Evaluating Energy Poverty: Policy Implications

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FEEM - IEFE Joint Seminar Series. Milano

May 11th. 2017

Outline

- A (very brief) introduction to energy poverty
- Energy poverty indicators applied to a real situation
  - And an improved proposal
- Energy vulnerability: the key to policy design
- Policy recommendations

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Access to energy vs Energy poverty

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The EU mandate on energy poverty

- The requirement that a share of energy efficiency measures are applied primarily to households living in energy poverty
- The obligation on Member States to monitor and report the situation of energy poverty
- The creation of an energy poverty observatory to obtain better data about the problem and its solutions. and to assist Member States in combating it
- The definition of energy poverty and energy vulnerability

Energy poverty

- Lack of capacity of a household to meet the cots of its basic energy needs
- A component of “general” poverty
- Which can be:
  - Very relevant
  - Not always coincident
  - And may require specific measures

Poverty vs Inequality

- Many (energy) poverty indicators actually measure inequality
  - E.g.. the threshold of 60% of median income
- But energy poverty is social justice issue. not a welfare one
  - Therefore. we consider that it should measure absolute levels
  - Although of course measures of energy inequality may also be interesting

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Indicators of energy poverty

- Subjective and qualitative. developed by the individuals themselves.
- Subjective and qualitative. developed by third parties.
- Objective and quantitative indicators. not income-expenditure based (eg. humidity. incidence of mold in the household or epidemiological data).
- Objective. quantitative and income-based indicators.

(Heindl. 2014)

Objective indicators

Indicator	Description
10%	Expenditure in energy higher than 10% of the household income (originally twice the median energy expenditure. and the average expenditure of the 30% poorest households)
2M	Expenditure in energy larger than double the median expenditure in energy
***Minimum Income Standard* (MIS) based**	Income available after energy and housing costs lower than MIS (after average energy and housing costs)
***Low Income/High Cost* (HCLI)**	Expenditure in energy larger than the median. and below the poverty line (60% of the median income)
***After fuel cost poverty* (AFCP)**	Income after energy and housing costs lower than the poverty line (excluding energy and housing costs)

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Energy poverty indicators in Europe

Reference	Country	Year	Indicator	Value
(Hills, 2011)	England	2009	LIHC	9%
(Moore, 2012b)	England	2008	MIS	25.5%
(Tirado Herrero and Ürge Vorsatz, 2012)	Hungary	2005-2008	Double Median Expend. Energy Expend > Food Expend.	4-8% 17-25%
(Boltz and Pichler, 2014)	Austria	2013	LIHC	2.5%
(Valbonesi et al., 2014)	Italy	2011	MIS	8.4%
(Heindl, 2014)	Germany	2011	10% MIS LIHC	27.6-29.5% 9.9-10.6% 11.1-15.6%
(Legendre and Ricci, 2015)	France	2013	10% AFCP LIHC	16.6% 20.9% 9.2%
(Roberts et al., 2015)	UK	1997-2008	10%	18-18.2%
(Department of Energy and Climate Change (DECC), 2016)	England	2014	LIHC 10%	10.6% 11.6%
(Imbert et al., 2016a)	France	2006	10% LIHC	11-13% 10%
(Papada and Kaliampakos, 2016)	Greece	2015	10%	58%
(Economics for Energy, 2015)	Spain	2013	10% LIHC MIS	18.24% 8.71% 9.88%

Energy poverty in Spain
Objective indicators

	Households in energy poverty
10%	14.96%
Double median expenditure	12.29%
Double percentage median expenditure	17.60%
Double average expenditure	7.41%
Double percentage average expenditure	10.31%
Low income/High cost (HCLI)	8.10%
After fuel cost poverty	22.31%
Minimum Income Standard (MIS) based	8.70%

