Adapting an English methodology to assess health cost benefits of upgrading energy inefficient French dwellings

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Health cost benefits of upgrading energy inefficient French dwellings

1. Fuel poverty and Health
2. Adaptation of an English methodology to estimate the health cost of energy inefficient dwellings and energy vulnerability in France
3. Health cost benefits of upgrading energy inefficient dwellings occupied by low income households in France

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1. Fuel poverty and Health

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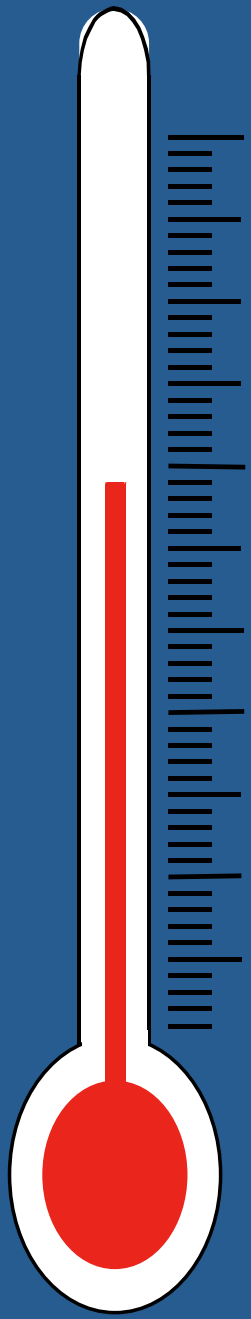
Health and Comfort Zone Definitions

- WHO defines 'health' as:
  - ✓ a state of complete physical, mental and social well-being, not only the absence of disease or infirmity (1946)
- WHO defines comfort zone in dwellings as:
  - ✓ indoor temperature between 18 and 24^{o} C (1982)

Ormandy and Ezratty. *Energy Policy,* 2012

Health effects of low indoor temperatures



24 ºC

21 ºC

Comfortable and healthy

18 ºC

Possible discomfort. No risk except for the vulnerable (eg, elderly)

16 ºC

Uncomfortable. Risk of respiratory conditions, and to mental health

12 ºC

Cardiovascular risk

≤ 6 ºC

Beyond 2 hours, risk of hypothermia

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2. Adaptation of an English methodology (based on the HHSRS*) to estimate the health cost of energy inefficient dwellings and energy vulnerability in France

* HHSRS = Housing Health Safety Rating System

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The Housing Health Safety Rating System

- Evidence-based system, developed in England over the last 10 years
- Incorporated into the UK legislation in 2006

and adopted (unchanged) in 2010 by the US Department for Housing and Urban Development as the Health Homes Rating System

- Includes 29 potential Hazards, one of which is **exposure to low indoor temperatures**
- Gives the possible associated health outcomes for each Hazard
- Links health outcomes (in our study, exposure to low indoor temperatures) with particular housing conditions and then calculates the cost to the health sector
- Outcomes categorized as 4 classes of harm based on degree of incapacity makes it possible to put a cost to the health sector against each one

The English methodology : HHSRS

- Data on housing conditions were matched with health data to calculate the Likelihood of a Hazardous Occurrence and of the possible outcomes (Harms)

- Severity of outcome would vary, but would be one of the 4 **Classes of Harm** (extreme, severe, serious, moderate)

- In this case of exposure to low indoor temp., analysis showed a Likelihood of an individual suffering harm over a 12-month period of 1 to 18 ;

ie, one harmful event for every 18 energy inefficient dwellings

The English methodology : HHSRS

- 4 **Classes of Harm** (extreme, severe, serious, moderate)

Cause of cost	Outcome (England)	Outcome (France)
Class I harm (extreme)	Heart attack leading to death, after some time	Acute Coronary Syndrome leading to death
Class II harm (severe)	Heart attack	Non fatal episode of Acute Coronary Syndrome
Class III harm (serious)	Respiratory condition	Severe lower respiratory tract infection with hospitalization
Class IV harm (moderate)	Occasional mild pneumonia	Mild to moderate pneumonia (outpatient care)

French national claims database (2007-2011), ENCC survey (2013) and Patients Classification system (GHM)

Adapting the English methodology (HHRSR) to France - Different stages (1/2)

