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Inspire Policy Making with Territorial Evidence

AN ONLINE CONFERENCE ON

**SUSTAINABLE DEVELOPMENT AND REGIONAL  
RESTRUCTURING IN THE BALTIC SEA REGION**

**Online ESPON Conference on Sustainable Development and Regional  
Restructuring in the Baltic Sea Region**

POSTED ON SEPTEMBER 22, 2021 BY ESPONEVENTS IN WORKSHOPS

**Venue**


Online

13 October 2021

**MORE  
WORKSHOPS**

**New challenges and thinking for  
spatial planning systems**

WORKSHOPS | September 22, 2021  
[field\_date]  
New challenges and thinking for spatial  
planning systems  
Date:  
Tuesday, October 16, 2018

 **Online Workshop:  
Territorial impacts of  
natural hazards**

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2021 [field\_date]  
ESPON-TITAN project has been  
practically completed and a set of policy  
recommendations on how to mainstream  
Disaster Risk Managemen  
Date:  
Wednesday, June 16, 2021

**Potentials of Cross-border Public  
Services for Hungarian and  
neighbouring border regions**

WORKSHOPS | September 22, 2021



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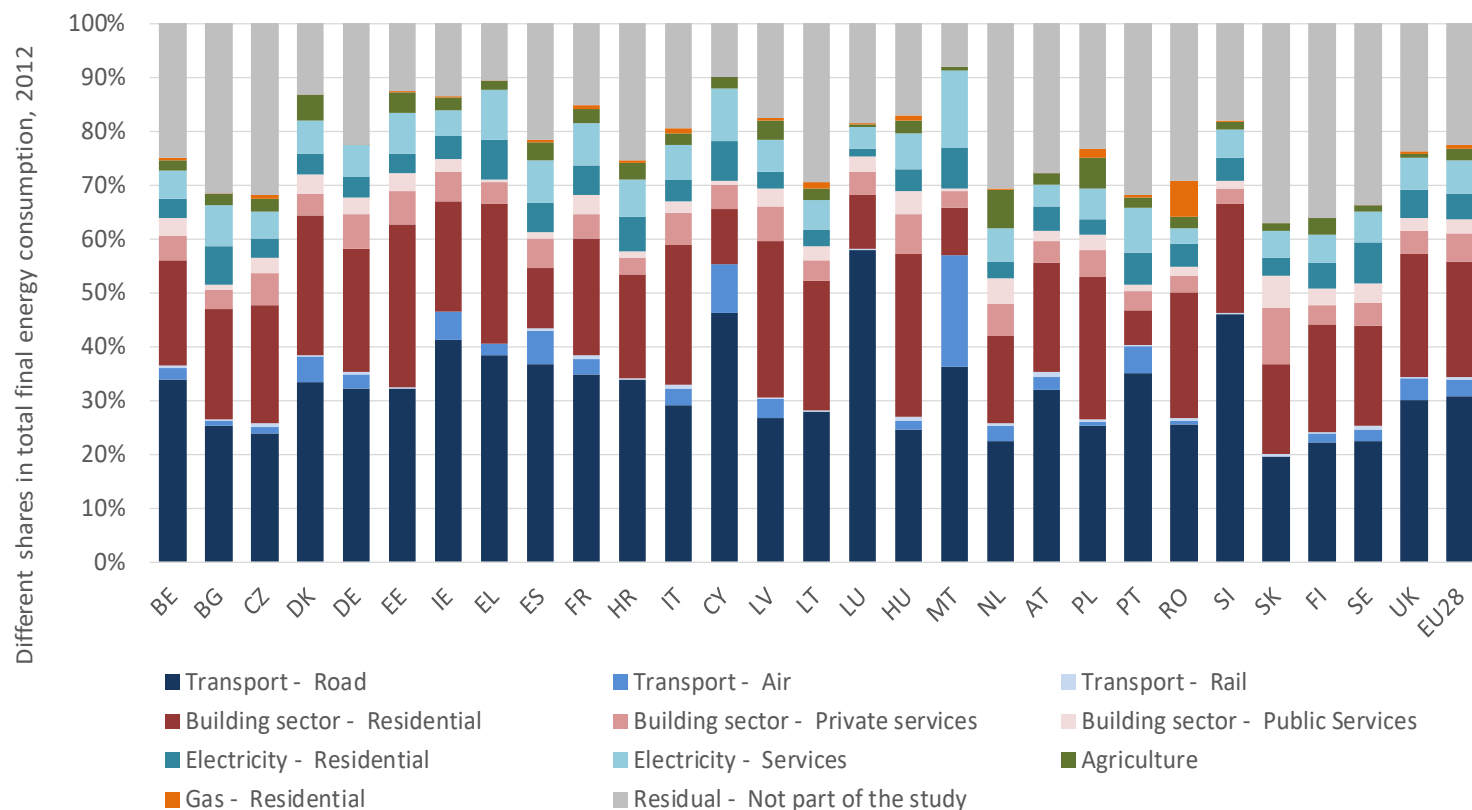
# Potential for renewable energy, its exploitation and energy consumption patterns at a regional level

