



French higher domestic electricity consumption for captive uses compared to Germany: assessment of explanatory factors

Didier Bosseboeuf, ADEME

Bruno Lapillonne and Carine Sebi, Enerdata

Sophie Attali, SOWATT

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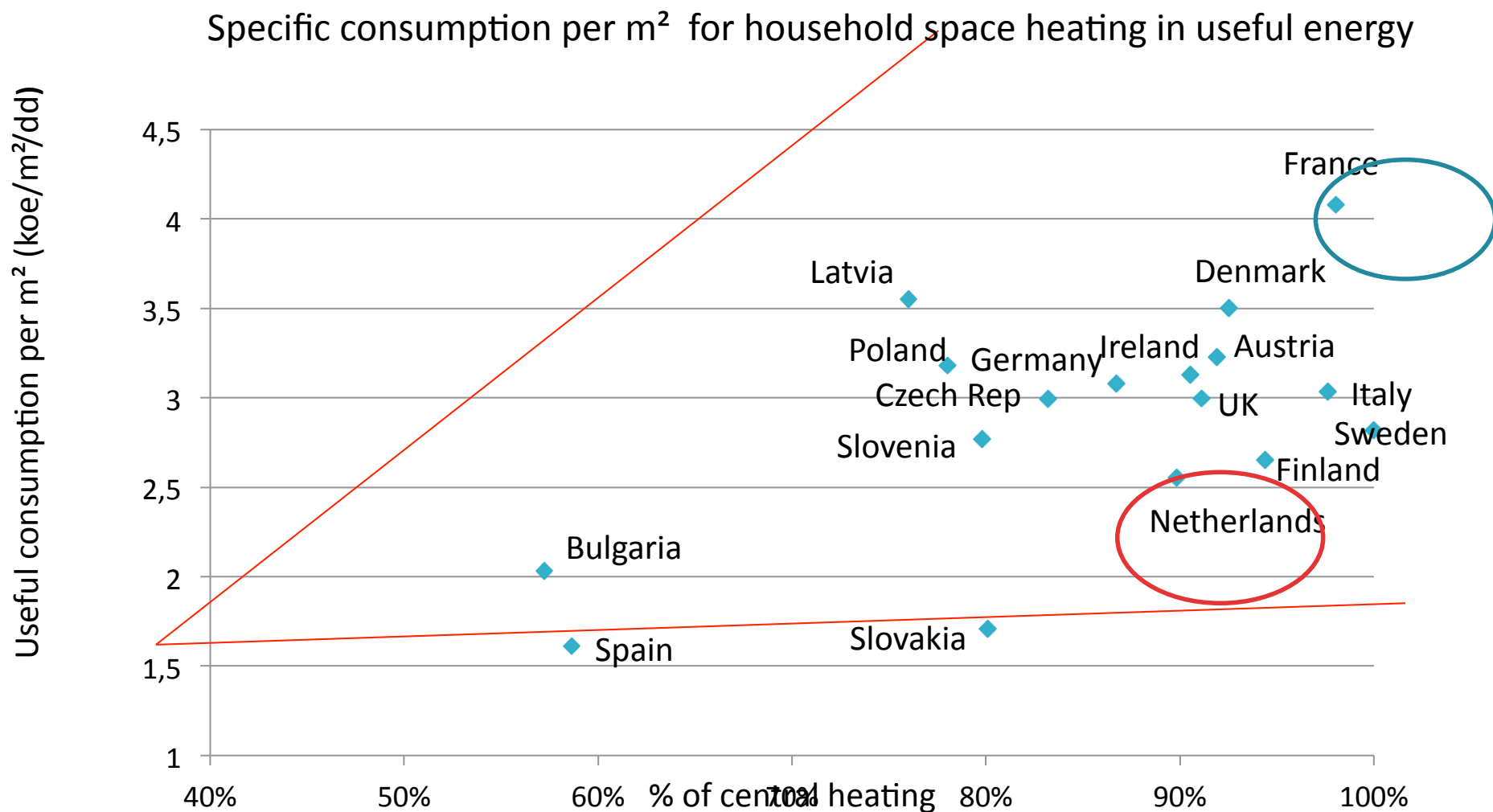
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Background