- **Stage 1** – Classifying the French dwellings according to the energy performance ; Making compatible the English SAP and the French DPE

- **Stage 2** – Identifying the energy inefficient French dwellings (SAP<38); (with the French survey PHEBUS data)

- **Stage 3** – Estimating the potential health cost* associated with the French energy inefficient dwellings

**(here we only consider the direct effects on health,as respiratory and cardiovascular problems)*

Adapting the English methodology (HHRSR) to France - Different stages (2/2)

- **Stage 4** – Estimating the renovation cost to upgrade energy inefficiency and comparing this with the potential health cost

- **Stage 5** – Identifying energy inefficient dwellings (SAP<38) occupied by low income households (= energy vulnerability)

- **Stage 6** – Estimating the potential health cost and the renovation cost to upgrade energy inefficient dwellings, occupied by low income households, at the average level of the French housing stock

Classifying energy inefficient dwellings : from French DPE to English SAP

	English SAP	French DPE
Calculation	• Scale of 0 (very inefficient) to 100 (very efficient)	• Scale of <50 (very efficient) to >450 (very inefficient)
Domains	• Space heating, hot water, lighting, ventilation and air-conditioning	• Space heating, hot water, and air-conditioning

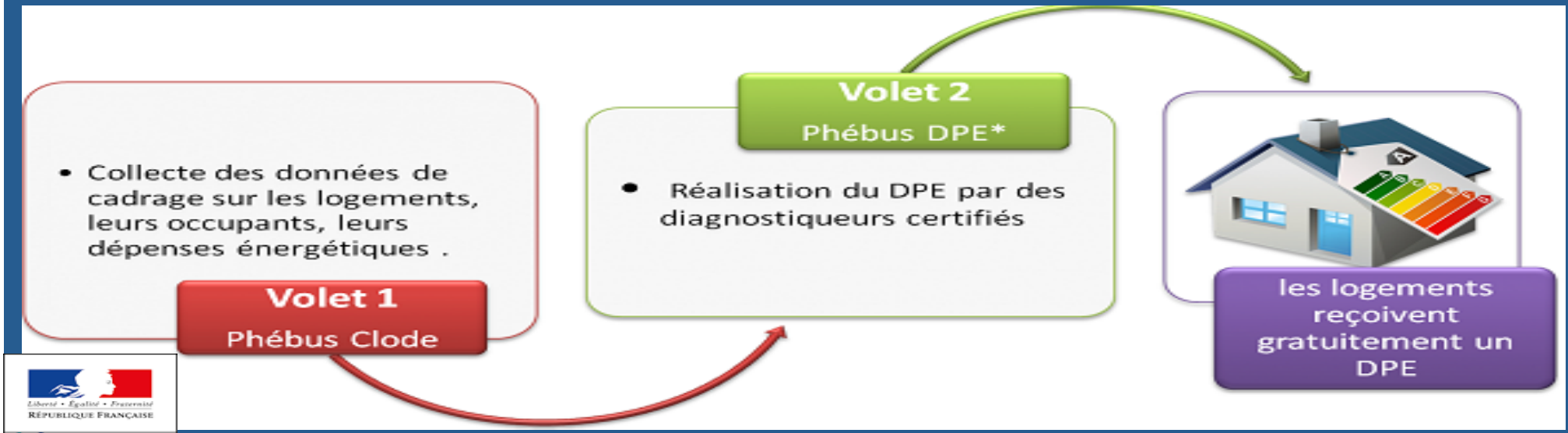
•Identifying energy inefficient dwellings involved converting DPE to match SAP,

so creating the indicator « Indice de Performance Energétique du Logement (IPEL)"

The French Survey PHEBUS (2012)

- Face-to-face interview of residents (13,074 individuals) of 5,405 representative dwellings of the French metropolitan principal residences
- Information on a sub-sample of 2,389 dwellings to give a picture:
  - on the energy performance,
  - on energy vulnerability (comparing income and the share of energy expenses),
  - on the subjective satisfaction with the heating