Lukas Kranzl, Mostafa Fallahnejad, Lukas Liebmann, Andreas Müller, Gustav Resch, TU Wien, Energy Economics Group

Jan Steinbach, Rainer Elsland, André Kühn, Frederik Mayer, Martin Pudlik, Gerda Schubert, Fraunhofer ISI

ESPON Conference on Sustainable Development and Regional Restructuring in the Baltic Sea Region, 13.10.2021

# Share of different sectors in total final energy consumption for selected countries in 2012



Source: ESPON LOCATE, Schremmer et al., 2017

# The project ESPON LOCATE

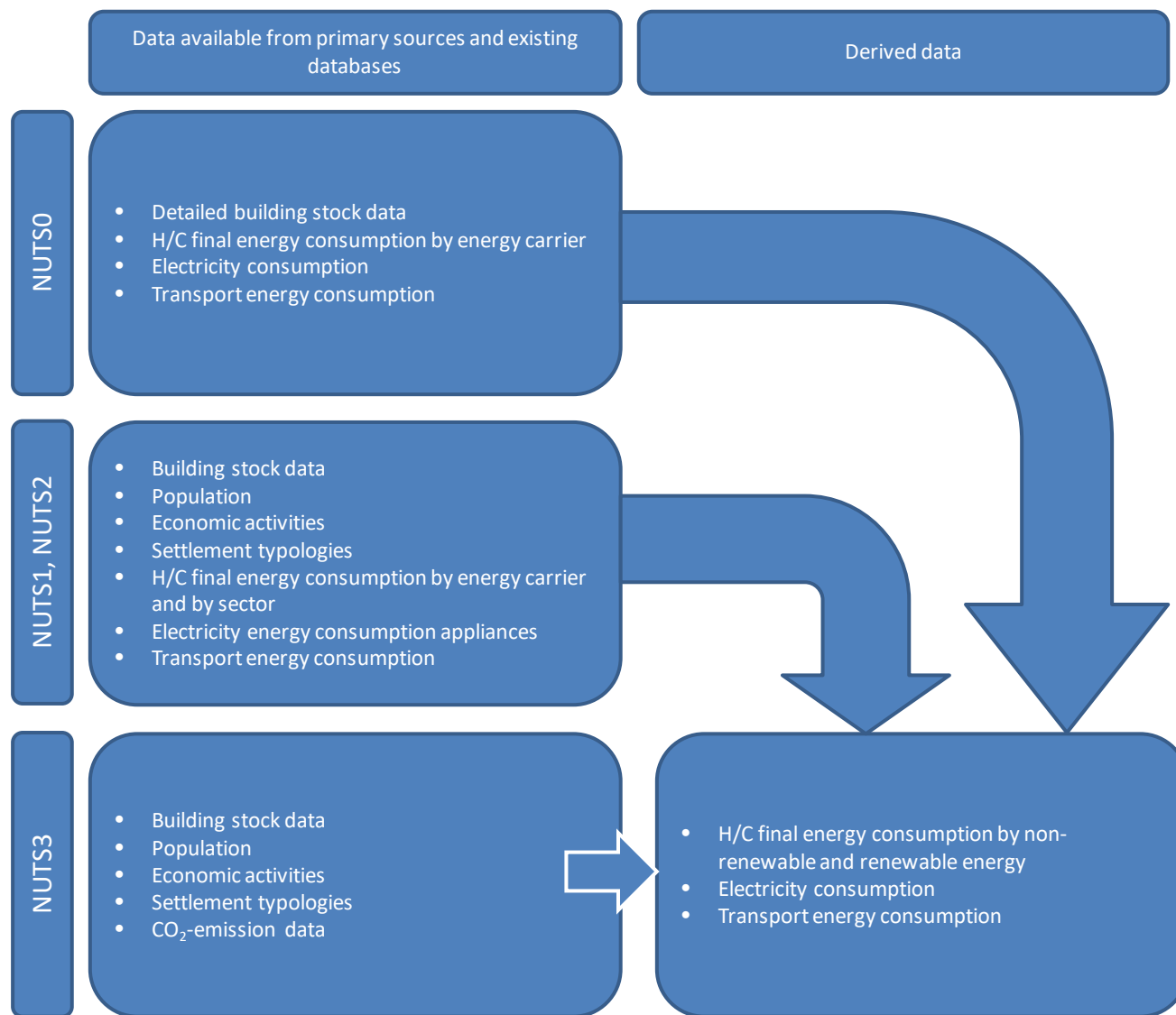
- ▶ Objective: to provide evidence on the territorial dimension of implementing the low-carbon economy approach in different parts of Europe and in different types of European regions and cities at NUTS 3 level
- ▶ Energy consumption patterns and the potential to produce (and use) renewable energy sources (quantitative research)
- ▶ Energy-relevant regional competencies and regional room for action and their interaction with EU and national levels of legislation and policy making (qualitative research).