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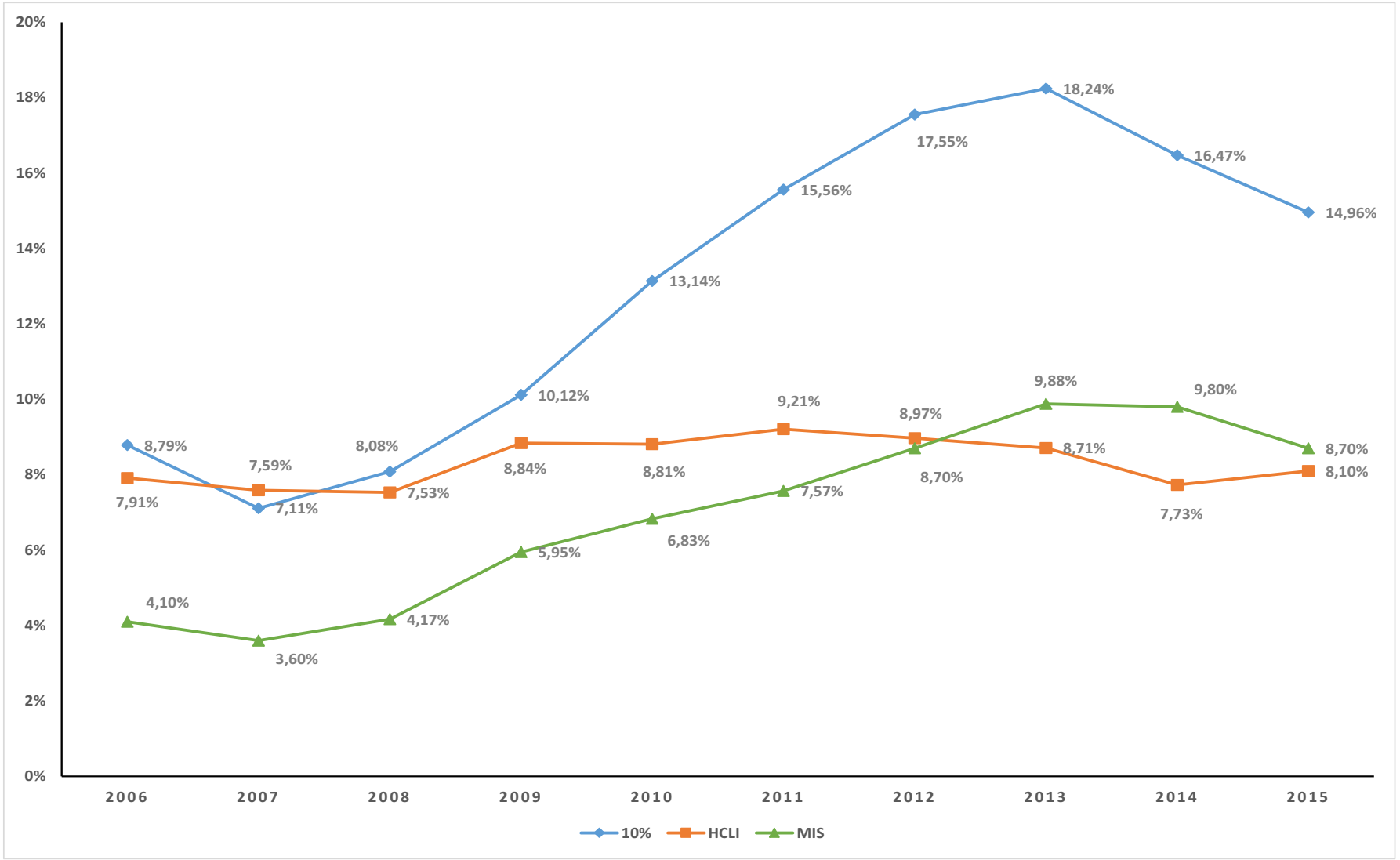
Energy poverty in Spain
Temporal evolution (2006-2015)



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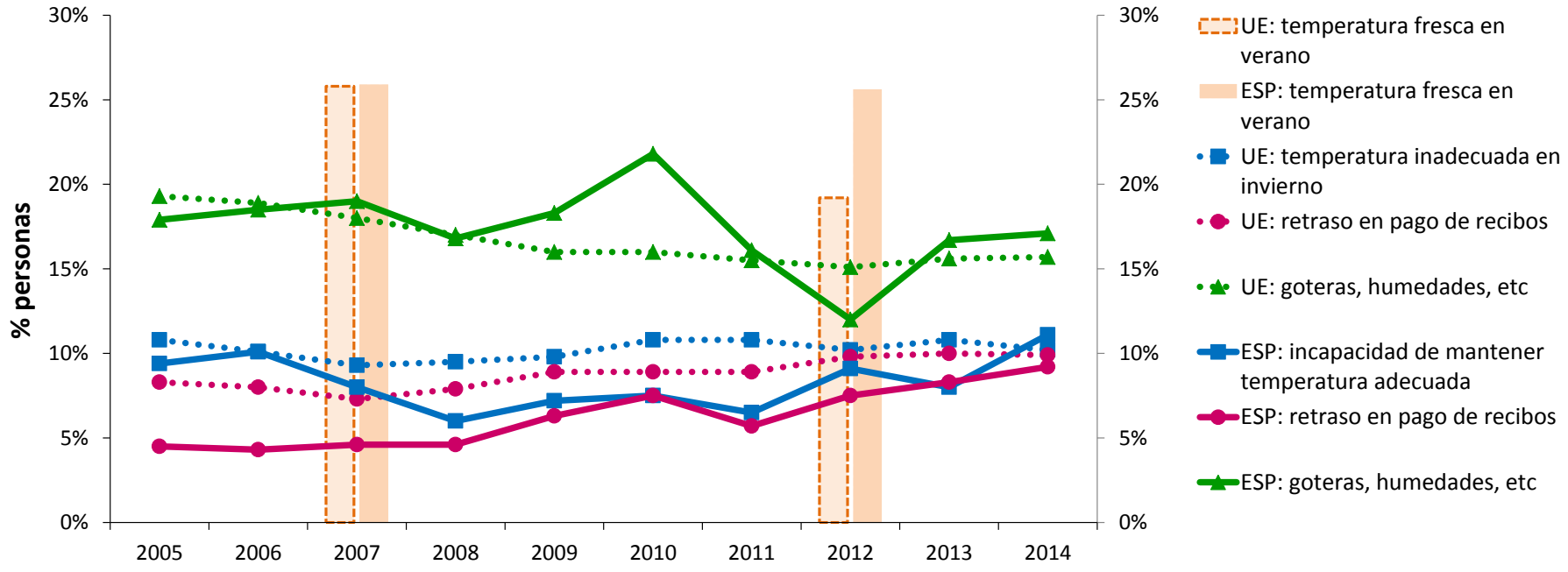
Energy poverty in Spain
Subjective indicators

