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PER L'ECONOMIA E L'IMPRESA

Energy and Transport poverty in the European Union and UK: A bibliometric and systematic literature review.

A non “autobiography of no energy emancipated households in UE”

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Why should we work on energy and transport poverty together?

The joint study of **energy poverty** and **transport poverty**, also known as **double energy vulnerability (DEV)**, is a relatively recent development. It began in France and the UK, gaining attention as societies shifted toward electrification. Recognizing the connection between these two issues is essential, as they are deeply interlinked in everyday life.

Why should we work on Islands?

As written by Manuela Deidda (2015) "The double nature of islands—threat and opportunity—makes them an interesting case study as well as a target for policy interventions. The peculiarity of the economic challenges faced by islands, together with a considerable variability in terms of islands' economic performance, fosters a debate among economist and policy-makers regarding the nature of the difficulties faced by islands and their consequences in terms of economic performance".

...What is Energy Poverty?

- “The inability of a family to access essential energy services that provide basic levels and dignified standards of life and health, including adequate provision of heating, hot water, cooling, lighting, and energy to power appliances, [...], due to a combination of factors, including at least economic inaccessibility, insufficient disposable income, high energy costs, and poor energy efficiency of housing” . (regulation(UE) 2023/955)

...What is Transport Poverty?

- “transport poverty’ means individuals’ and households’ inability or difficulty to meet the costs of private or public transport, or their lack of or limited access to transport needed for their access to essential socioeconomic services and activities, taking into account the national and spatial context;(regulation 2023/955)

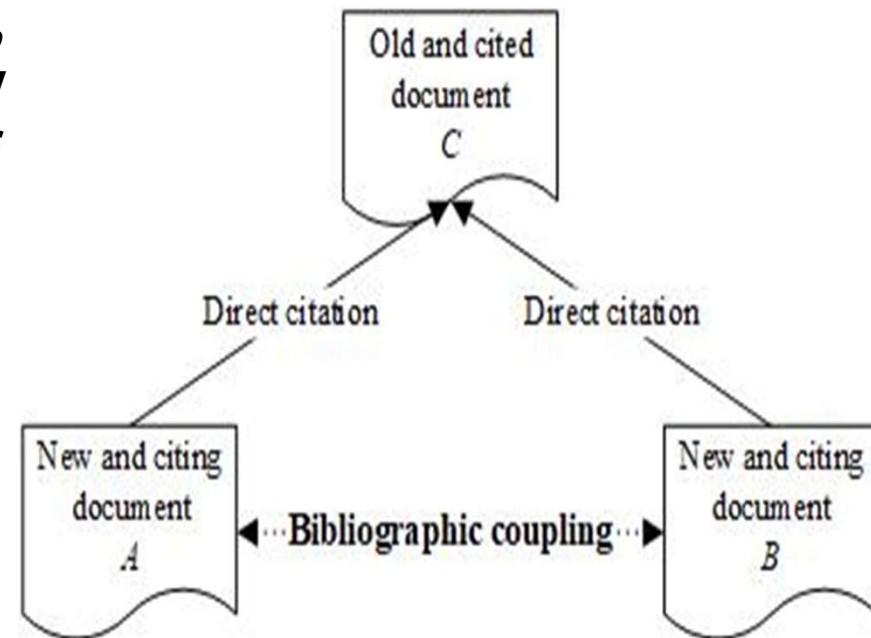
(with Giacomo Marzi IMT Lucca)