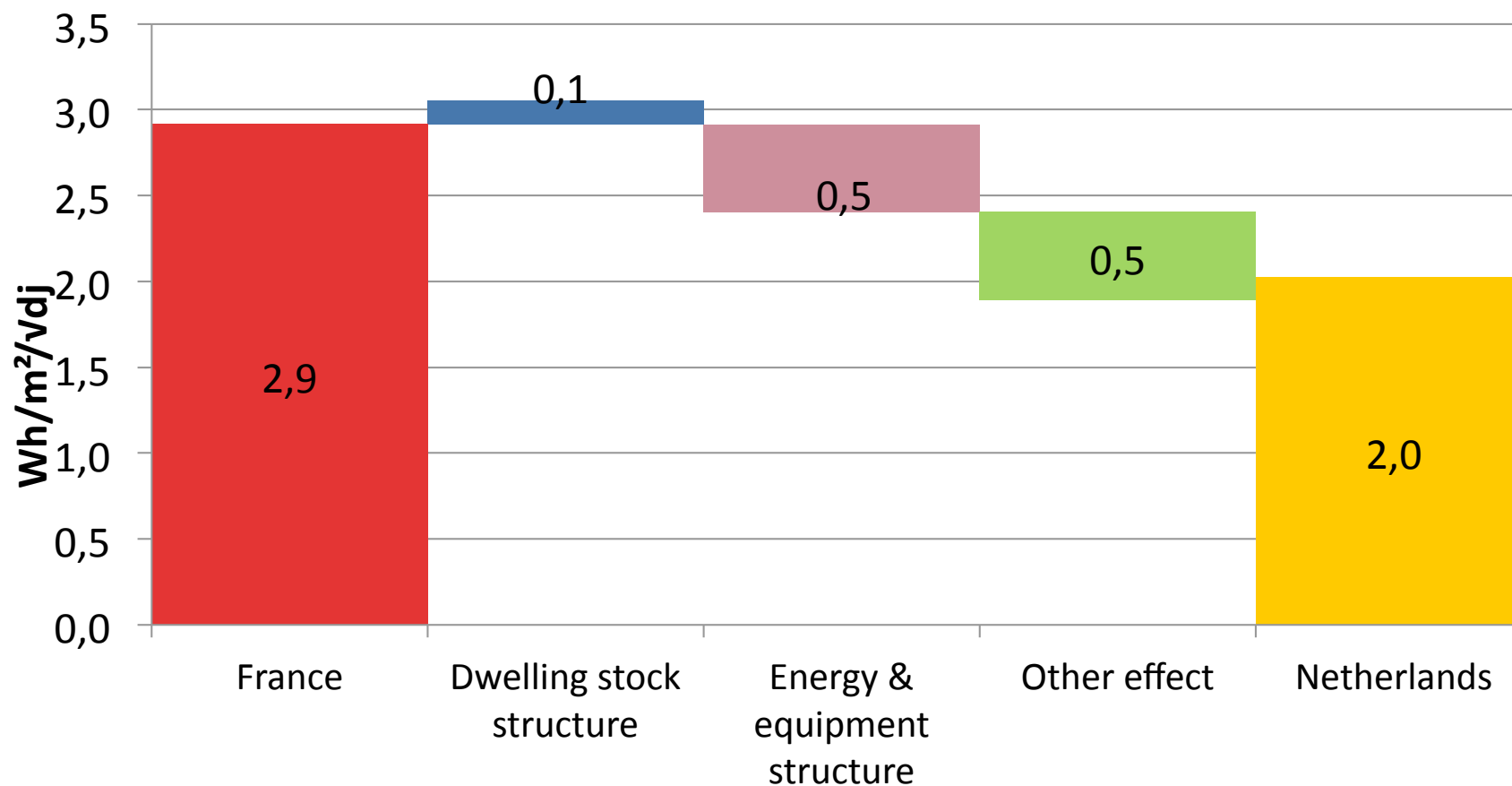
- ADEME's is coordinating several international projects on energy efficiency indicators and performances indicators (ODYSSEE, WEC, G20, Medener, UN-CEPAL etc.) and benchmarks on policies (MURE, NEEAPs, Service sectors, energy obligations etc.).
- ADEME extensively uses these benchmarks for internal strategy and policy design (ex current debate on energy transition)
- More specifically, we currently develop a serie of benchmark between France and the European best practices :
 - Specific consumption for space heating (NL)
 - Electrical appliance (DE)
 - Trucks

A French dwelling consumes 60% more than a Deutch one dwelling per M2 for space heating (usefull energy) Why?