# ESPON LOCATE: Elaborated datasets

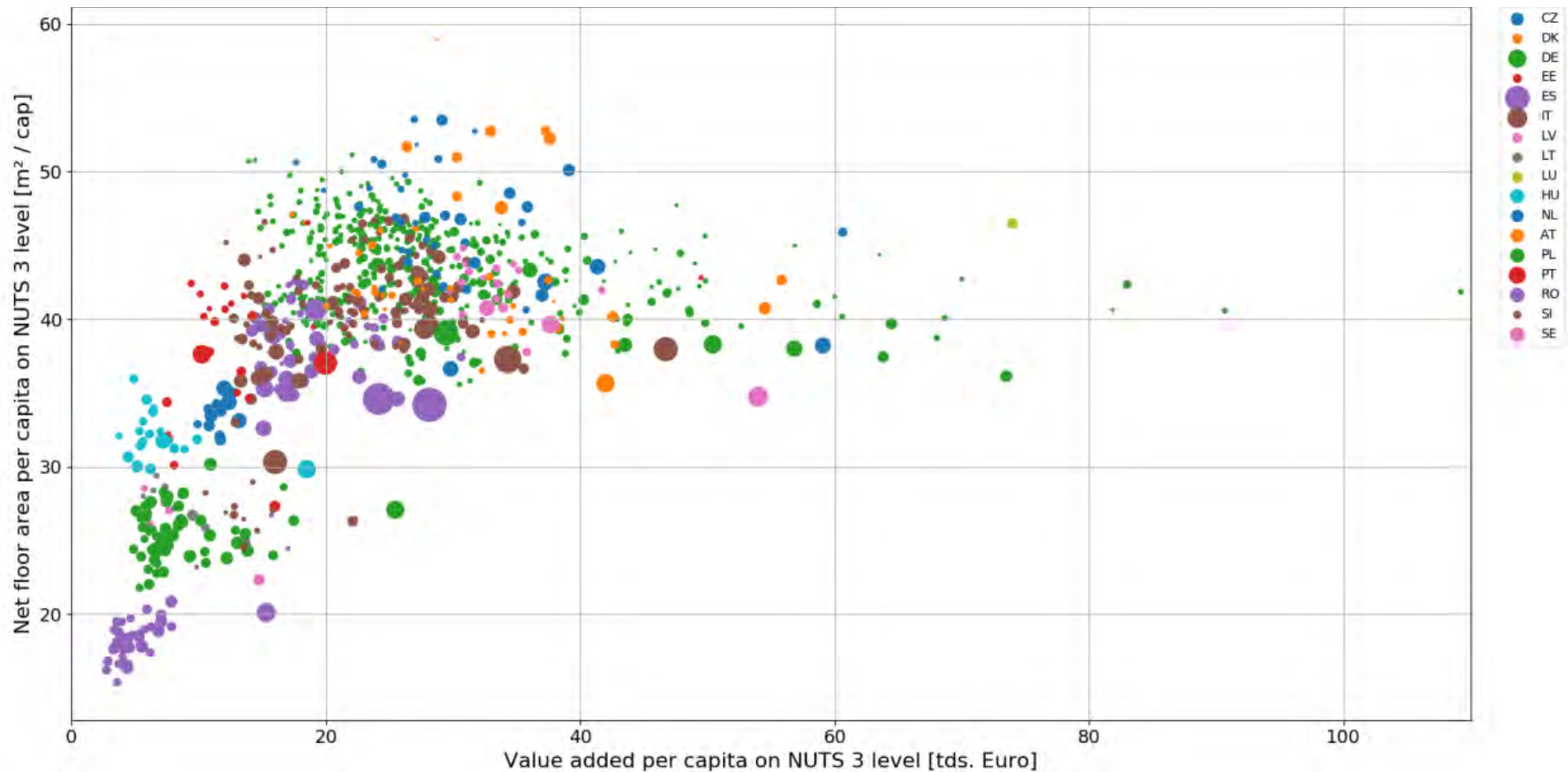
SECTORS of Energy consumption	Household sector	Tertiary sector		Agriculture and forestry	Transport			
Sub sectors	Residential buildings	Public non-residential buildings	Other non-residential buildings		Road	Rail	Air	Water
<b>HEATING AND COOLING</b>								
space heating and domestic hot water, cooling								
<b>OTHER END USES (excl. Space heating, cooling and domestic hot water)</b>								
electric appliances, lighting and process energy demand								
<b>RES-H/C share</b>								
<b>RES-E share</b>								
<b>TRANSPORT</b>								
<b>RES-T share</b>								