PHEBUS = Performance de l'Habitat, Equipements, Besoins et USages de l'énergie



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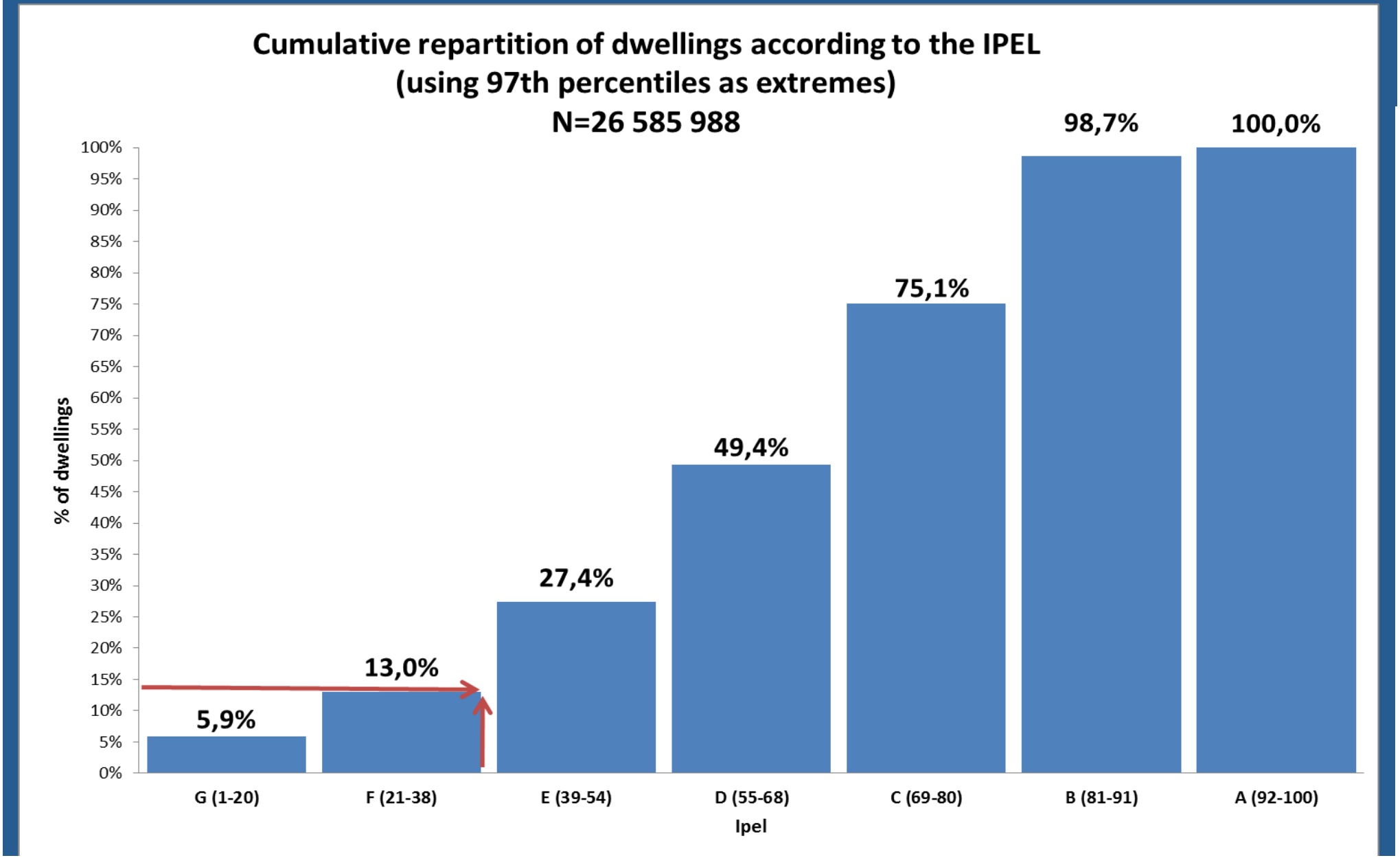
Energy inefficient French dwellings : IPEL < 38



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3. Health cost benefits of upgrading energy inefficient dwellings occupied by low income households in France

