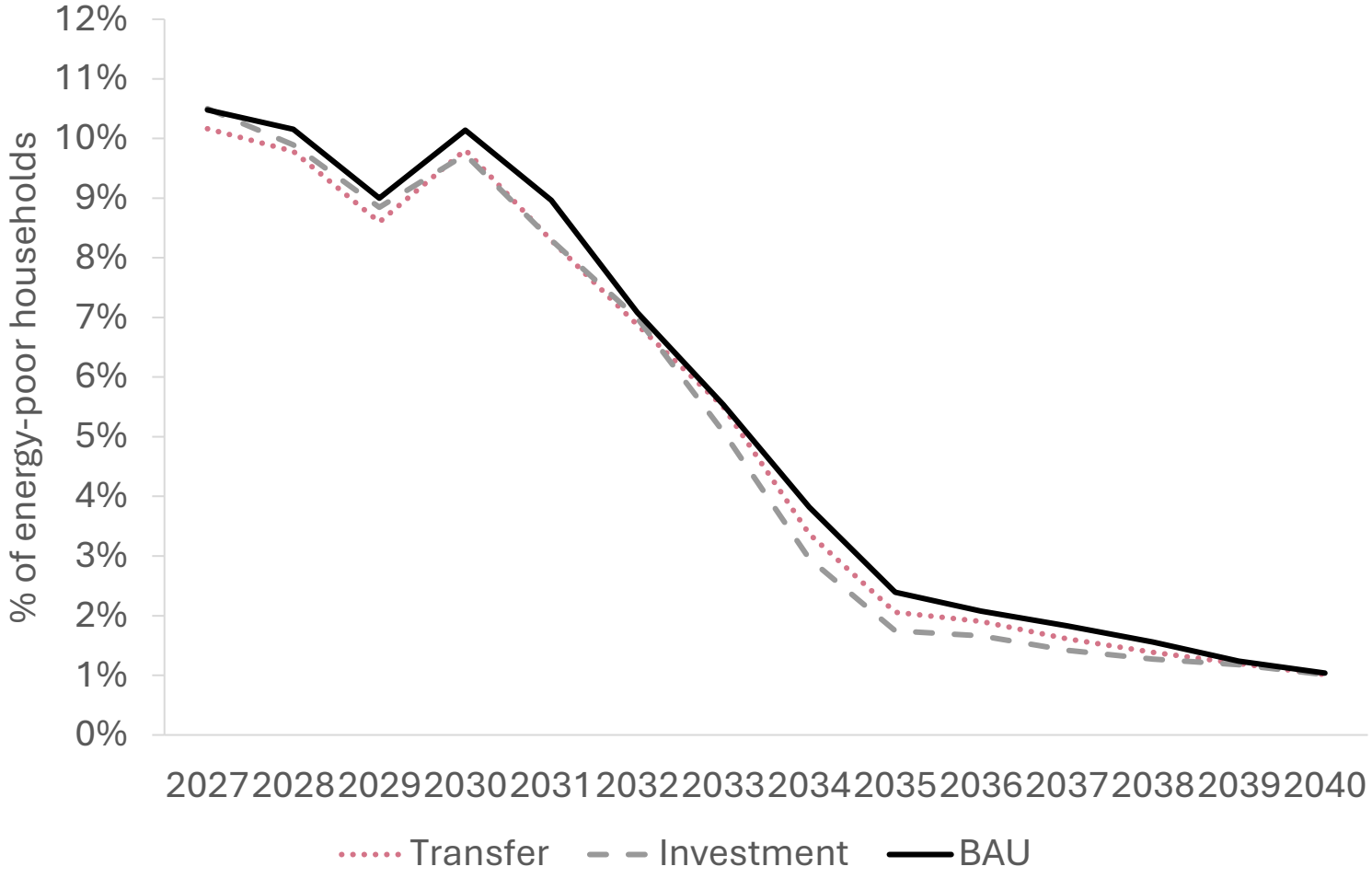
1. High costs: $\left(H_g^{eq} > \tilde{H}_g^{eq}\right)$
2. Low residual income: $\tilde{Y}_g^{AHC,eq} - H_g^{eq} < 0.6\tilde{Y}_g^{AHC,eq}$
3. Bottom 3 income deciles

Stratification cells: Building type × construction period × heating system

Transfers win early, investments win later

BAU: 10.5% energy poverty
Transfer: 10.2% (−0.3pp, ~40,000 fewer households)
Investment: no immediate effect
2030: Investment catches up
2033–2035: Investment pulls ahead

Scale of energy poverty in Poland 2027-2030, according to different SCF recycling scenarios (% of energy-poor households)



Source: own elaboration based on the microsimulation model and HBS data.