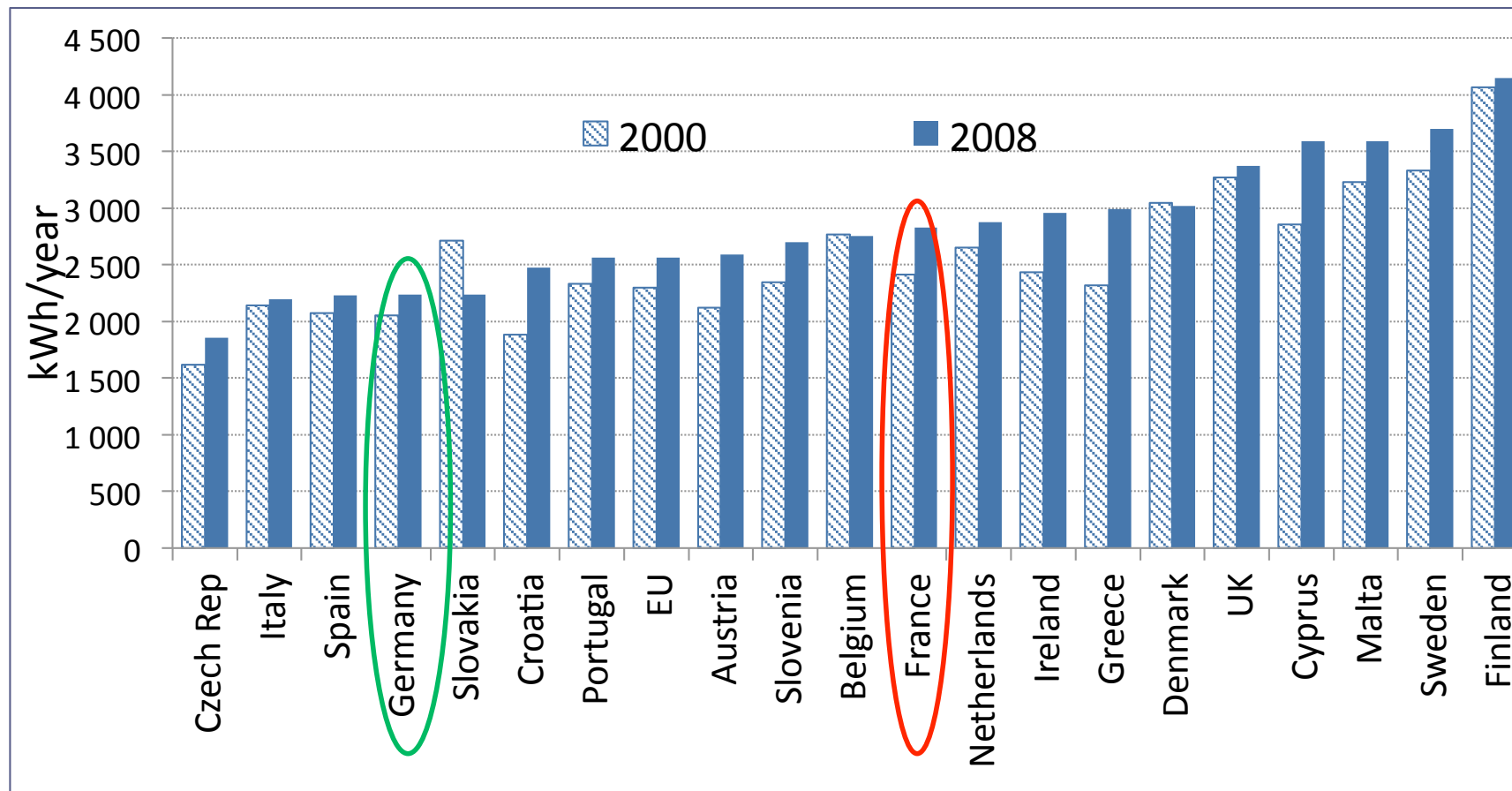


Central heating, which includes district heating, block heating, individual boiler heating and electric heating, implies that all the rooms are well heated, as opposed to room heating, where generally a stove provides heat to the main room only.

Specific consumption difference between France and Netherlands for space heating



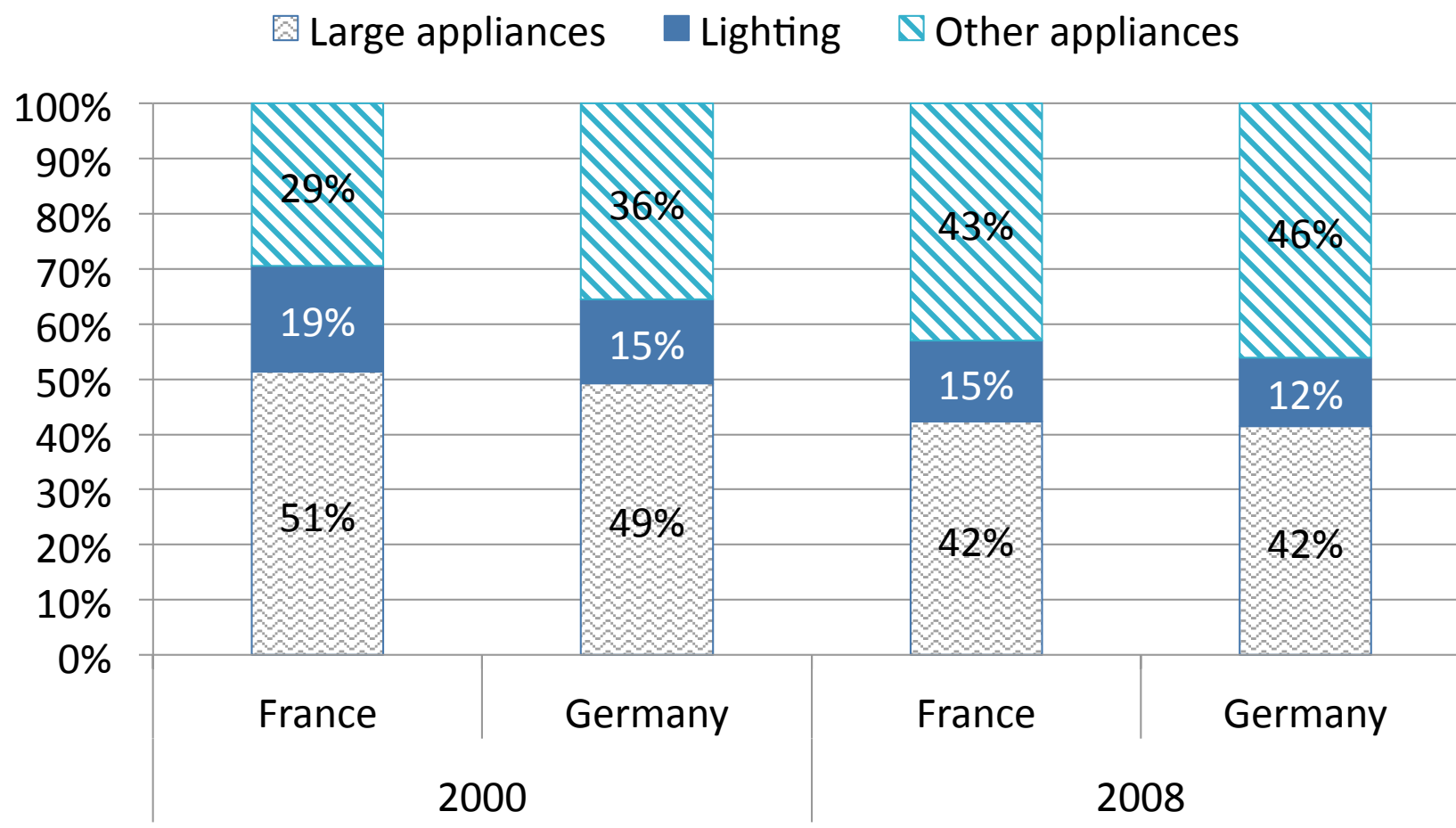
French households' specific electricity consumption was 26% higher than in Germany in 2008