Gráfico 9. Porcentaje de personas que no pueden permitirse mantener su vivienda con una temperatura adecuada, con retrasos en el pago de recibos (calefacción, electricidad, gas, agua, etc.), con presencia de goteras, humedades o podredumbre en su vivienda y que no pueden mantener una temperatura fresca en verano, para la UE27 y España en el periodo 2005-2014).
Fuente: Elaborado por ACA con datos de EU-SILC, Eurostat.



Fuente: ACA (2016). Pobreza. vulnerabilidad y desigualdad energética. Nuevos enfoques de análisis.

Energy poverty in Spain
Indicators per income deciles

	10%		LIHC		MIS	
	% households	Accum. indicator	% households	Accum. indicator	% households	Accum. indicator
1st Decile	37.06%	5.54%	41.59%	3.37%	74.73%	6.50%
2nd Decile	18.34%	8.29%	51.71%	7.56%	20.41%	8.28%
3rd Decile	13.33%	10.28%	6.39%	8.08%	2.89%	8.53%
4th Decile	10.96%	11.92%	0.29%	8.10%	1.06%	8.62%
5th Decile	7.80%	13.09%	0.02%	8.10%	0.43%	8.66%
6th Decile	4.39%	13.74%	0.00%	8.10%	0.25%	8.68%
7th Decile	4.27%	14.38%	0.00%	8.10%	0.10%	8.69%
8th Decile	1.93%	14.67%	0.00%	8.10%	0.02%	8.69%
9th Decile	1.31%	14.87%	0.00%	8.10%	0.12%	8.70%
10th Decile	0.62%	14.96%	0.00%	8.10%	0.00%	8.70%