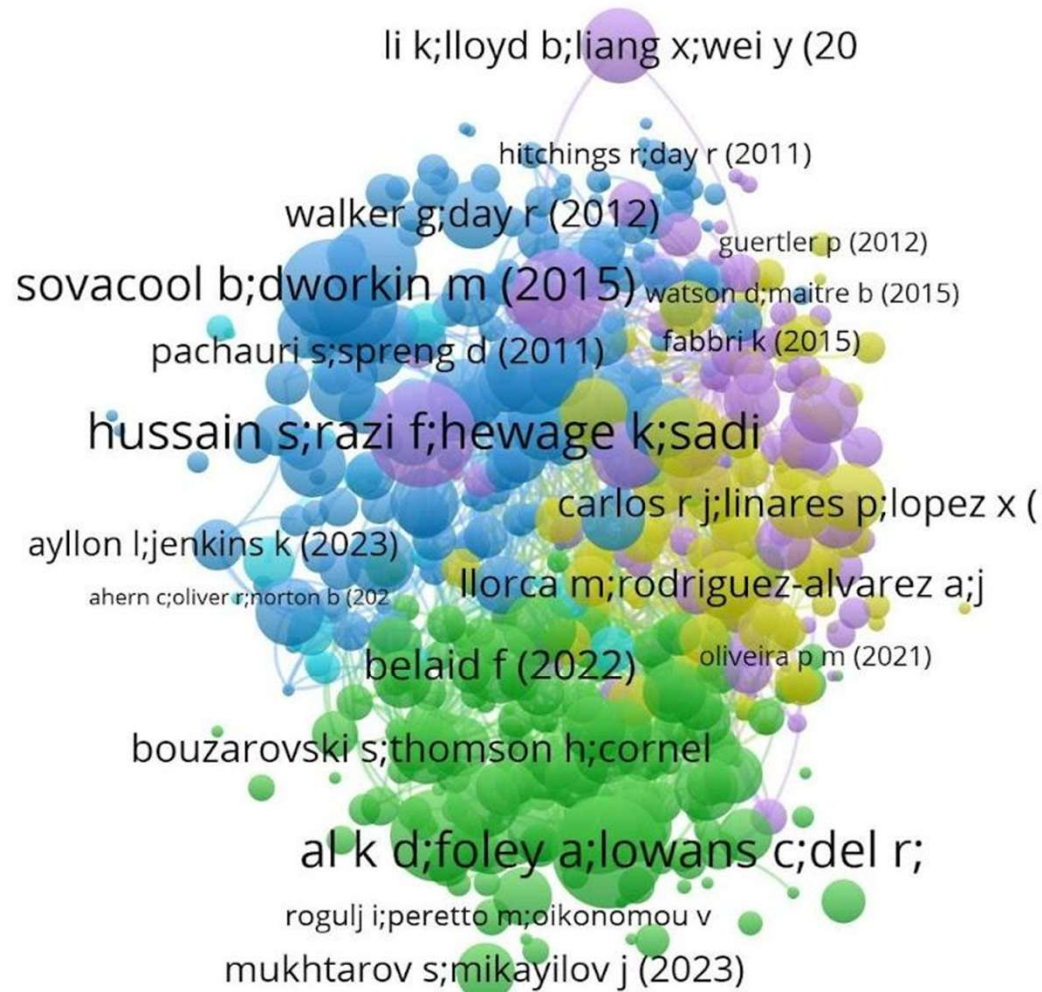
- **RQ1: What are the main Knowledge clusters in the intellectual structures of Energy poverty (EP) and Transport Poverty (TP) in the EU? Which are the policies that the main trends propose?**
- **RQ2: How has a niche theme such as Double Energy Vulnerability developed over time?**

In order to provide an answer to those research questions, I'll use the Bibliometric and systematic literature review, proposed by Marzi et al.(2024). Indeed, B-LSR builds upon protocols such as PRISMA (Page et al., 2021a) and AMSTAR 2 (Shea et al., 2017), alongside tools bibliometrix and biblioshiny (Aria, M. & Cuccurullo, C.2017) and Vosviewer (Van Eck, N.J., & Waltman, L.2010).

Bibliographic coupling: "**Two publications are bibliographically coupled if there is a third publication that is cited by both publications** (Kessler, 1963).

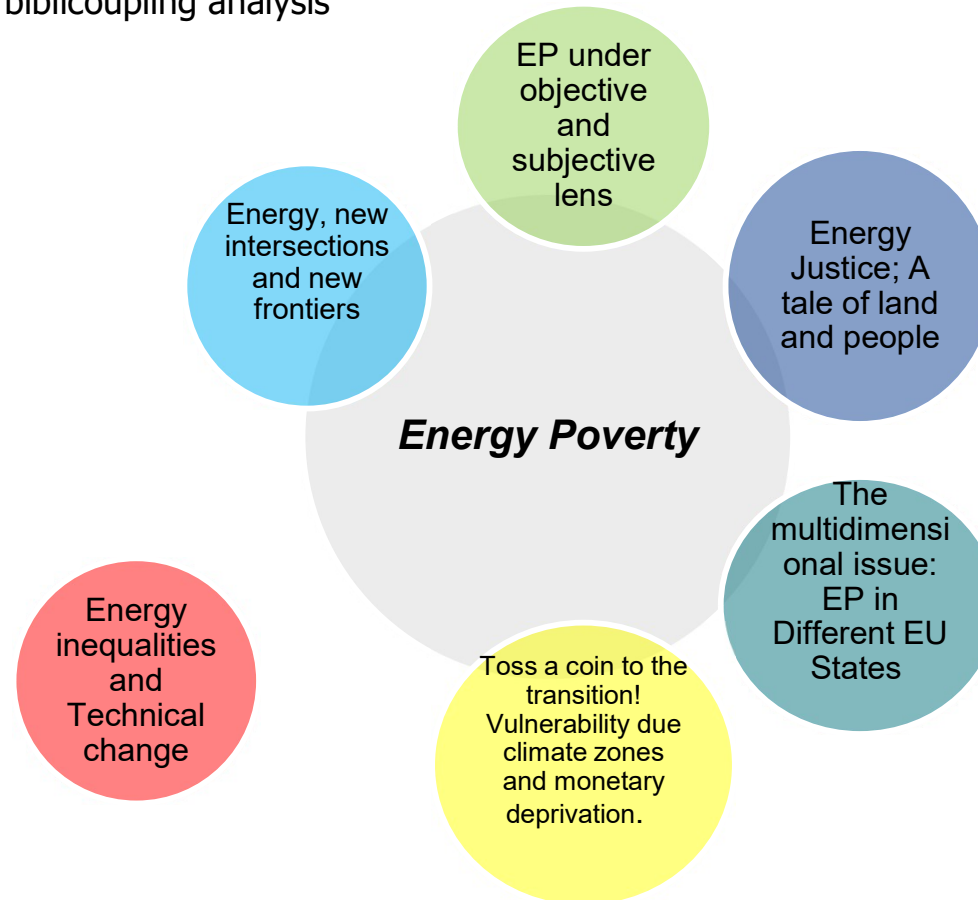
- Overlap in the reference lists of publications.
- The larger the number of references two publications have in common, the stronger the bibliographic coupling





- Bibliometric and Systematic Literature Review**

EP research string for biblicoupling analysis



- **Bibliometric and Systematic Literature Review**

Second Cluster : Energy Poverty from objective and subjective lens

- ✓ The studies included in this cluster of literature, focus on the various variables that exacerbate energy poverty meanwhile analysing the current institutional responses to it.