Source: Odyssee

➔ Identify & quantify factors influencing the difference

Breakdown of the electricity consumption of appliances and lighting



Source: Odyssee

Selected list of 30 potential explanatory factors

Quantitative

Equipment rate in appliances

Appliances' size (cold appliance & TV)

Efficiency level: energy label and standards

Equipment features & functionality

Equipment price for energy efficient class

Electricity price

Consumer usage behaviour

Other policy implementation

Qualitative

Countries' structure

Appliance market structure

Consumer's purchasing behaviour

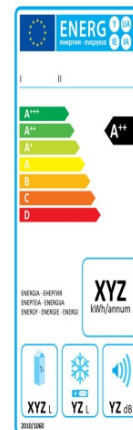
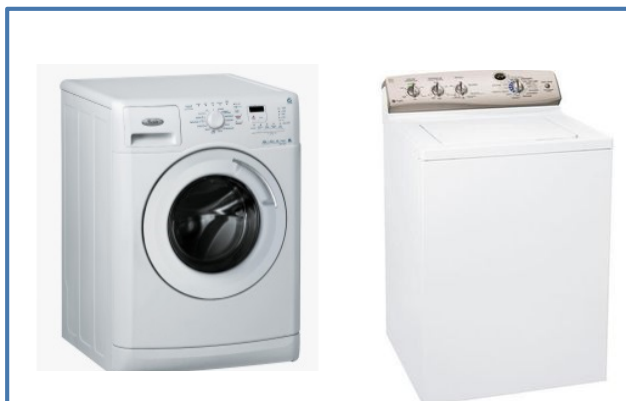
Size of country