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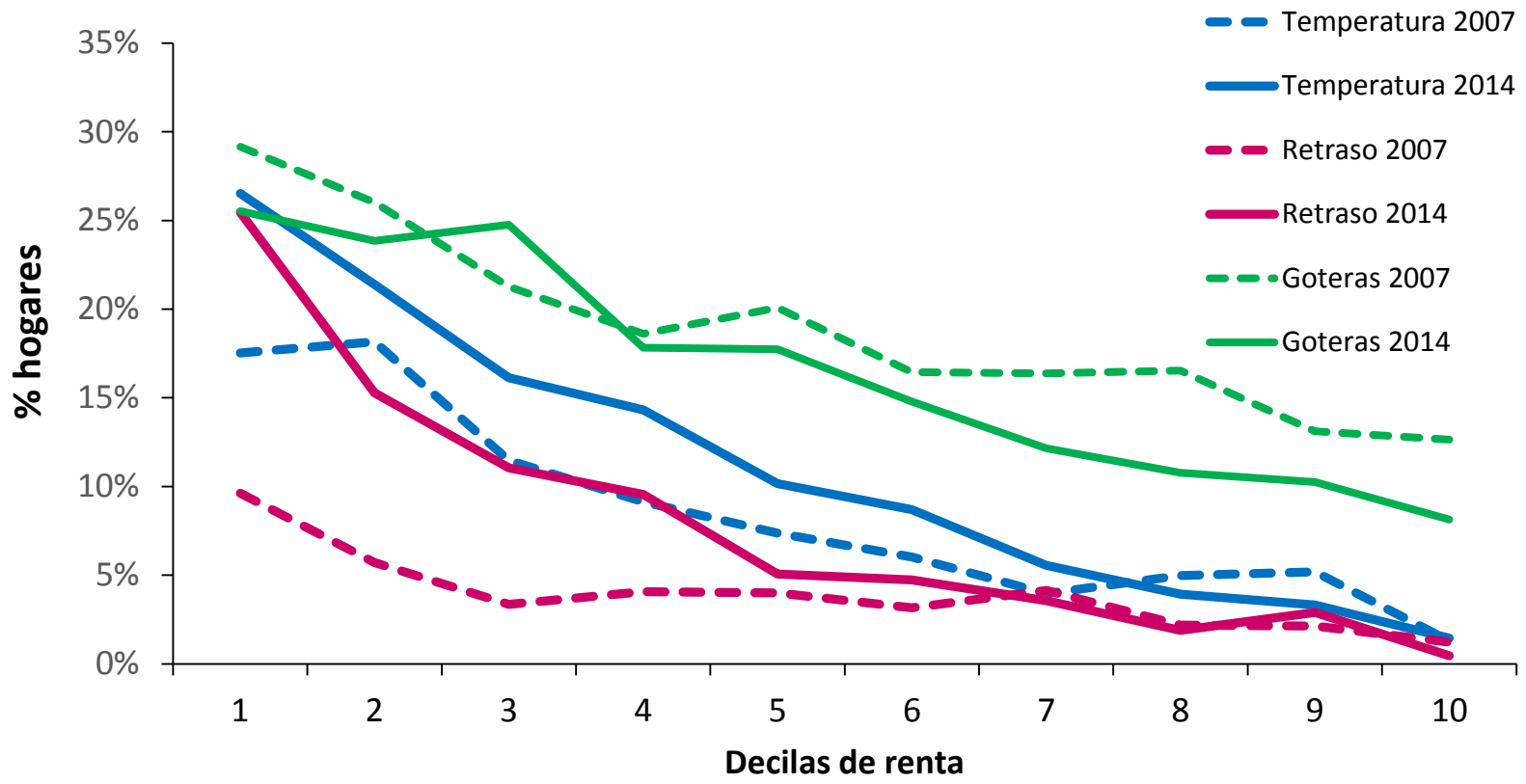
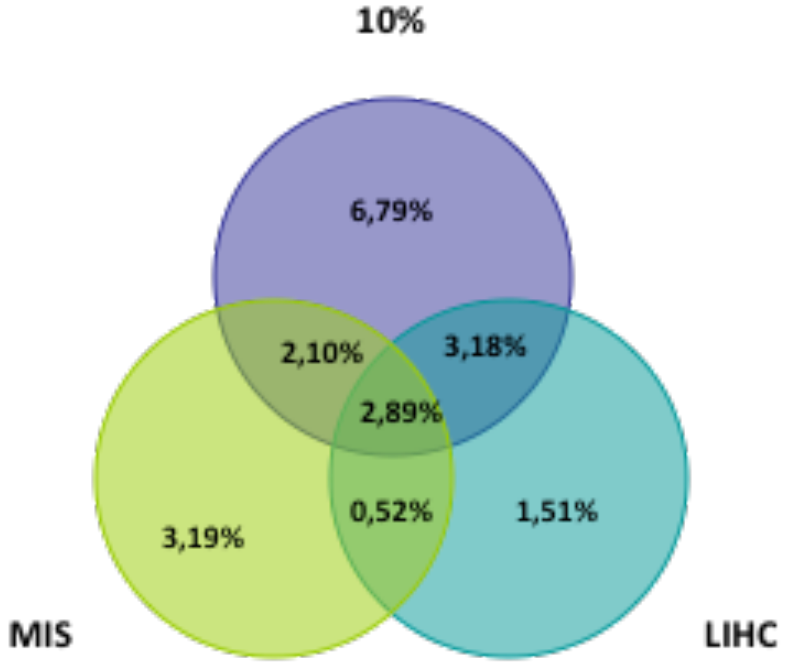
Energy poverty in Spain
Subjective indicators per income deciles

Gráfico 19. Porcentaje de hogares afectados según indicadores ECV: incapaces de mantener una temperatura adecuada en la estación fría, con retraso en el pago de facturas, y con goteras humedades y podredumbre, por decilas de renta, España 2007 y 2014.
Fuente: Datos elaborados por ACA a partir de microdatos ECV, INE.