Uniform allocation risks widening urban–rural and tenure-based disparities

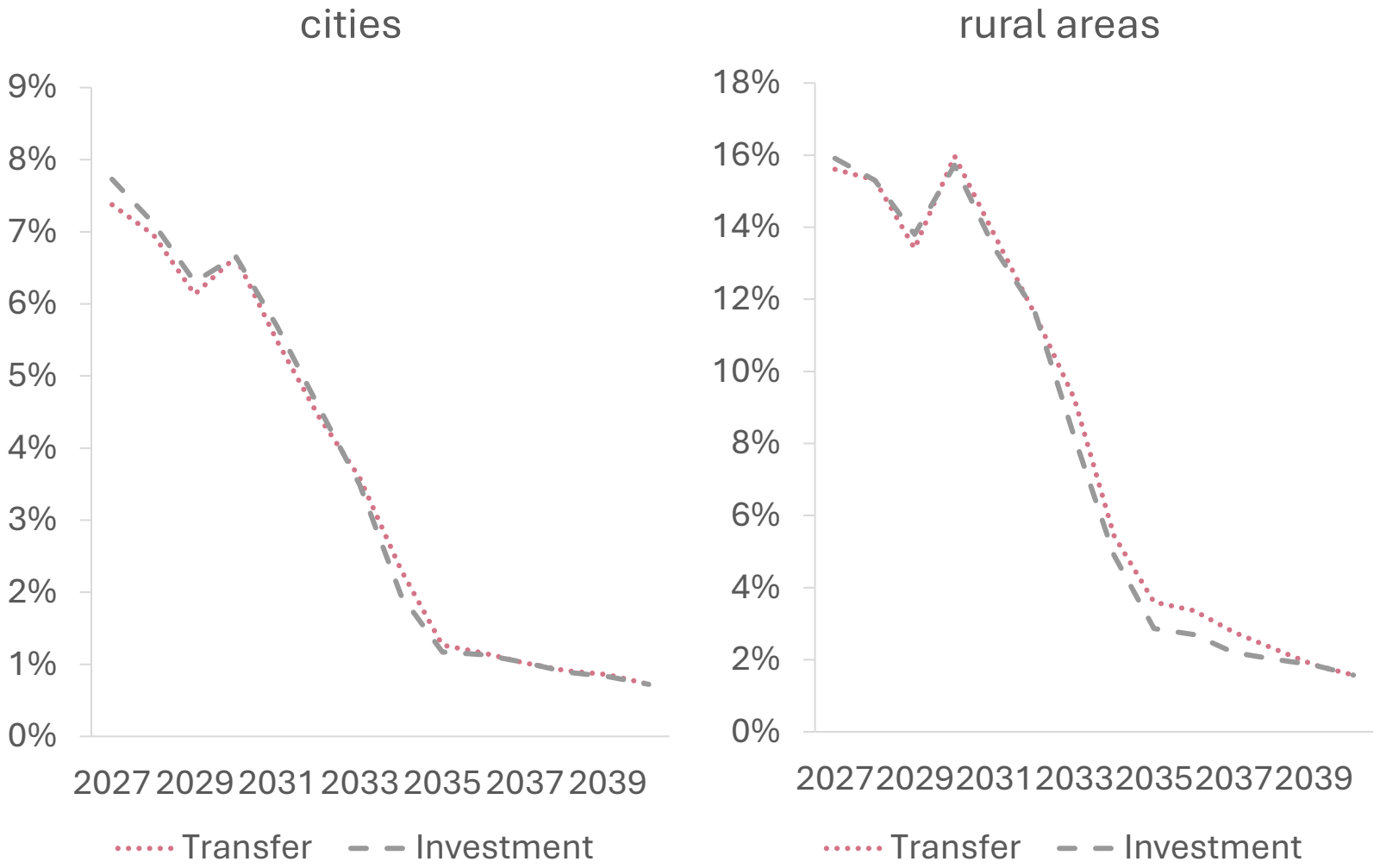
Who benefits more from **transfers**?

- Urban households
- Multifamily building residents

Who benefits more from **investments**?

- Rural households
- Single-family homeowners (where coal heating is concentrated)

Energy poverty by settlement type, according to different SCF recycling scenarios (% of energy-poor households)



Source: own elaboration based on the microsimulation model.

Sequencing matters: front-load transfers, scale up investments

Phase	Strategy	Rationale
2027–2030	Generous transfers	Cushion initial shock, build political legitimacy
2027–2035	Rapid investment scale-up	Structural fixes take time to deliver
Post-2032	Phase out transfers	Retrofitted homes no longer need ongoing support

- Transfers address *symptoms* (affordability)
- Investments address *causes* (high energy needs)
- Neither alone is sufficient

A politically sustainable transition requires carbon pricing with socially-efficient redistribution

1. **Timing asymmetry:** Transfers act immediately on income; investments lower energy needs with a lag, but persistently
2. **Complementarity:** Sequenced mix maximises both short-term protection and long-term poverty reduction
3. **Targeting:** Place-based allocation needed, investments for rural/single-family; transfers for urban/multifamily

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