Value and volume market

Relation between retailer and manufactureres

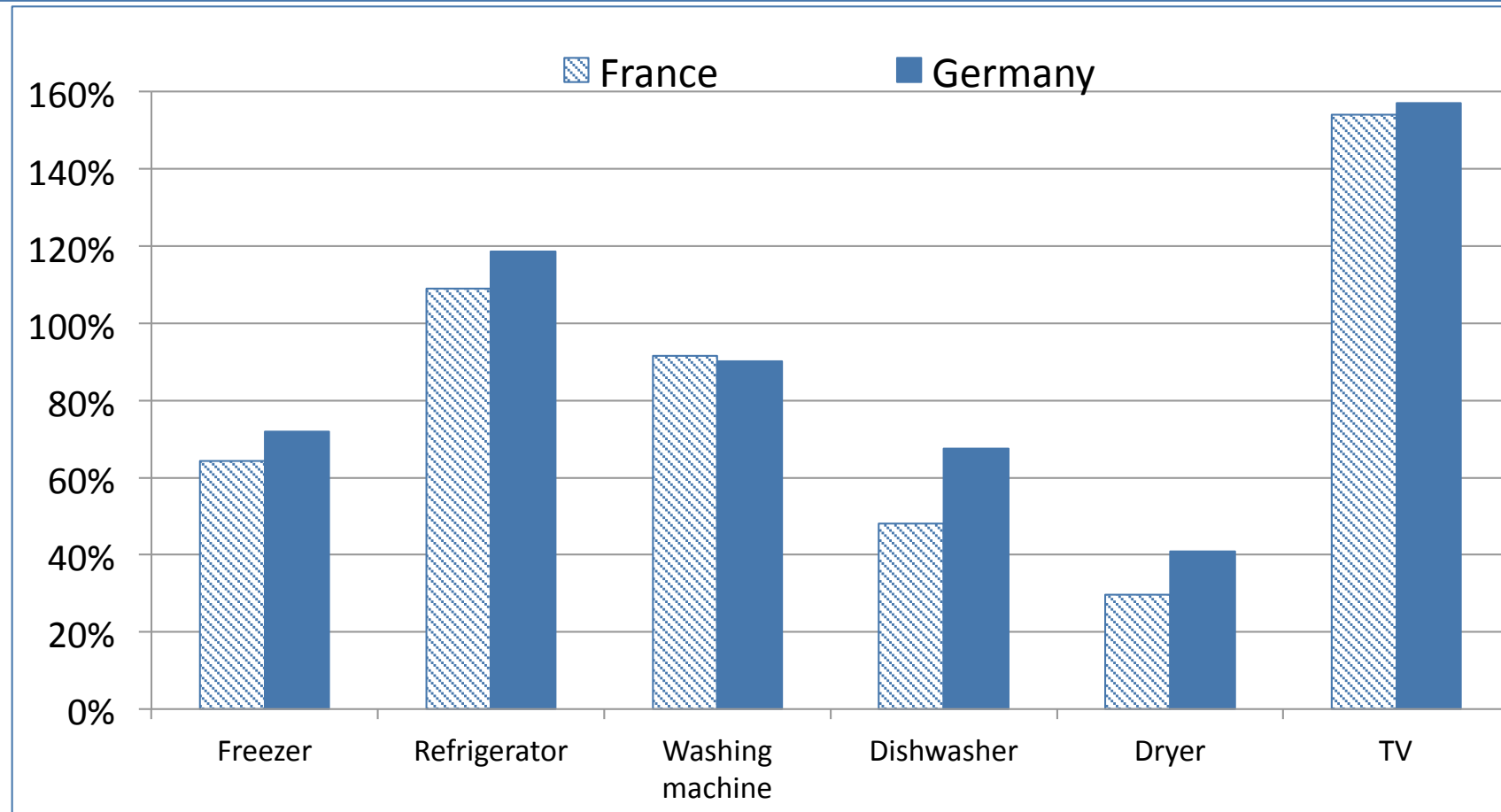
Information on energy efficiency available in the shop