- ▶ Most data sets developed on NUTS3 level (dark green)
- ▶ Some data sets on a lower level of spatial disaggregation (light green)
- ▶ EU-28 (status 2017) member states plus Switzerland, Norway, Iceland and Liechtenstein for the years 2002 and 2012
- ▶ RES potentials: Wind, Solar, Hydro, Biomass, Geothermal, Tidal/Wave

# Methodology consumption patterns: Selected data sources



# Selected methodological aspects: Correlation of economic activities and average net floor area per capita



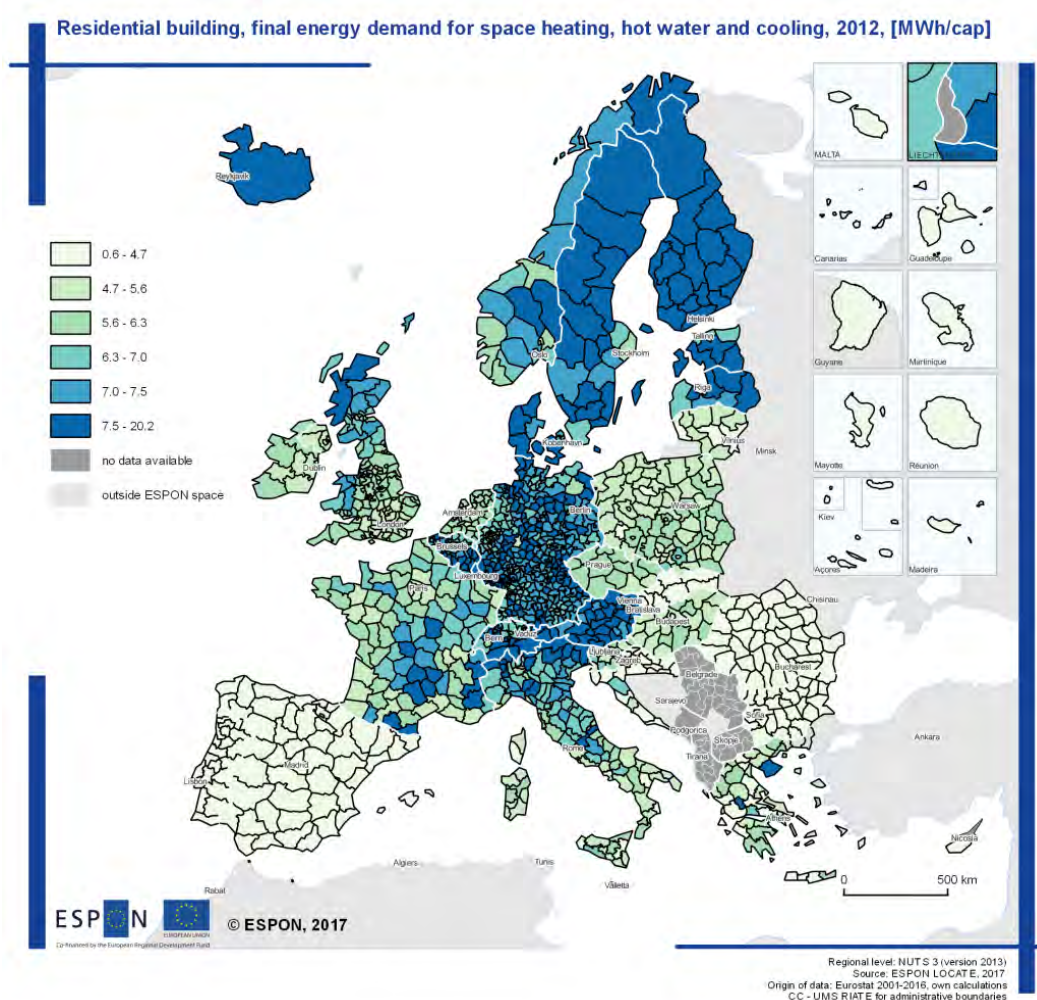
Source: ESPON LOCATE, Schremmer et al., 2017