Third Cluster: Energy and Justice: a tale of land and people

- ✓ Focus on justice in energy-related issues.
- ✓ Energy systems can produce injustice.
- ✓ Inequalities are deeply tied to specific places.
- ✓ Human relationships, behaviors, and theories shape energy outcomes.

- **Bibliometric and Systematic Literature Review**

Fourth Cluster: The multidimensional issue: EP in Different EU States

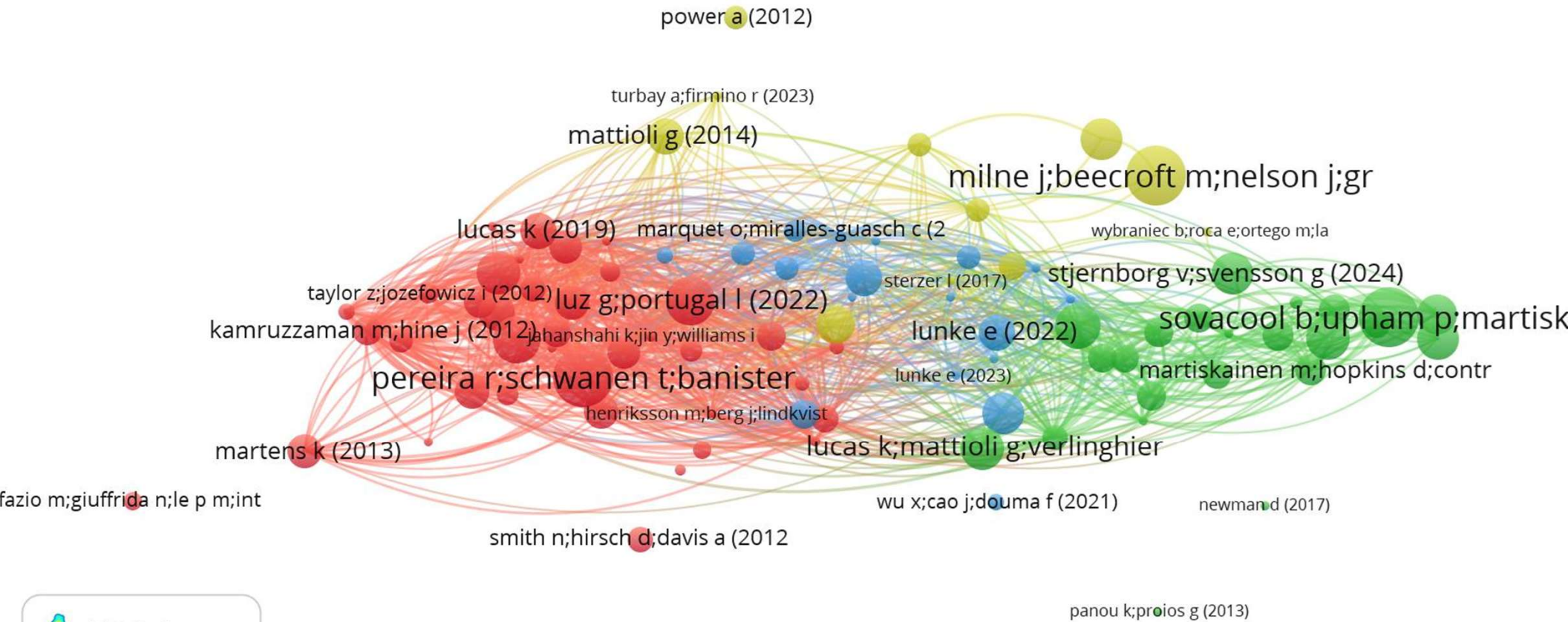
- ✓ Focus on the complex nature of energy poverty across EU Member States.
- ✓ Highlights the use of diverse methodologies.
- ✓ Goes beyond **expenditure-based measures**, including broader socio-economic variables.
- ✓ Offers new insights despite methodological differences.

Fifth Cluster: Toss a coin to the transition! Vulnerability due climate zones and monetary deprivation.

- ✓ EP effects vary across households and families.
- ✓ Climate conditions and energy transition policies can worsen EP impacts.
- ✓ Monetary deprivation is a major concern in this cluster.

