Research Framework of T-ENDURE

How do climate change and extreme weather events impact fuel poverty among vulnerable citizens in the UK and China, and what measures can be implemented to ensure an inclusive urban net-zero transition?

This framework will explore the interaction between thermal energy demand, extreme weather events, and socio-economic factors affecting fuel poverty. It will highlight the need for a user-centric approach to energy transitions that considers the comfort and well-being of affected populations.

Limitations:
- The availability and reliability of existing datasets may vary between the UK and China, potentially affecting comparative analyses.
- Response bias may affect survey results, particularly among vulnerable populations.

Assumptions:
- It will be assumed that the definitions and measurements of fuel poverty and energy demand are consistent across both countries.
- The study presumes that stakeholders are willing to participate in interviews and focus groups, providing honest and comprehensive insights.

Research Question / Hypothesis

Conceptual Framework

I. Independent Variables:
- Climate change (temperature changes, frequency of extreme weather events)
- Urban morphological parameters (building type, density, green spaces)

II. Dependent Variables:
- Fuel poverty levels among households
- Thermal energy demand in the built environment

III. Mediating Variables:
- Socio-economic status of households (income level, employment status)
- Adaptation measures (energy efficiency retrofits, behavioral changes)

Limitations & Assumptions

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Variables

Research Framework

The research will be grounded in theories of social justice and equity, focusing on how energy transition policies can be designed to be inclusive of vulnerable populations. The framework will assess existing policies and propose recommendations for integrating social considerations into the net-zero transition.

Theoretical Framework / Policy

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A **mixed-methods approach** will be employed, combining quantitative data analysis with qualitative insights. The study will involve comparative analyses between the UK and China, utilising case studies to explore the socio-economic impacts of extreme weather events on fuel poverty.

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Data Analysis Techniques

Data collection methods

Research Design

Quantitative Analysis:
- Statistical methods to analyse the relationship between extreme weather events, energy demand, and fuel poverty levels (e.g., regression analysis, correlation studies).
- Geographic Information System (GIS) tools to visualise urban morphological factors and their correlation with energy demand and fuel poverty.

Qualitative Analysis:
- Thematic analysis of interview transcripts to identify key themes related to barriers and opportunities for energy transition in the context of fuel poverty.

Quantitative Data:
- Existing datasets on thermal energy demand, housing archetypes, and climate data.
- Surveys targeting households in both countries to assess fuel poverty and socio-economic conditions.

Qualitative Data:
- Interviews and focus groups with stakeholders (policy-makers, community organisations, affected households) to gather insights on lived experiences and perceptions of energy transition measures.