## **Selected results (1):**

**Final energy demand for space heating, hot water and cooling, residential buildings**



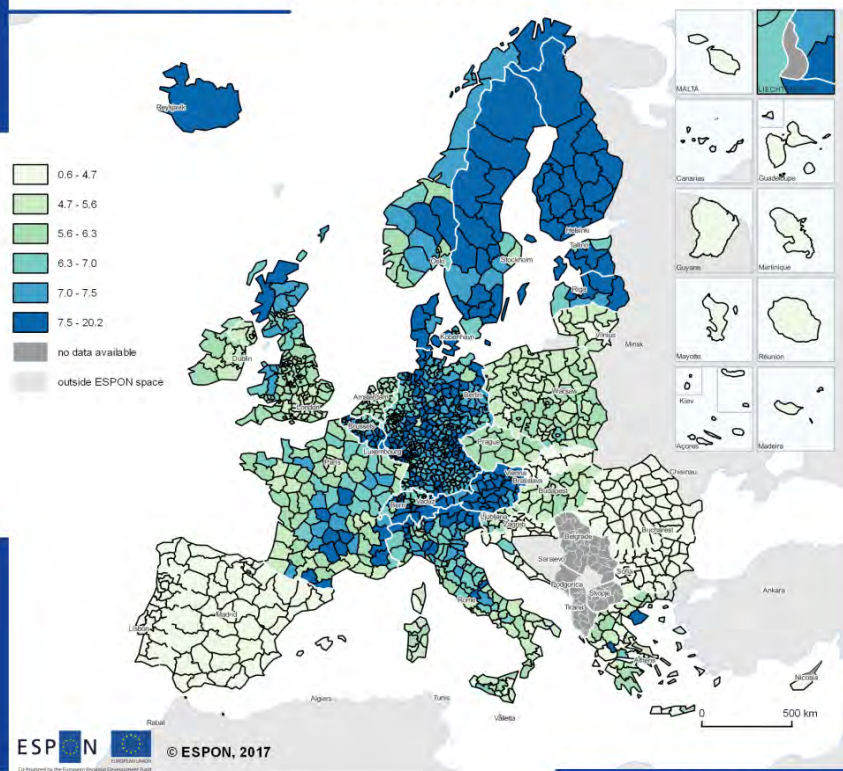
# Final energy demand for space heating, domestic hot water and cooling of residential buildings, MWh per capita



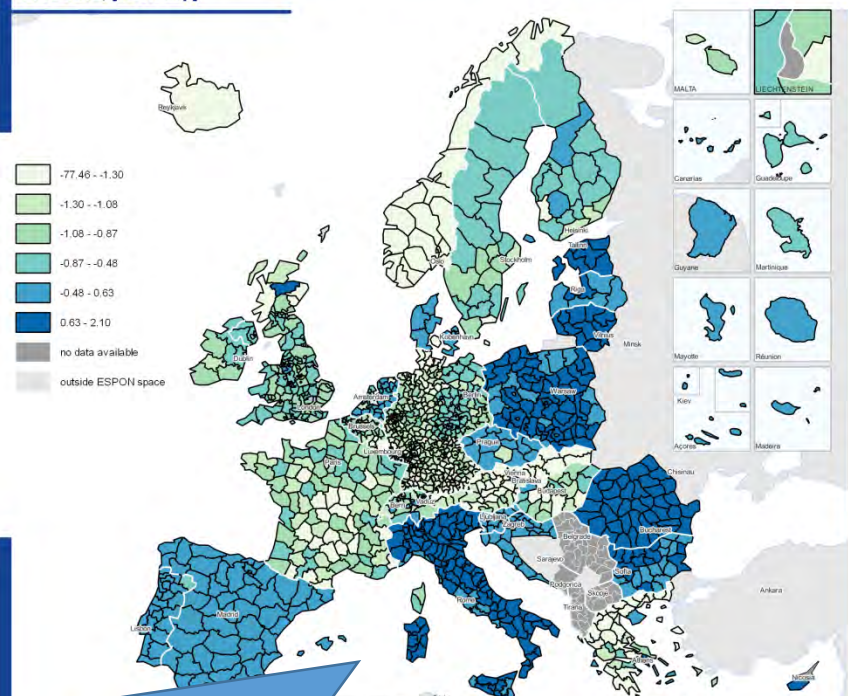
Source: ESPON LOCATE, Schremmer et al., 2017