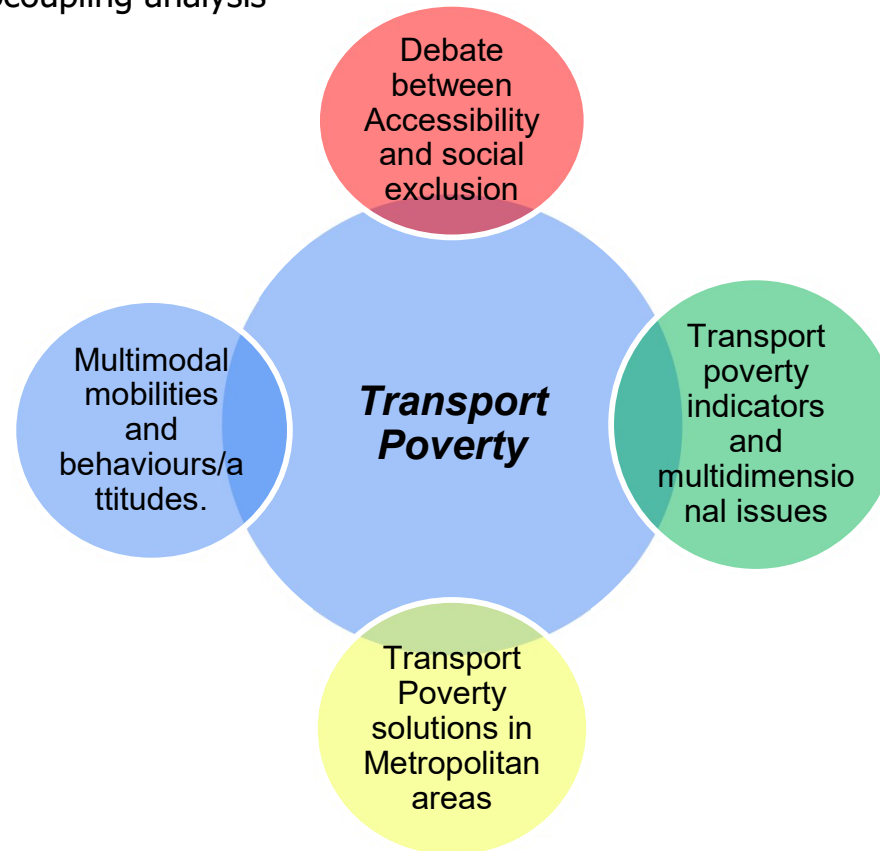
Sixth Cluster: Energy, new intersections and new frontiers

- ✓ Demonstrates how studies on energy poverty, vulnerability, and precarity are increasingly intersecting with other research fields.
- ✓ Reflects an avant-garde and exploratory approach, addressing the complexity of contemporary energy issues.



- **Bibliometric and Systematic Literature Review**

TP research string for Bibliocoupling analysis



● Bibliometric and Systematic Literature Review

First Cluster: debate between Accessibility and social exclusion

- ✓ Focuses on the **complex relationship** between accessibility and social exclusion, using diverse research methodologies.
- ✓ Reveals that various terms are often used interchangeably to describe transport accessibility poverty.
- ✓ Follows the definition proposed by Lucas et al. (2017), adopting accessibility as the preferred term.

Second Cluster: : transport poverty, indicators and multidimensional issues.

- ✓ Explores the **multidimensional nature** of transport poverty and related social challenges.
- ✓ Includes innovative and mature studies, indicating an **evolution in the academic debate**.
- ✓ Connects transport poverty to broader topics such as **social housing, energy services, social dynamics, and income inequality**.
- ✓ Shows two main research directions:
- ✓ One focusing on **policy design and recommendations**.
- ✓ The other establishing **correlations between specific social issues**, especially **energy and transport poverty**.

● **Bibliometric and Systematic Literature Review**

Third Cluster: Transport Poverty and solutions in Metropolitan areas;

- ✓ Transport poverty related issues in the metropolitan areas in the European Union and England.

Fourth Cluster: Multimodal mobilities and behaviours/attitudes in Rural Areas

- ✓ Topics that relate multimodal mobility and car dependence to social exclusion mostly in rural areas.
- ✓ The articles describe the actual situation of Rural and some Urban areas.

From the cluster analysis we could summarise **some outcomes**:

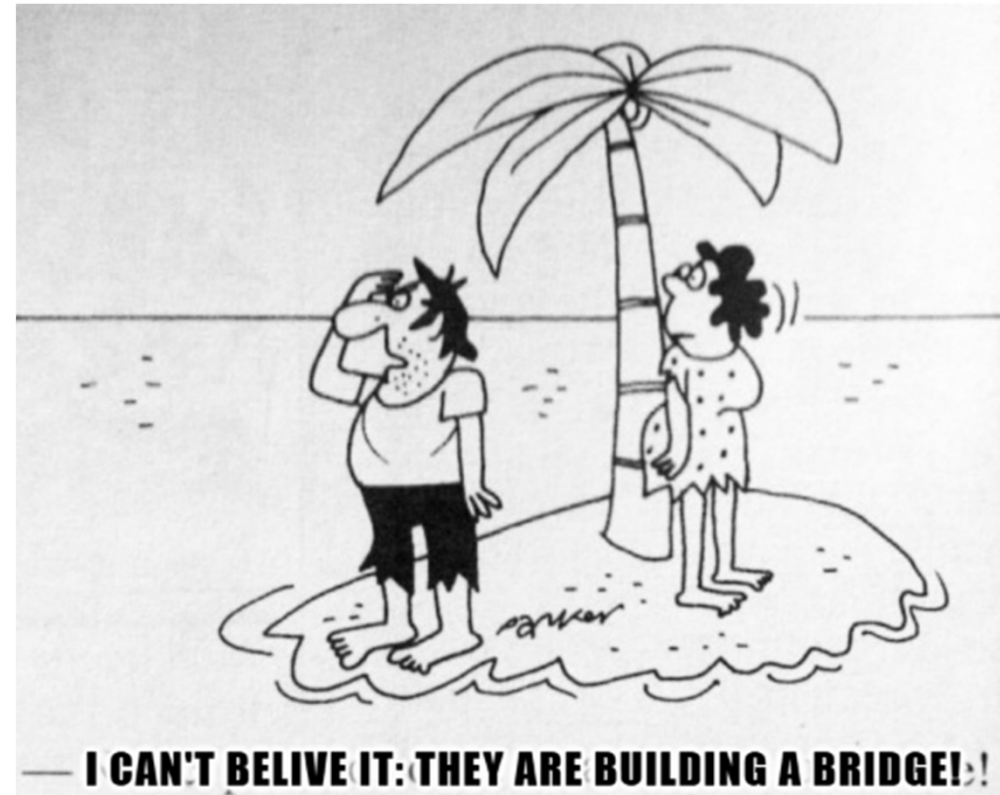
✓ *Call for more precise and targeted subsidy policies; Emphasis on technological innovation; Promotion of citizen participation and energy democracy.*

❖ **Literature Core Question:** What is welfare today?

- ✓ Lavinia Bifulco (2015) describes how local welfare relies on five main pillars, which are: Activation; **“territorialisation”**; **“integration”**; **participation”** **“contractualisation”**.
- ✓ **“Local energy welfare”**?
- ✓ Although the EU since the 1980s has faced and is facing a process of “rescaling and multilevel governance”, the allocation and implementation of services is fragmented and often isolated in individual cities.
- ✓ This is particularly evident in Europe, leading to the common idea that there **may be some places that are more unequal than others**, and these places are often sub-urban areas, inner areas and islands; even the largest ones.

Insularity. Which are the main challenges?

- Physical discontinuity
- No density economies
- Feckless transport infrastructure
- Old energy grids



Consumer protection

- Special tariffs and electricity disconnection protection, temporary but effective solutions.

Fiscal Interventions

- Payments and bonuses for vulnerable households, identified through national social services

Energy Savings and Renewable energy sources

- Subsidised programmes to improve household efficiency and promote renewable energy.

Informative Campaigns

- Campaigns and counselling points to raise awareness and provide practical advice.

Energy democracy and participation

- Policies with the objective of increasing democratic participation in local energy issues..

Source, authors but compiled from: Kyprianou, I., Serghides, D. K., Varo, A., Gouveia, J. P., Kopeva, D., & Murauskaite, L. (2019). Energy poverty policies and measures in 5 EU countries: a comparative study. *Energy and Buildings*, 196, 46-60. <https://doi.org/10.1016/j.enbuild.2019.05.003>

Transport protection

- Special tariffs and electricity disconnection protection, temporary but effective solutions.

Fiscal Interventions

- Payments and bonuses for vulnerable individuals, identified through national social services.

Social legislative measures

- Subsidised programmes to improve and individuals efficiency and promote renewable energy.

Energy and Infrastructure measures

- Works on infrastructure improvement.