Energy labelling comprehension



Equipment rate of large domestic appliances slightly lower in France

Equipment rate of households in France and Germany in 2008



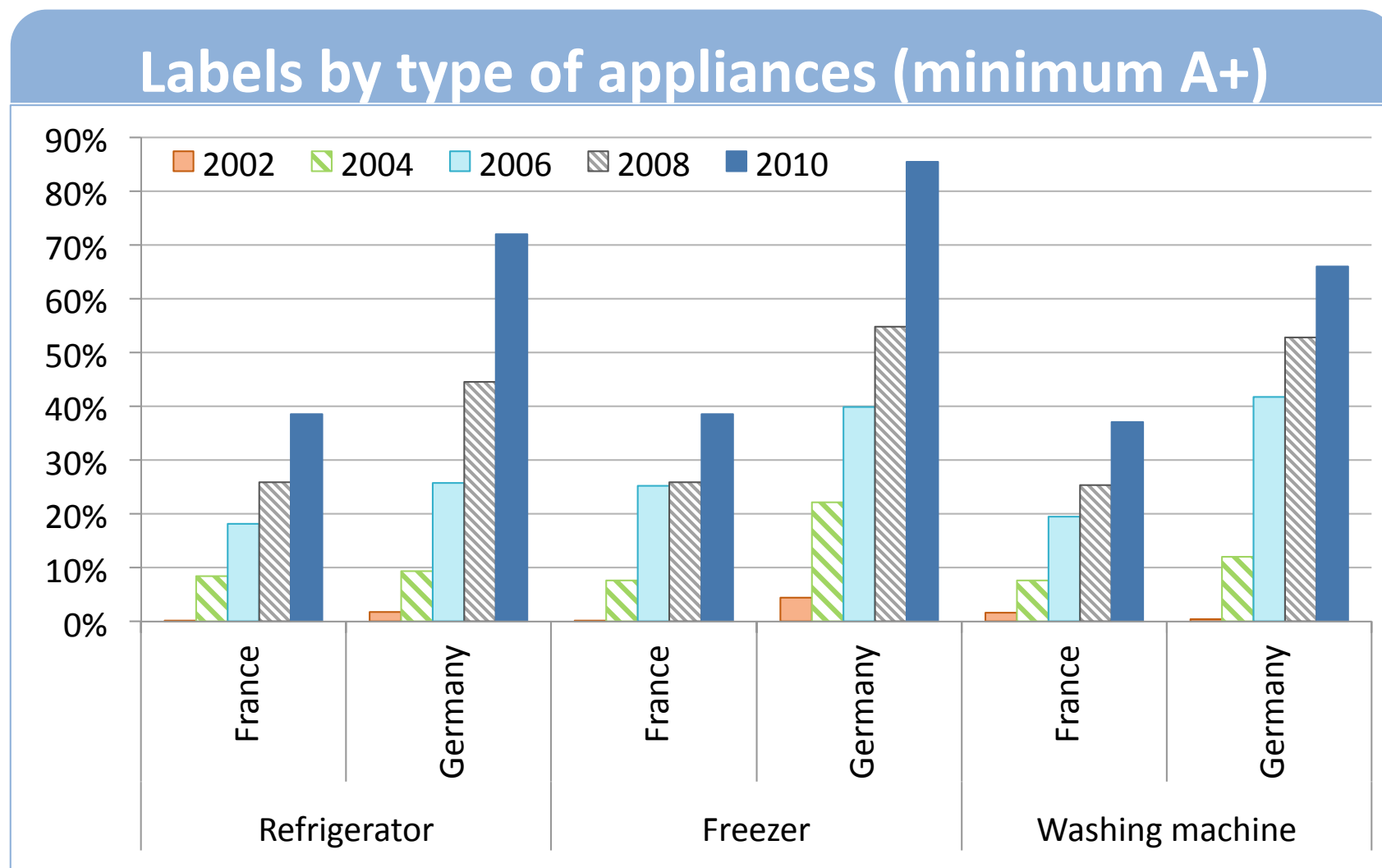
Source: Odyssee; Sofres, INSEE

The size effect

- Refrigerators and freezers sold in France are larger than the ones sold in Germany (+30% and +23% respectively). It may be partly explained by :
 - the average size of household, i.e. the average number of inhabitant per household, that is 13% higher in France
 - dwellings are on average smaller in Germany (by about 9%), due a larger share of apartments compared houses .
- The size difference for washing machines and dishwashers is hardly significant.



A larger penetration of very efficient large appliances in Germany



Equipment types and functionalities

- **Efficient cold appliances' (table-top, 1 and 2-doors)** sales are higher in Germany than in France. French consumers buy twice the number of frost-free refrigerators (18% of French sales in 2008, versus 9% in Germany). This system is more energy intensive and lessens France's performance. On the contrary, the German market share of built-in refrigerators, which are less energy-efficient, was 45% in 2008 vs. only 13% in France.
- The **market share of upright-freezers'**, which are more energy intensive than the chest type, is 30 % larger in Germany than in France.
- **Front-loading washing machines'** sales are higher in Germany (90% vs. 59% in France), but their share has been quickly increasing in France (from 25% in 2000 to 59% in 2008).

Lighting

- Lighting electricity consumption is notably higher (+49%) in France than in Germany in 2008. This consumption gap does not lie in the number of lighting points, because it is identical in both countries: **25 lights on average per household**.
- In contrast, the German households have installed twice as many compact fluorescent lamps as in France (**6,5 / house in Germany vs. 3 in France**). Compact fluorescent lamps' penetration can explain most of the difference in consumption. According to Remodece report, the differences in consumers' attitude for lighting offset each other.

Appliances pricing

The French ones are more expensive

- Most energy-efficient cold appliances are more expensive in France than in Germany. The price difference **can reach up to 20%** for class A+ or A freezers and 13% for A+ refrigerators. In addition, the price difference between an A and an « A+/A++ » washing machine is higher in France than in Germany (39% vs. 23%).
- Sales prices according to the energy label are partly determined according to market shares. High efficient appliances (A++ and A+) market share is notably lower in France compared to Germany. The price difference can be explained by the smaller size of the market, and the lack of trust of manufacturers in the French consumer “green” awareness, which leads them to market less energy-efficient models.

Behaviours

- If Germans use higher temperature water to wash their laundry (50% of households wash their laundry at 65°C versus 29% in France) and dishes (44% of German households wash their dishes at 65°C vs. 21% in France) than French households. However, they will use more frequently economic cycles. In addition, German households tend to load more their washing appliances, reducing the number of cycles and the electricity consumption (Remodece, 2007).
- Although it is impossible to quantify each attitude's impact in terms of consumption, they tend to partially compensate each other, and hardly play a part in the observed consumption discrepancy.

Lighting

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Electricity pricing : Despites prices are double in Germany , econometrics did not provide proper answer

- The average electricity price for households in France is currently about half of the German price. Half of the difference can be explained by cost differences and the other half by a different level of taxes. VAT weighs equally in both countries (around 15%). Other taxes are much higher in Germany, accounting for 27% of electricity total price (of which an 8% eco-tax since 2000), versus 10% in France.
- In order to assess these price differences, we attempted to measure households' sensitivity to electricity price variation, through an econometric analysis. Unfortunately, the price elasticity was very difficult to gauge for the 1990-2010 period, and results lack statistical consistency.