# Final energy demand for space heating, domestic hot water and cooling of residential buildings, MWh per capita

Residential building, final energy demand for space heating, hot water and cooling, 2012, [MWh/cap]



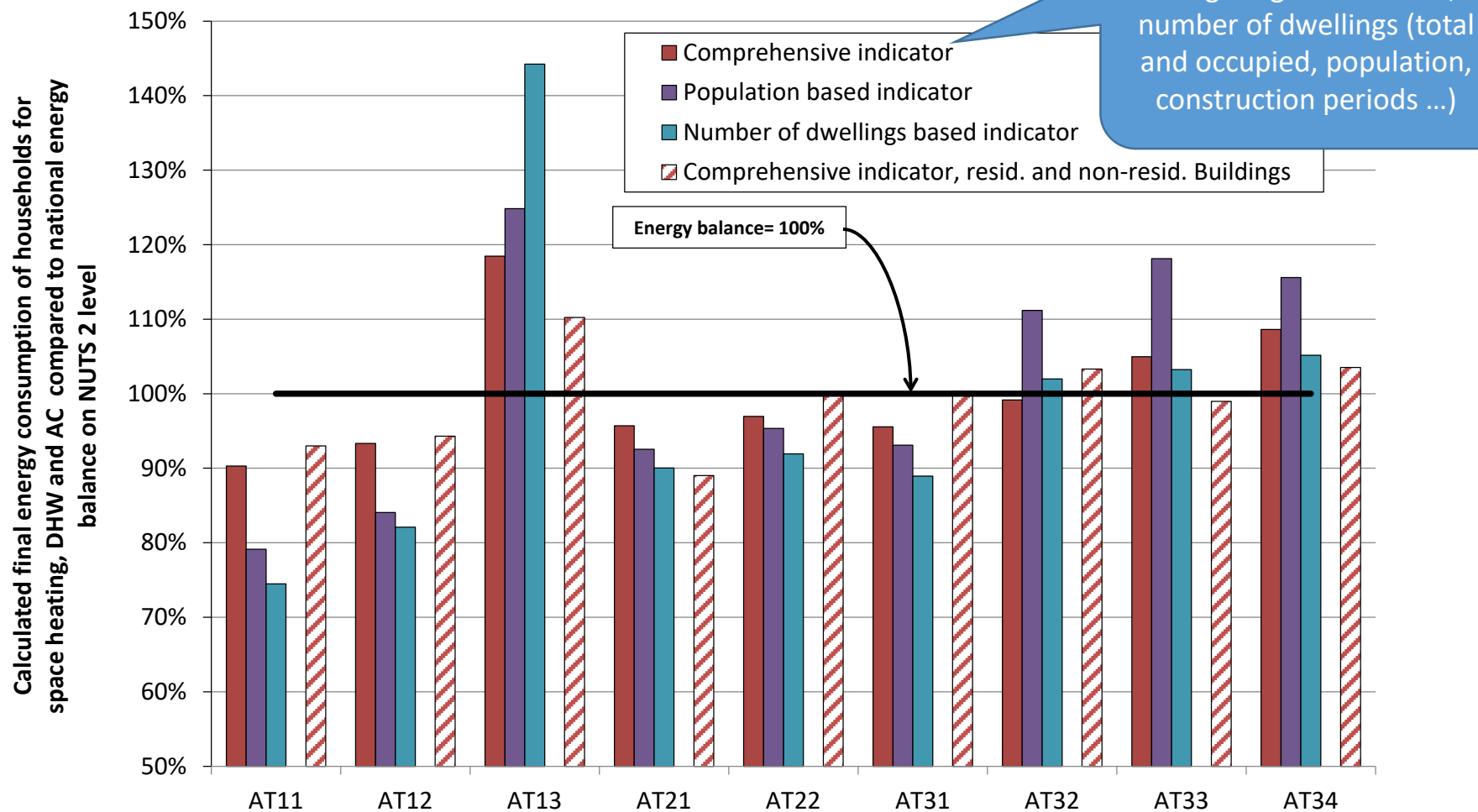
Residential building, change in final energy demand for space heating, hot water and cooling, 2012-2002, [MWh/cap]



Change mainly driven by:

- Thermal building renovation and replacement of heating systems
- Change in the supply of energy services, e.g. the related floor area, change in comfort.