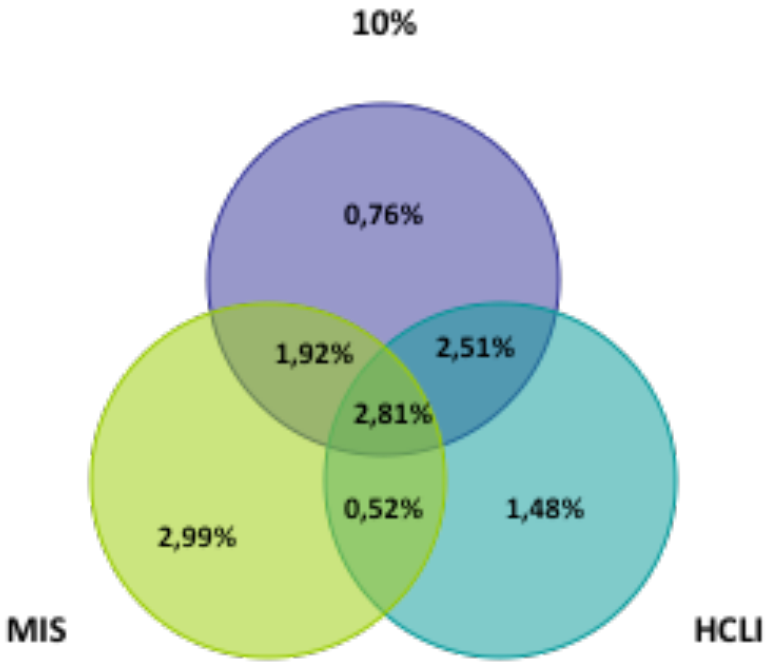


Fuente: ACA (2016). Pobreza. vulnerabilidad y desigualdad energética. Nuevos enfoques de análisis.

Energy poverty in Spain
False positives and overlaps



Overlap before false positives



Overlap after false positives

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Examples of false positives (I)

False positive, MIS-Based			
Household	1 person		
Total income	Implicit rent	Equivalent MIS – average housing and energy costs	Income - Housing costs - [Equivalent MIS – average housing and energy costs]
19.200 €	24.331.46 €	1.280.58 €	**-6.412.04 €**
Diagnosis:	Energy poor (low energy cost, 1725.36 €), in spite of high rent and good housing		

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Examples of false positives (II)

False positive 10%		
Household	Two adults, two kids	
Median equivalent income	Average energy cost	Equivalent median income after average energy cost
11.286.67 €	1.003.16 €	10.283.51 €
Equivalent income	Energy cost	Equivalent income after energy cost
26.954.29 €	12.810.00 €	**14.144.29 €**
Diagnosis:	Energy poor, energy expenditure is 22.63% of income. But income is much higher than the median.	

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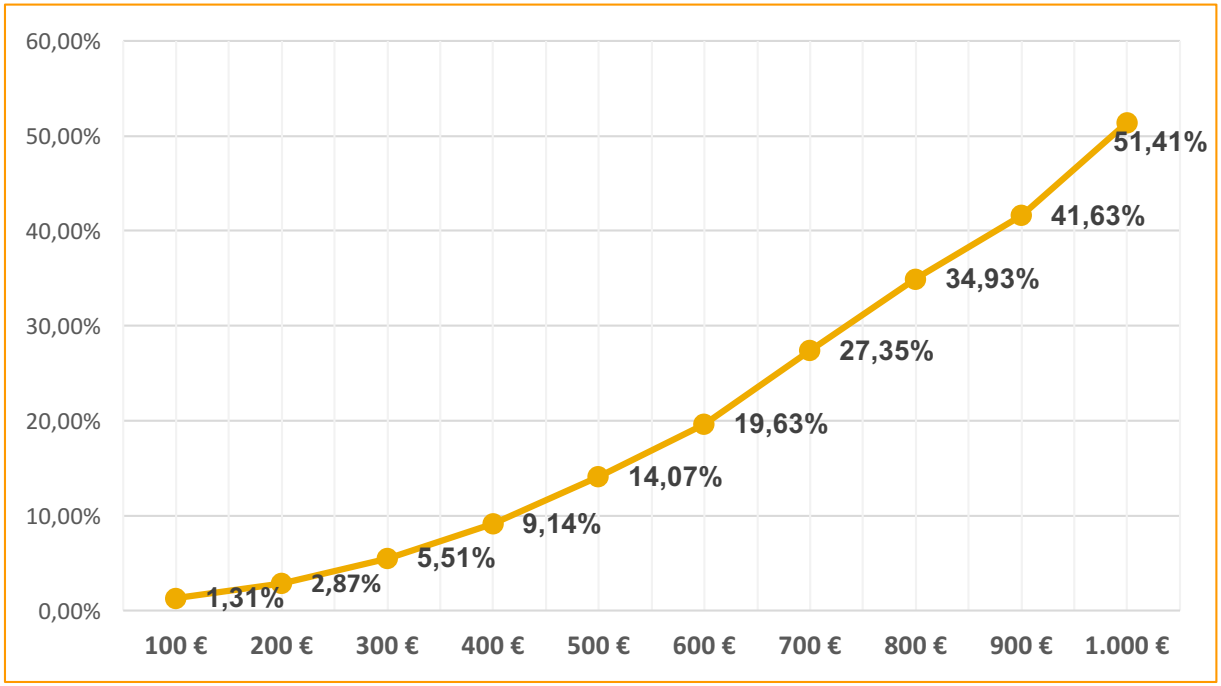
Sensitivity to the MIS

