

# The Urban Financial Metabolism (UFM) of Energy Poverty; analysis of the financial mechanisms between energy poverty and municipal spending

## End Energy Poverty Forum



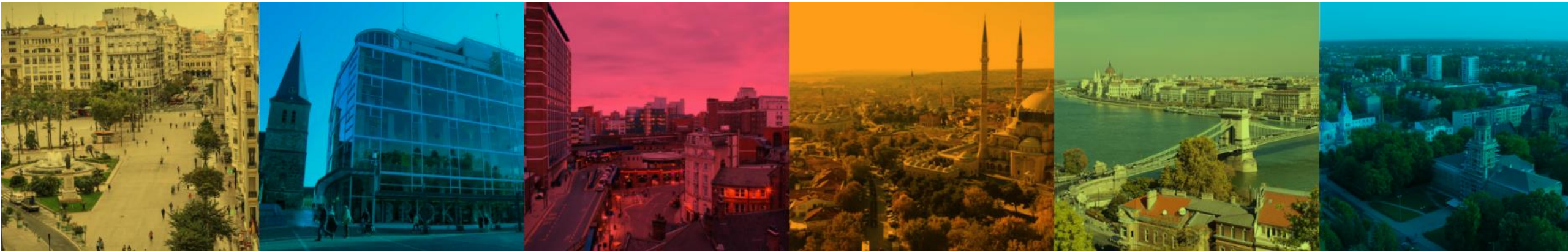
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TNO (Strategic Business Analysis)



# Wider Effects of Energy Poverty (theory)

## Spatial planning and management

Spatial determinants influence EP vulnerability (Mashhoodi et al., 2019)

## Recreation, sports and culture

EP restrict households in recreation & culture (Bartiaux et al., 2021)

## Public order and safety

EP increases the likelihood of experiencing physical violence (Hailemariam et al., 2019)

## Local utility services

bill balancing to deal with EP results in municipal utility debt (Carley, 2022)

## Education

Energy poor households can experience limited access to education (Bartiaux et al., 2021)

## Transport

problems with energy poverty, are linked to individuals being unable to meeting basic needs on transport (Middlemiss, 2022)

## Health services

A growing body of literature has consistently confirmed the negative impact of EP on health (Nie & Li, 2023)

## Social services

Seek government assistance is a key coping strategy for dealing with EP (Carley, 2022)

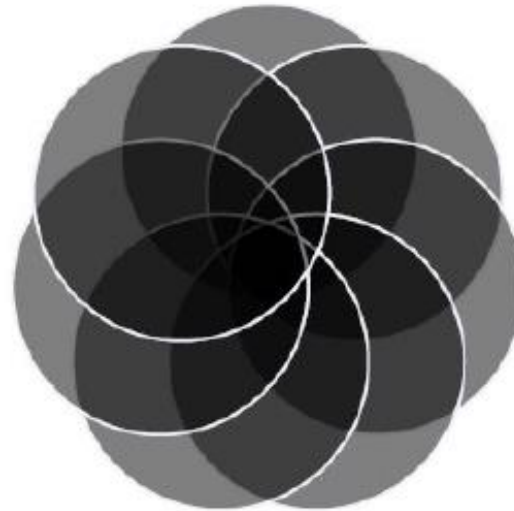
## Administration & permits

## Environment

Building retrofits mitigate CO2 emissions & energy poverty (Riva et al., 2023)

## Local economic development

Areas of municipal expenditure  
Impacts of energy poverty



# Connecting Cause & Effects of energy poverty and resulting policy issues in a municipality

⇒ “The costs of doing nothing” may eventually outweigh the cost of interventions

However; quantification of cause & effects is so far lacking....