# Validation: Energy consumption using a comprehensive indicator and two simpler indicators, selected NUTS2 regions

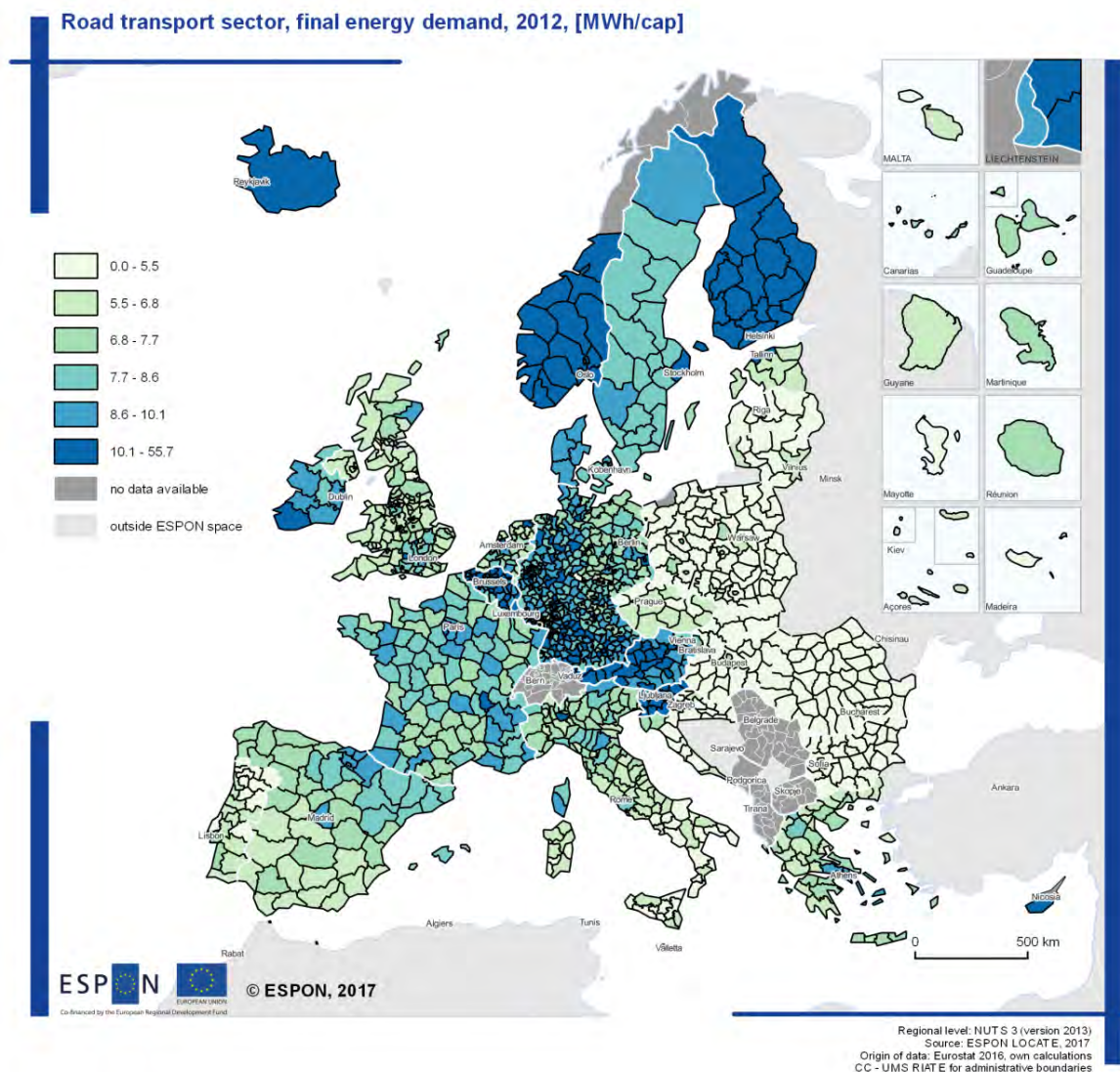


**Selected results (2):**

**Final energy demand for road transport**



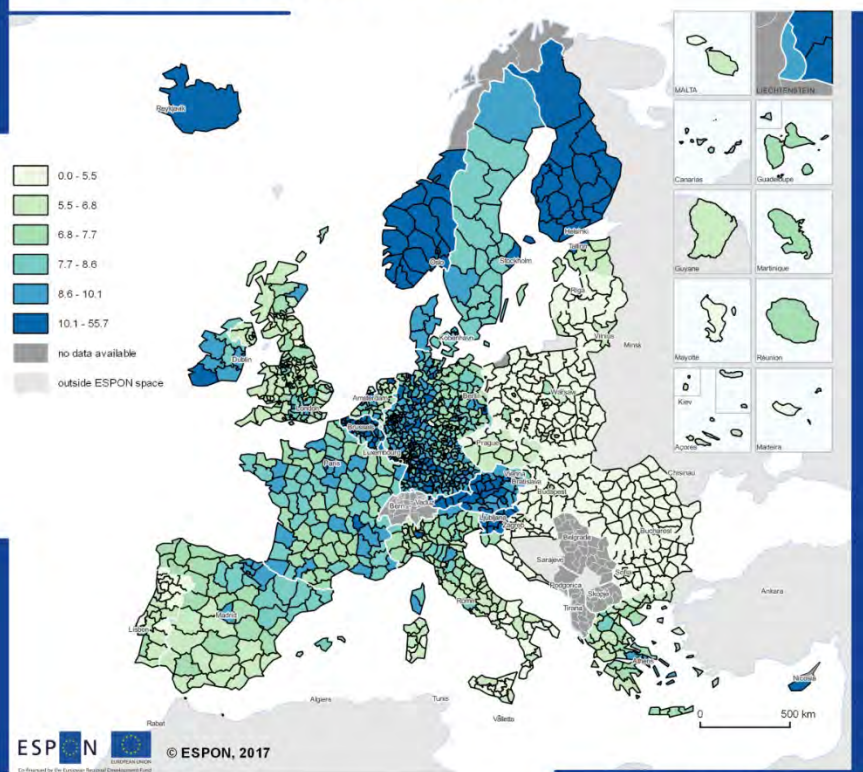