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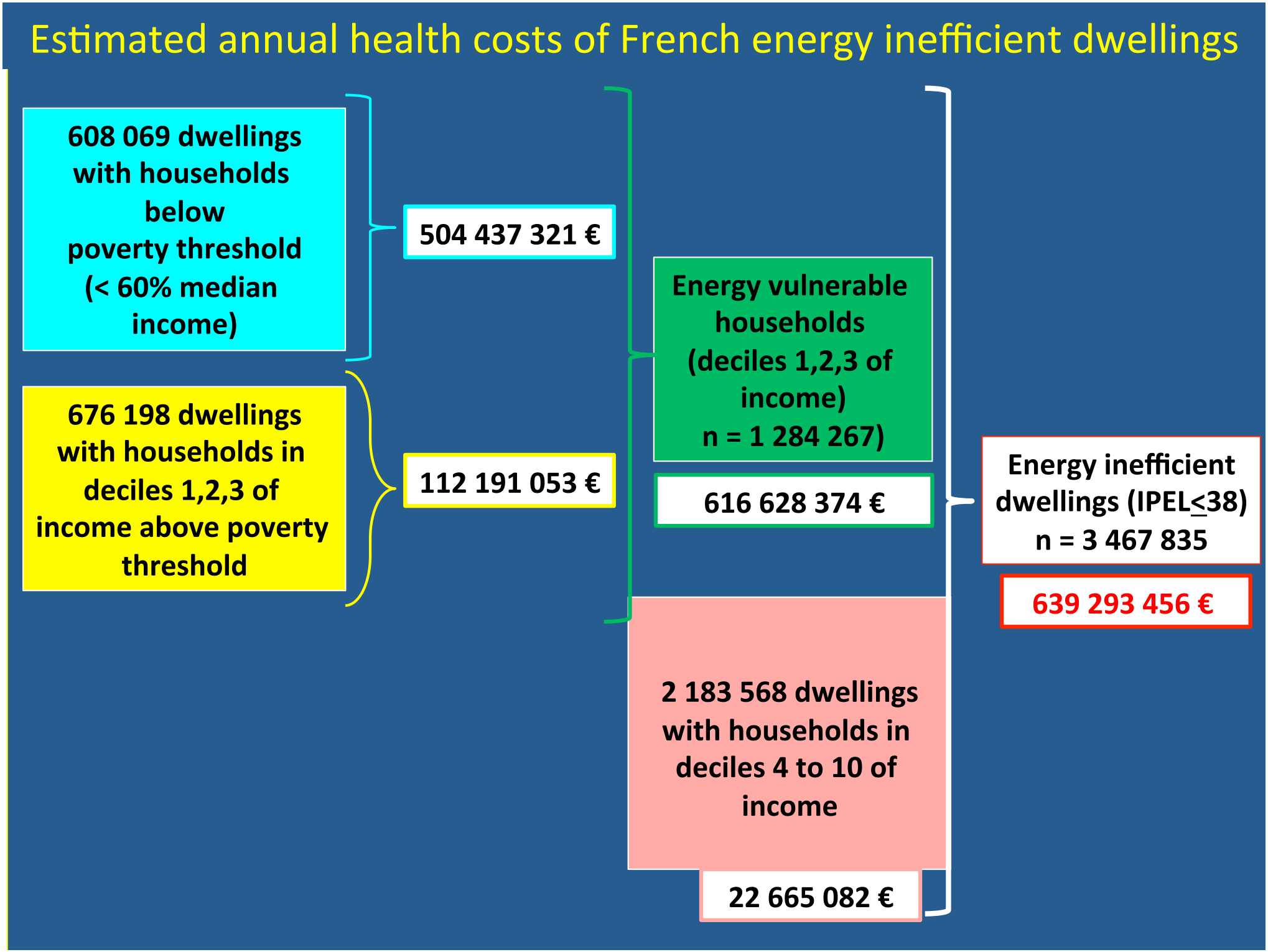
Methodology adapted to France

- Revision of the spread of harm :
  - quite old initial parameters (based on pre-2000 data in England)
  - strong reduction in the more serious health conditions (especially cardio-vascular mortality: Class I) over the last 15 years

Class of Harm	Spread of Harm (English Values)	Spread of Harm (French Evaluation)
I (extreme)	34%	3%
II (severe)	6%	17%
III (serious)	18%	30%
IV (moderate)	42%	50%

Source: INSERM 2013

Estimated annual health costs of French energy inefficient dwellings



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CONCLUSION

1. First study applying HHSRS on energy inefficient French dwellings
2. Considering only the inefficiency of the building (without any detail on occupants) → savings on health system could « finance » a significant part of the annualized investment cost of the renovation program
3. This part increases drastically if low income household are considered

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Thank you for your attention

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