Transportation fleet Renewement

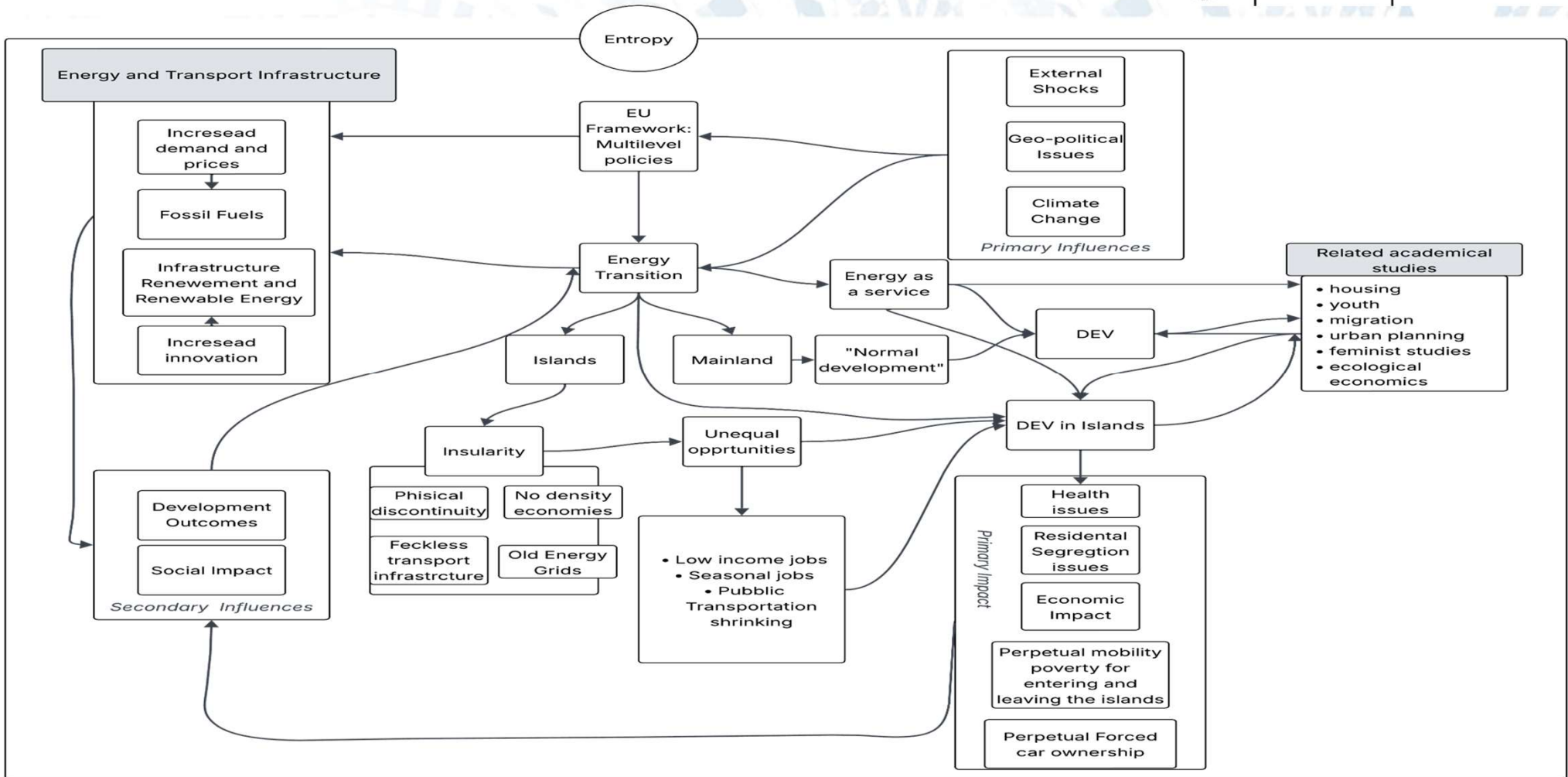
- Expenditure on improving the public transport service.

Energy democracy and participation.

- Policies with the objective of increasing democratic participation in local energy issues.

Source, authors but compiled from: Transport poverty: definitions, indicators, determinants, and mitigation strategies - Final Report. (2024). Employment, Social Affairs and Inclusion. https://employment-social-affairs.ec.europa.eu/transport-poverty-definitions-indicators-determinants-and-mitigation-strategies-final-report_en

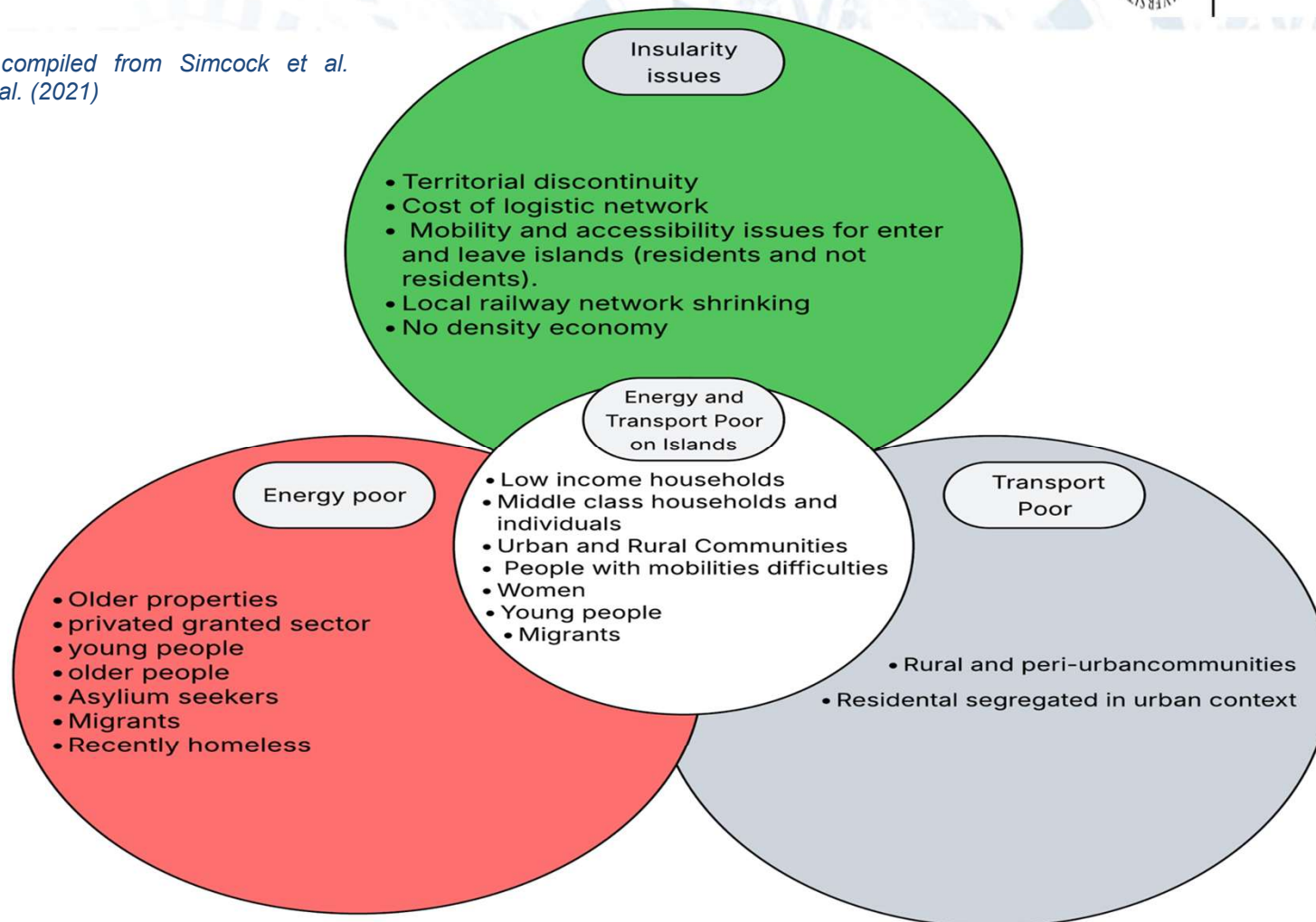
Summary framework, with a regional emphasis.