$\text{Log (elec. Consumption)} = \text{coeff} * \text{log (income)} + \text{coeff} * \text{log (elec. price)} + \text{constant} + \epsilon$

The quantifications of the explanatory factors

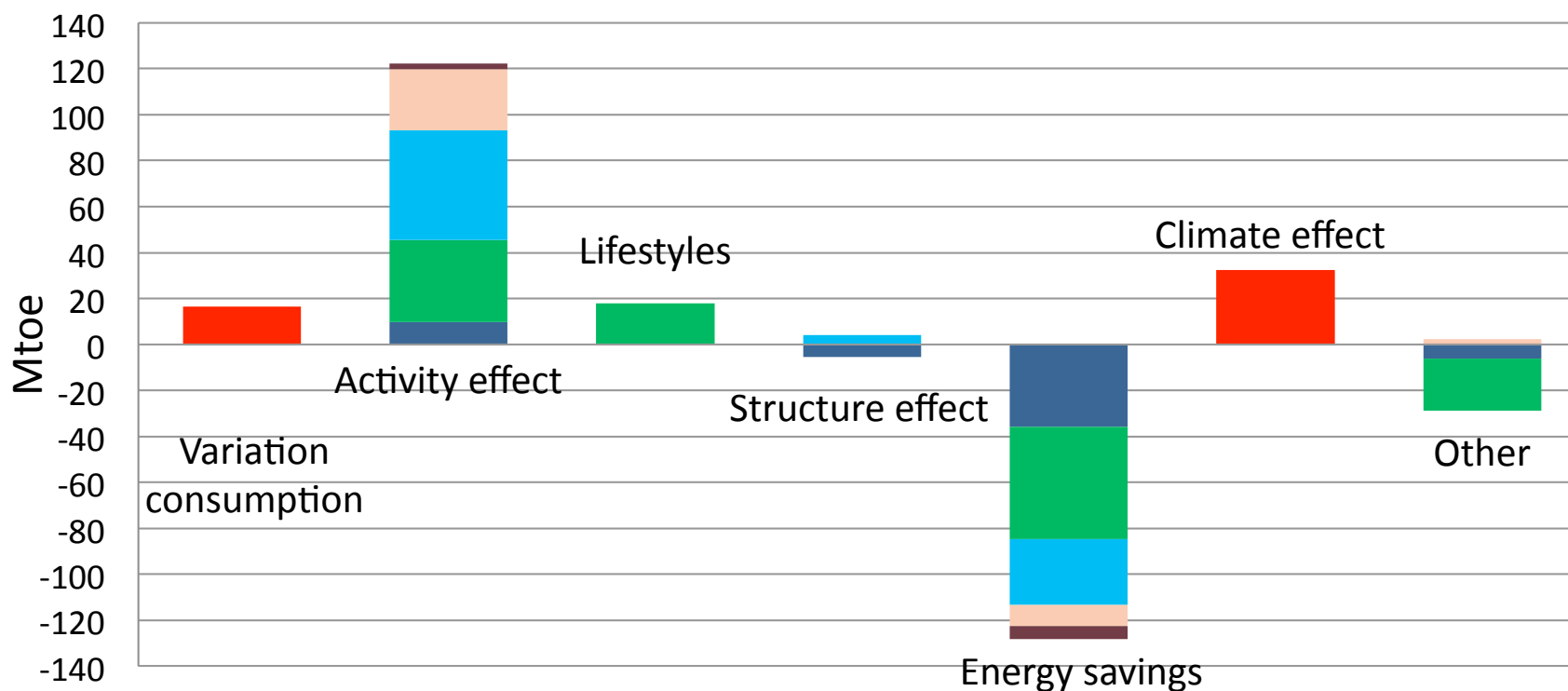
We use the so-called “**decomposition analysis of the energy demand changes**” methodology with the **technico-economic** explanatory factors based on TD indicators representative of the countries.

This methodology is broadly applied over the world but rarely applied on electrical appliances due to lack of data

Decomposition of the final energy consumption variation

- Consumption increased by 16 Mtoe between 2000 and 2010
- Economic activity contributed to an increase of 122 Mtoe (of which 48 Mtoe due to traffic increase in transport, 42 Mtoe to more dwellings), the effect of which was more than offset by energy savings (128 Mtoe).
- Other drivers were: structural changes (+2 Mtoe), lifestyles (18 Mtoe), climate variation (32 Mtoe) and other factors (mainly behavioural changes; 26 Mtoe).