⇒ Joint fact finding into the costs of doing nothing vs. intervention scenario's for a Positive Energy District

⇒ Requires understanding of causal effect chains

⇒ Scenario development (2020-2035)

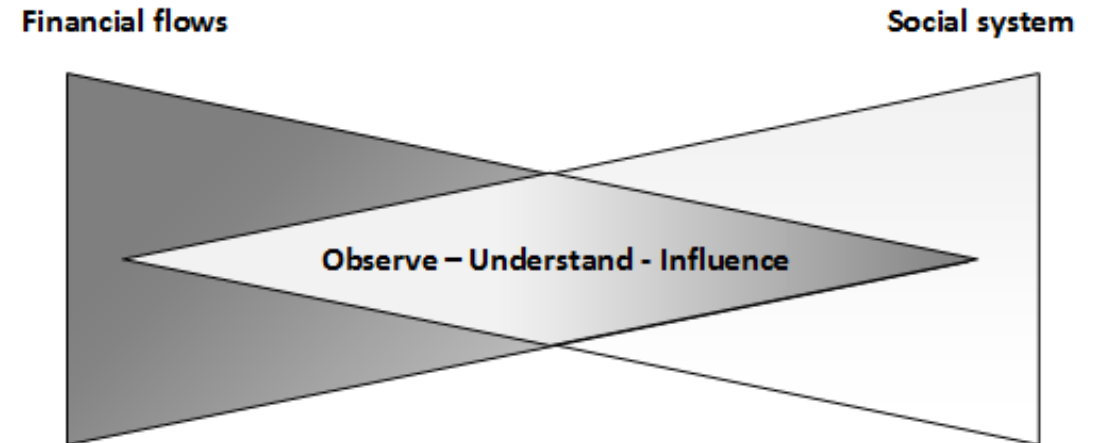
⇒ Interviews & workshops with municipal budget owners, stakeholders, practitioners

⇒ Quantification of budget lines with stakeholders (attempt)

# Theoretical Framework; Urban Financial Metabolism(UFM)

UFM is a holistic financial model, based on urban metabolism thinking, that is employed for mapping financial streams of local (public) spending that are affected by energy poverty and for identifying the underlying mechanisms

- Household budgets & cash flows
- Neighbourhood Services (& financial flows)