Comunidad Autónoma	RMI de la primera persona del hogar
Andalucía	400.09 €
Aragón	441.00 €
Asturias	442.96 €
Baleares	425.70 €
Canarias	472.16 €
Cantabria	426.01 €
Castilla y León	426.00 €
Castilla – La Mancha	372.76 €
Cataluña	423.70 €
C. Valenciana	385.18 €
Extremadura	399.38 €
Galicia	399.38 €
Madrid	375.55 €
Murcia	300.00 €
Navarra	641.40 €
País Vasco	616.13 €
La Rioja	372.76 €
Ceuta	300.00 €
Melilla	387.18 €



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The problem of housing costs

$$[Actual\ Household\ expenditure\ on\ energy] > [Net\ household\ income] - [Housing\ costs] - [MISeq.\ - Average\ energy\ expenditure - Average\ housing\ costs]$$

- The MIS used does not always include housing costs
  - This might be specific for Spain due to the housing bubble
- We detected lower energy poverty rates in households with non-negative housing costs
- May create false negatives, particularly for one-person households
- The MIS-based indicator increases to 9%

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An (ideal) indicator

- Calculate an objective MIS, depending on climate conditions, housing typology, and energy costs

$$[Net\ household\ income] - [Actual\ Household\ expenditure\ on\ energy] > [non\ energy\ MIS]_{Type\ T} \quad (6)$$

- If the income of the household is higher than the equivalent MIS of type 'T' households, the household can be considered specifically energy poor
  - Otherwise, that household is income poor, being energy only one of the factors contributing to this situation.
- For those energy poor households, if their energy expenditures are higher than the energy component of the MIS of the type 'T', the nature of the energy poverty of those households would be related to their energy bills.
  - Otherwise, the nature of their energy poverty would be related to structural high costs of energy in the area.

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Energy poverty in Spain
Vulnerable households

	Coefficients	Probablity ratios
Type of household		
Single	0.2325*	1.2618*
large family High income	-1.553	0.2116
Large family Low income	2.3852***	10.8608***
Normal family	1.0008***	2.7205***
Tenure status of households		
Mortage	-0.898***	0.4074***
Without mortage	0.9636***	2.621***
Rent	1.2661***	3.5468***
Type of house		
Detached house	-0.2885	0.7494
Terraced house	-0.496	0.6090
Condo less than10 apartments	-0.6464	0.5239
Condo more than 10 apartments	-0.7003	0.4965
Age of the property		
Older than 25 yrs	0.2254**	1.2529***
Heating		
None	-0.3282	0.7202
Electricity	-0.7226	0.4855
Natural gas	-0.8685	0.4196
GLP	-0.8465	0.4289
Liquified fuel	0.748	0.4733
Solid fuel	-0.6065	0.5452

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Energy poverty in Spain
Vulnerable households

Type of employment of the main breadwinner		
Manager	-0.100	0.9048
Professional	-0.3714*	0.6898*
Administrative employee	0.3390*	1.4036*
Craftman	0.1811	1.1985
Elementary jobs	0.8996***	2.4586***
Employment of the main breadwinner		
Employed	-1.9742***	0.1389***
Leave	-1.8607***	0.1556***
Unemployed	0.7416***	2.0992***
Retired	-1.4700***	0.2299***
Student	0.5341	1.7059
Household tasks	-0.7227**	0.4854**
Permanent disability	-0.8991***	0.4069***
Education level of the main breadwinner		
Primary	0.8554***	2.3523***
Secondary	0.4566***	1.5787***
Area of residence		
Urban	0.2043**	1.2267**
Members of the family under 14 yrs	0.1642***	1.1785***
Members of the family over 65 yrs	-0.7623***	0.4666***
Dummy low energy consumption	0.1717**	1.1873**

$R^2 = 0.3634$ Wald $c^2(53) = 4612.90(p - valor = 0.0000)$

Note: Asterisks indicate the level of significance of the parameters, so that *** indicates significance at 1%, ** at 5% and * at 10%

Evaluating energy poverty policies
The Spanish social tariff

- Introduces an equivalent income criterion to define two vulnerable consumers
- Prevents cutting supply to severely vulnerable consumers
- But:
  - Includes also large families and pensioners
  - Only considers electricity
  - Uses discounts (25% or 40%)
  - Funded by electricity consumers