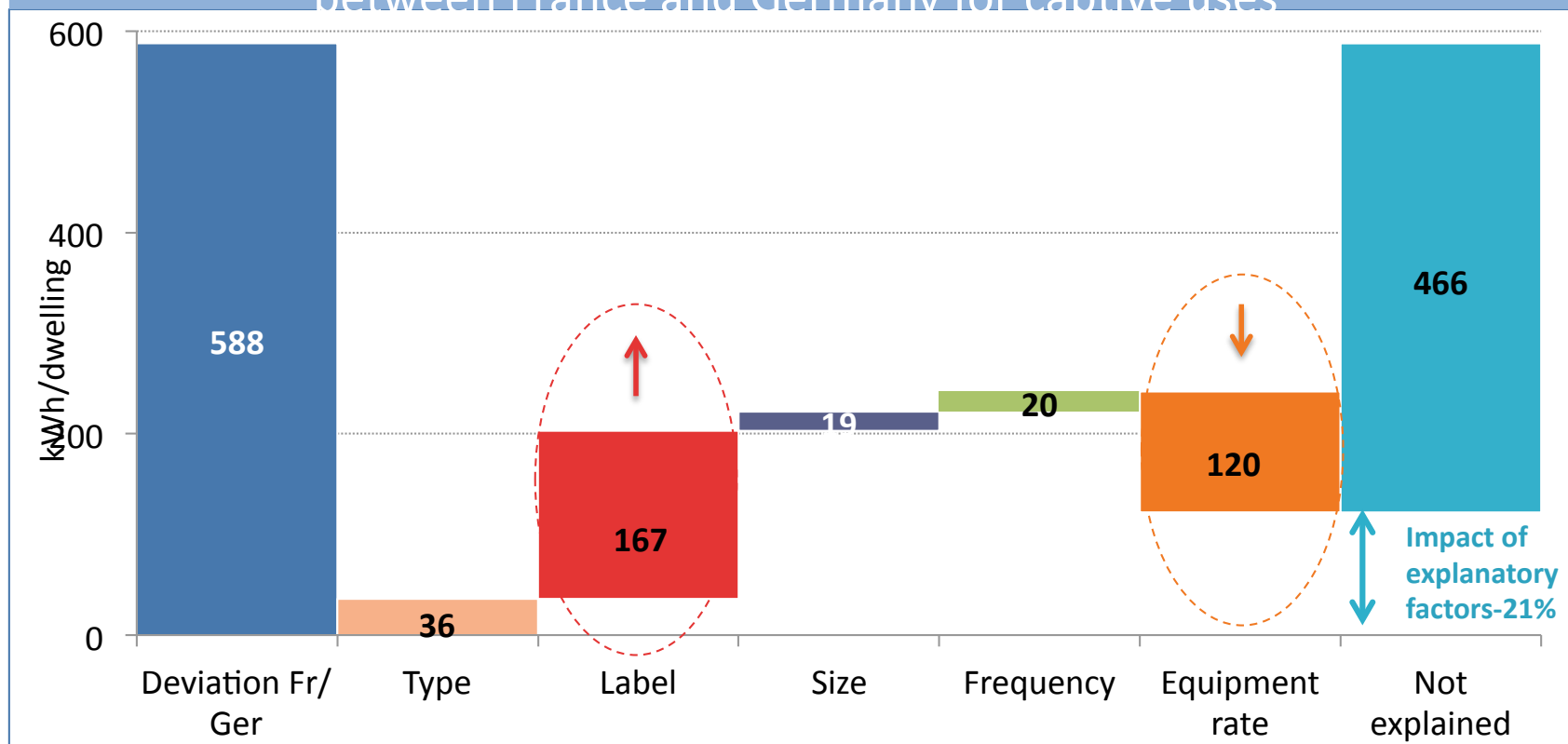
Drivers of the variation of the final energy consumption in the EU between 2000 and 2010



When combining the five adjustments, France's specific consumption remains significantly higher (20%)

➔ what about qualitative factors and policy impact?

Decomposition of the electricity consumption gap per household between France and Germany for captive uses



Source: Enerdata, ADEME

Identifying the residual gap

Considerable similarity between both countries, with the following notable exceptions:

- **Electricity prices** are twice higher in Germany, and the long term benefits from buying energy efficient appliances are more obvious in that country.
- German households also benefit from numerous **awareness programmes and demand-side management programmes** run locally by Länders, cities and over 1,000 electricity providers, some of which are managed by local authorities and have been involved in DSM for decades.
- **Manufacturers** present in Germany are very proactive and push high-end high-efficiency appliances on the market.
- German **consumers are more sensitive** to environmental issues;

Germany and public awareness programmes

- Label has been implemented in Germany since 1977



- Sensibilisation of the youngsters since the 70's (after oil crisis)
- Implementation at the lander level: information campaign on the highest efficient equipment (Initiative Energieeffizienz)
- Identification and incentive to manufacturer to focus on high efficient appliances

Conclusion (1/2)

- **Benchmarks are useful** for identifying EE potential and raise awareness to decision makers.
- **Technico- economic analysis** and decomposition analysis through explanatory factors are very **powerful methodologies** to evaluate impacts of drivers and EE policies. However they are data demanding and do not account for price changes properly

On the **quantitative** front, 2 main factors partly explain the higher consumption in France:

- Large domestic appliances are larger in France than in Germany
- A more rapid penetration of very efficient large appliances in Germany.

On the opposite, some factors may compensate for the difference observed:

- more energy-consuming features and functionalities in Germany
- Equipment rate of large domestic appliances slightly lower in France.

Conclusion (2/2)

Policy makes the differences:

The **analysis of the policy and instruments factors** in France and in Germany shows that the situation is quite similar in the two countries, with the important exception **that Germany has implemented public awareness programmes for longer than France, and with more continuity** besides the european legislation

→ Influence consumers' attitude



Thank you for your attention !



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Contact:

Didier Bosseboeuf

Bruno Lapillonne

Carine Sebi

Sophie Attali

carine.sebi@enerdata.net