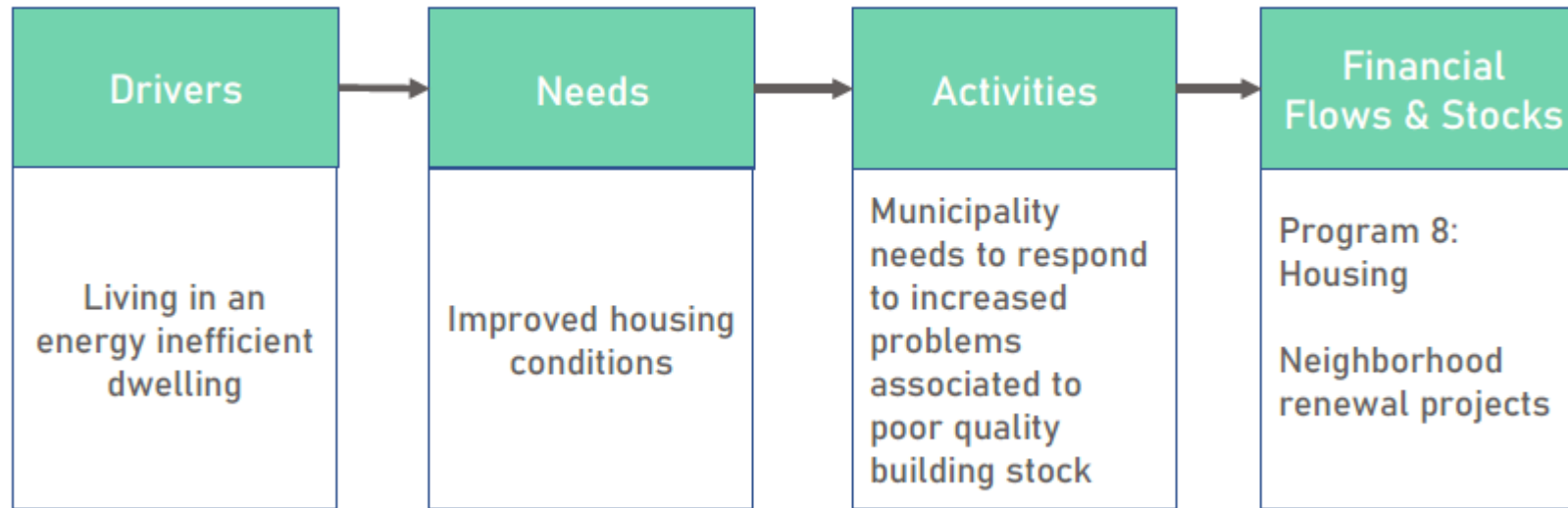


*Financial flows and the social system. Adapted from (Dijst et al. 2018)*



*Main components of the Urban Financial Metabolism framework. Adapted from (Dijst et al. 2018)*

## Example of causal effect chain (from workshops & interviews)





# Full result of analysis (for municipality of Groningen)

## Drivers

## Needs

## Activities

## Stocks & Flows

Energy affordability

Energy efficiency

Households need support in managing debts

Households need support to help with costs of living

Household need support to cope with effects of living in energy poverty

Communities need support to improve housing quality

Communities need support to mitigate the impact of energy prices on cost of living crisis

Household need support to save energy

Households need to support to improve housing quality

Individuals use available municipal support for managing debt

Individuals use available municipal support to help with cost of living

Individuals participate or are encouraged to participate in citizen participation initiatives supported by the municipality

Municipality takes action to deal with the impact of energy poverty on local policy goals

Individuals use available municipal mental health and wellbeing support services

Neighbourhood communities organise local community energy initiatives

Municipality adopts policies to alleviate energy poverty

Individual use available financial support for making energy efficiency investments

Individual use available technical support on taking energy efficiency measures

Individuals engage in violent and criminal activity to cope with cost of living crisis

Municipality provides debt management services

Municipality provides repayment arrangements

Municipality provides protective guardianship

Municipality provides income benefits

Municipality provides one-off energy allowance

Municipality provides collective health insurance

Municipality take extra poverty prevention and reduction action

Municipality offers student transport for low-income households

Municipality provides free lunch at schools

Municipality organises activities and holiday trips for low-income families

Municipality takes action to encourage equal opportunities for development

Municipality initiates various social activities in neighbourhoods

Municipality financially supports citizen initiatives

Municipality provides integrated support on health, wellbeing, cost of living to individuals and communities