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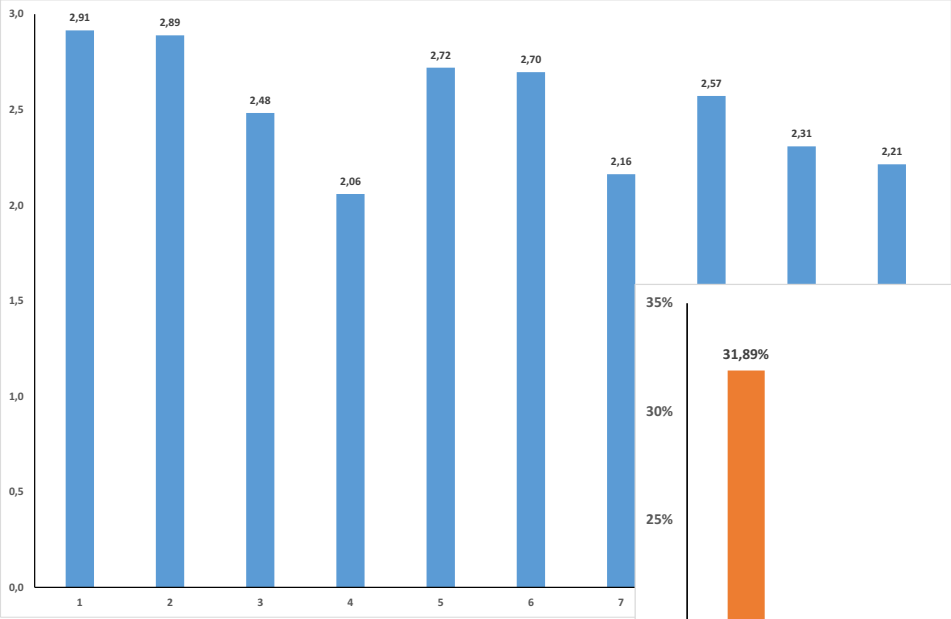
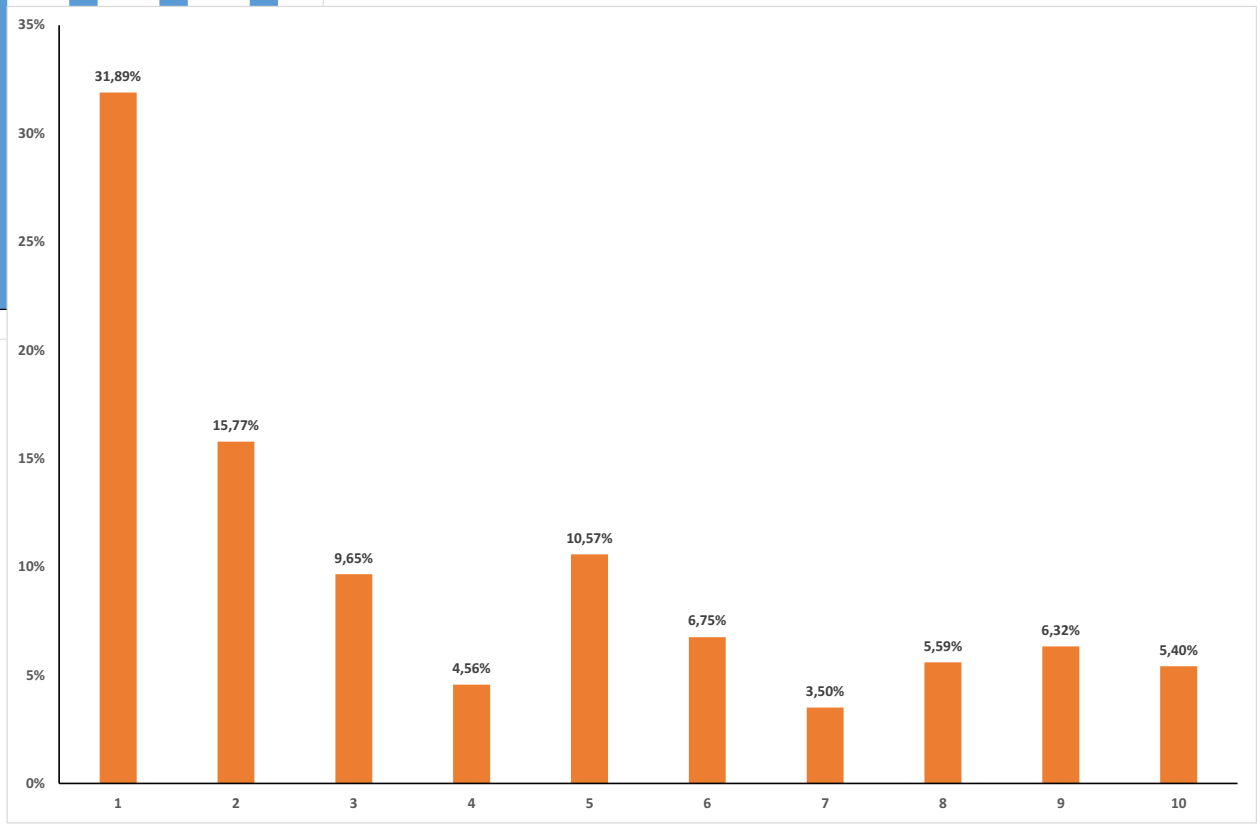
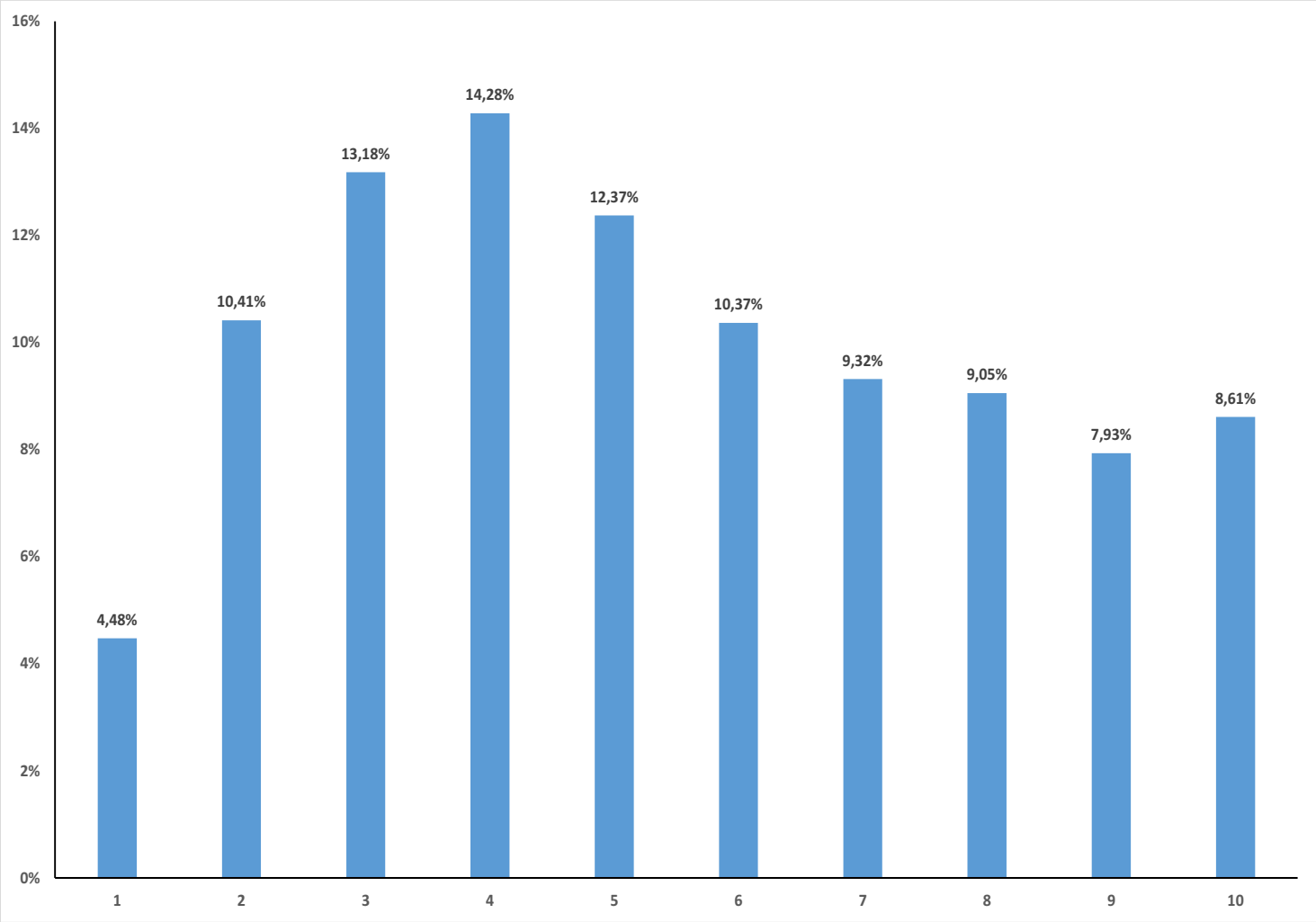
Evaluating energy poverty policies
The Spanish social tariff: Large families





Evaluating energy poverty policies
The Spanish social tariff: Pensioners



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Conclusions (I)

- There is a significant energy poverty problem in Europe.
  - The lower estimate seems to be around 9%
- But current indicators have many limitations
  - The highly popular 10% shows many false positives
  - The MIS-based has to be based on a realiable MIS
- Energy poverty indicators are interesting....but policy design requires a definition of the vulnerable consumer

Conclusions (II)

- We need better data
- And also better policies
  - Better social tariff
  - Use smart meters smartly
  - Energy efficiency policies – The French example

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Thanks for your attention

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