Source authors but compiled from Hussain et al. (2023)

A possible overview framework for EP and TP poor on islands.

Source authors but compiled from Simcock et al. (2020) and Lowans et al. (2021)



Results and a review of the grey literature revealed that:

- Research is becoming more interdisciplinary.
- Economic data alone is not enough.
- Subjective indicators (e.g. surveys) face criticism.
- “Energy services” link energy issues to: Transport, housing, youth, migration, urban planning, feminist/ecological economics.
- Policies focus on tech fixes (e.g. housing) and doubts remain about fairness and EU-wide applicability.



Thank you for your attention.

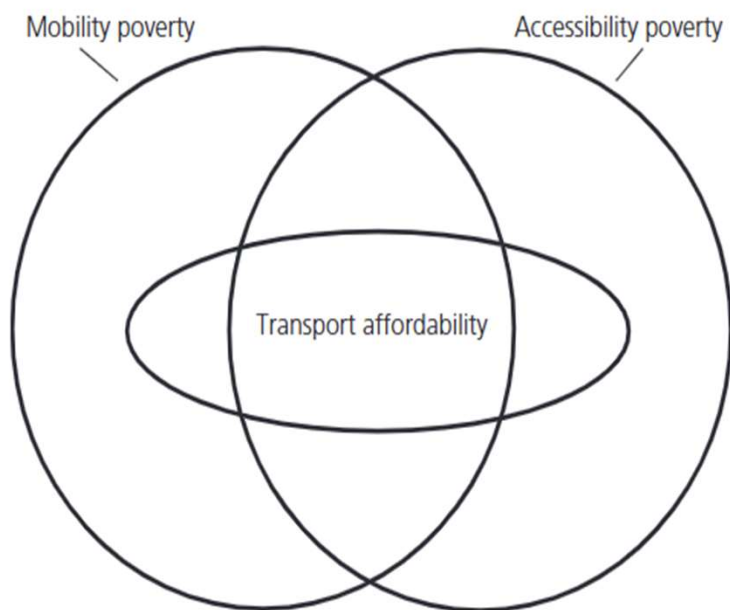
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SoBigData.it receives funding from European Union - NextGenerationEU - National Recovery and Resilience Plan (Piano Nazionale di Ripresa e Resilienza, PNRR) - Project: "SoBigData.it - Strengthening the Italian RI for Social Mining and Big Data Analytics" - Prot. IR0000013 - Avviso n. 3264 del 28/12/2021.

- Insofar this paper has the objective to analyse two different fields and try to capture the new novelty of the Double Energy Poverty and other emerging trends, in our inclusion criteria we don't set any ranking journal selection
- **In the next step**, we cleaned all the papers, reading all the titles and abstracts and keywords of the Scopus **2,536 documents** and the **WoS 2,646 documents. Following the inclusion criteria I obtained 792 documents in Scopus and 609 documents in Web of Science.** The cleaning process excluded so many papers, because using a broad research query implies a greater result of peer reviewed articles that discuss EP not in EU or don't discuss EP or excluded because of literature reviews. For TP, I used the same methods and in Scopus I Obtained **124 documents and 101 documents** in WoS.
- **799 documents for EP and 133 documents for TP** after combining and cleaning Scopus and Web of Science datasets

- ✓ Although, the Literature on this topic is multifaced and difficult to explain, transport poverty is composed by four main sub-concepts as: **Mobility Poverty; Transport Affordability; Accessibility Poverty; Exposure to transport Externalities.**