Municipality provides a €50 energy voucher

Municipality provides energy coaches and energy desk

Municipality provides energy retrofit loans for home-owners

Municipality included energy as part of neighbourhood renewal projects

Municipality provides support for energy community initiatives

Municipality as established new partnerships on energy efficiency

Municipality organises group buying schemes on energy efficiency

Municipality takes measures on crime, alcohol and drug abuse and trade

Municipality takes measures to prevent shoplifting and burglary

Municipality takes measures to limit acts of violence

Budget for work and income

Budget for education

Budget for for well-being, health and the health care

Budget for housing

Budget for public safety

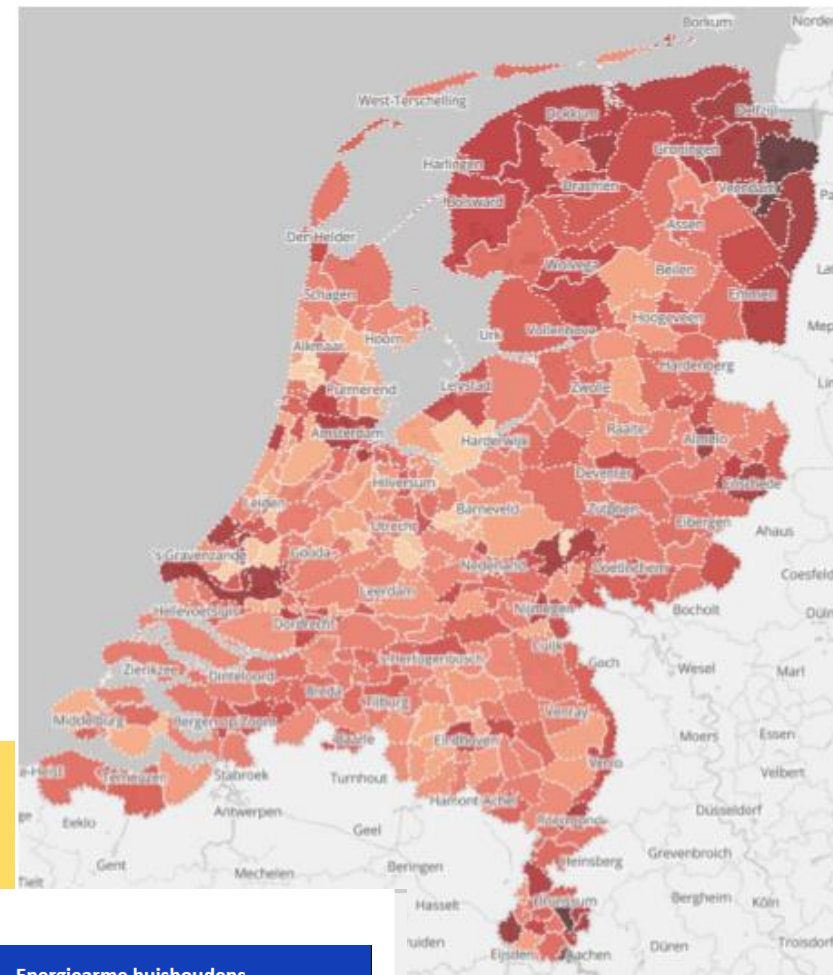
# Lessons Learned from this analysis

There are diverse mechanisms through which energy poverty affects various areas of local public spending.

- ▶ The impact of energy poverty on municipal expenditure is highly context specific, but is achieved in two ways:
  - By increasing demand of municipal services.
  - By aggravating problems that require local government response.
- ▶ Addressing energy poverty now is likely to save municipal expenditure in the future.

# Next steps: scenariobuilding & quantification

- The costs of doing nothing – build on scenario's from workshop & assumptions
- Intervention scenario's build on costs of technical measures & energy poverty estimates from micro-analysis
- **Quantification is the hardest job!**



Gemeente	Energiearme huishoudens			Energiearme huishoudens met de 15% slechtste woningen		
	Huishoudens met LIHE of LILEK (%) - 2020	Huishoudens met LIHE of LILEK (%) - Schatting 2022	LIHE of LILEK - Verschil 2020-2022	Huishoudens met LIHE of LIZLEK (%) - 2020	Huishoudens met LIHE of LIZLEK (%) - Schatting 2022	LIHE of LIZLEK - Verschil 2020-2022
Groningen	8,6	9,9	1,3	5	7,1	2,1

Source: TNO (2021-2023)



# Limitations & Replicability for WELLBASED

Using the UFM model has the following limitations:

- It can be difficult to collect all cash flow data since not all necessary sources might be available or public. Especially private partners are often not willing to share data.
- Additional system information is required in order to make the analysis. For example information regarding policies and regulations that affect energy poverty, household archetypes, and the range of energy labels. Corresponding knowledge is essential.
- The insights that the model provides solely serve as a tool or input for decision making. The next, essential step is the orchestration of actual (collaborative) intervention decisions, partnerships, and solutions.
- The UFM model can be replicated and applied in new cities or neighbourhoods when a data gathering protocol is in place and the needed data is available.
- Also, local knowledge on policies, regulations, and housing should be in place. It is unknown to what extent this information is accessible outside the Netherlands.

# Thank you for your attention

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# Thanks

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