Notion	Definition	References
Mobility poverty	A systemic lack of (usually motorised) transport that generates difficulties in moving, often (but not always) connected to a lack of services or infrastructures	Moore et al. (2013)
Accessibility poverty	The difficulty of reaching certain key activities – such as employment, education, healthcare services, shops and so on – at reasonable time, ease and cost	DfT (2014a) , SEU (2003)
Transport affordability	The lack of individual/household resources to afford transportation options, typically with reference to the car (in developed countries) and/or public transport	Carruthers et al. (2005) , Litman (2015) , Serebrisky et al. (2009)
Exposure to transport externalities	The outcomes of disproportionate exposures to the negative effects of the transport system, such as road traffic casualties and chronic diseases and deaths from traffic related pollution. Often considered within the US literature from an environmental justice perspective	Barter (1999) , Booth et al. (2000)

Tab1 and Tab2 proposed by Lucas et al.2016

- ✓ Studies on Energy Poverty reveals that social issue is not related (only) to Monetary poverty (MP). Sanz- Fernandez(2022) publications reveals that people affected by (MP) could may not be energy vulnerable and vice versa.
- ✓ Measured in a myriad of methods, the literature uses principally subjective(as survey, e.g. HBS) and objective indicators as (bills, household electric consumption)
- ✓ The more active actors dealing with EP are **UK, Spain** and the European Union hub **“Energy Poverty Advisory Hub”**

Boardman 1991	10%	Energy - space heating, water heating, lights, appliances and cooking	UK	Income of the whole household, with council tax deducted, but not water bills.
Hills (2012)	Low Income High Cost (LIHC)	Energy - space heating, water heating, lights, appliances and cooking	UK	Median household income from the EHS. No adjustments for any other expenditure such as council tax.
Moore (2012)	Minimum Income Standard (MIS)	Energy – requirements as set out in EHS	UK	Council Tax, rent and mortgage payments (from the EHS) are deducted from household income
Scottish Parliament (2019)	Scottish Fuel Poverty	Legislation states heating regime, not all energy expenditure.	Scotland	Household income adjusted to account for (a) rent, (b) council tax and water rates, (c) fuel, (d) childcare.
Unpacking the energy crisis impact with a multidimensional vulnerability index; A granular analysis of the Spanish case; Roberto Barrella & Laura Blas-Álvarez (2022)	Local level: Multi-Factor Energy Vulnerability Index (MFEVI)		Spain	This paper explores the likelihood of being exposed to energy poverty in this Member State by using a novel metric of energy vulnerability at the local level, i.e. the Multi-Factor Energy Vulnerability Index (MFEVI). The MFEVI ranges from 1 to 5 and measures energy vulnerability caused by a combination of four factors. It allows to identify territories in a more vulnerable situation and, therefore, with a higher risk of suffering energy poverty.
Energy poverty in the Netherlands at the national and local level: A multi-dimensional spatial analysis (2023) Peter Mulder *, Francesco Dalla Longa, Koen Straver	New Energy poverty spatial indicator	Energy poverty indicators in terms of the energetic quality of homes and at the extent to which people can join the energy transition by making their homes more energy efficient. Variants created : 0.1 HEQ for low income households (LIHEQ) 2.1 LILEQ for under-consuming households (LILEQ-); hidden energy poverty 2.2 LILEQ for over-consuming households (LILEQ+); hidden energy poverty 3.1 LEQ for owners (oLEQ) 3.2 LEQ for tenants (tLEQ)	Netherlands	The authors define energy poverty not only in terms of energy costs relative to income, but also in terms of the energetic quality of homes and at the extent to which people can join the energy transition by making their homes more energy efficient.

study	Indicator/method	resume
Transport affordability metrics		
Rac Foundation (2012)	10%	Where more than 10% of (household) expenditure is used on transport (both personal and public). Note this unit of measurement is the household, not the individual, in contradiction with the assertion that individuals rather than households experience fuel poverty
Mattioli et al.2017	Forced Car Ownership (FCO)	A household in FCO is a household which owns "at least one car and ii) reports difficulties to afford at least one of five items (rent, mortgage, household maintenance, energy bills, and food)". This metric emphasises the ownership of a car over expenditure on car based transport (e.g. taxis).
mobility poverty metrics		
Tao et al. (2020)	Activity space	This study has developed the activity space as a composite of "standard distance circle (SDC), the total distance travelled (TDT), the number of geographic locations visited (NGL) and the number of unique activity places (NAP)"
Accessibility poverty metrics		
Shen (1998)	Accessibility index	Accessibility computed as a function of employment opportunities at given destination; an impedance function between two locations; number of job seekers in a given location; proportion of households in a location with access to one or more cars.
Gomide et al. (2005)	Synthetic index of adequate service	Index measuring urban poor access to public transport in Brazil, comprised of: average monthly expenditure on transport; walking distance to nearest bus stop; average headway; average travelling time; reliability of service; capacity; security and safety.
Composite metrix		
E. Alonso-Elpelde;García-Muros a M. González-Eguino (2023)	framework for measuring transport poverty based on the HBS.	The authors develop 3 affordability metrics and 1 easily replicable composite measure. To calculate transport poverty indexes, we use microdata from the Spanish HBS for 2006–2021 provided by the National Institute of Statistics (INE).