# Final energy demand for road transport, MWh per capita



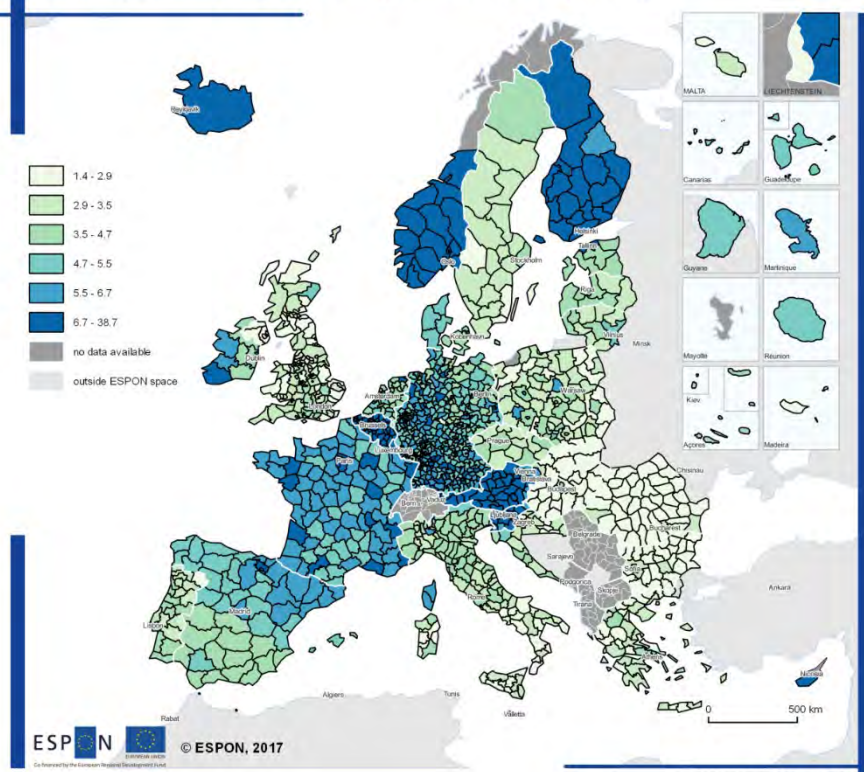
Source: ESPON LOCATE, Schremmer et al., 2017

# Final energy demand road transport, MWh per capita

Road transport sector, final energy demand, 2012, [MWh/cap]



Road transport sector, change in final energy demand, 2012-2002, [MWh/cap]



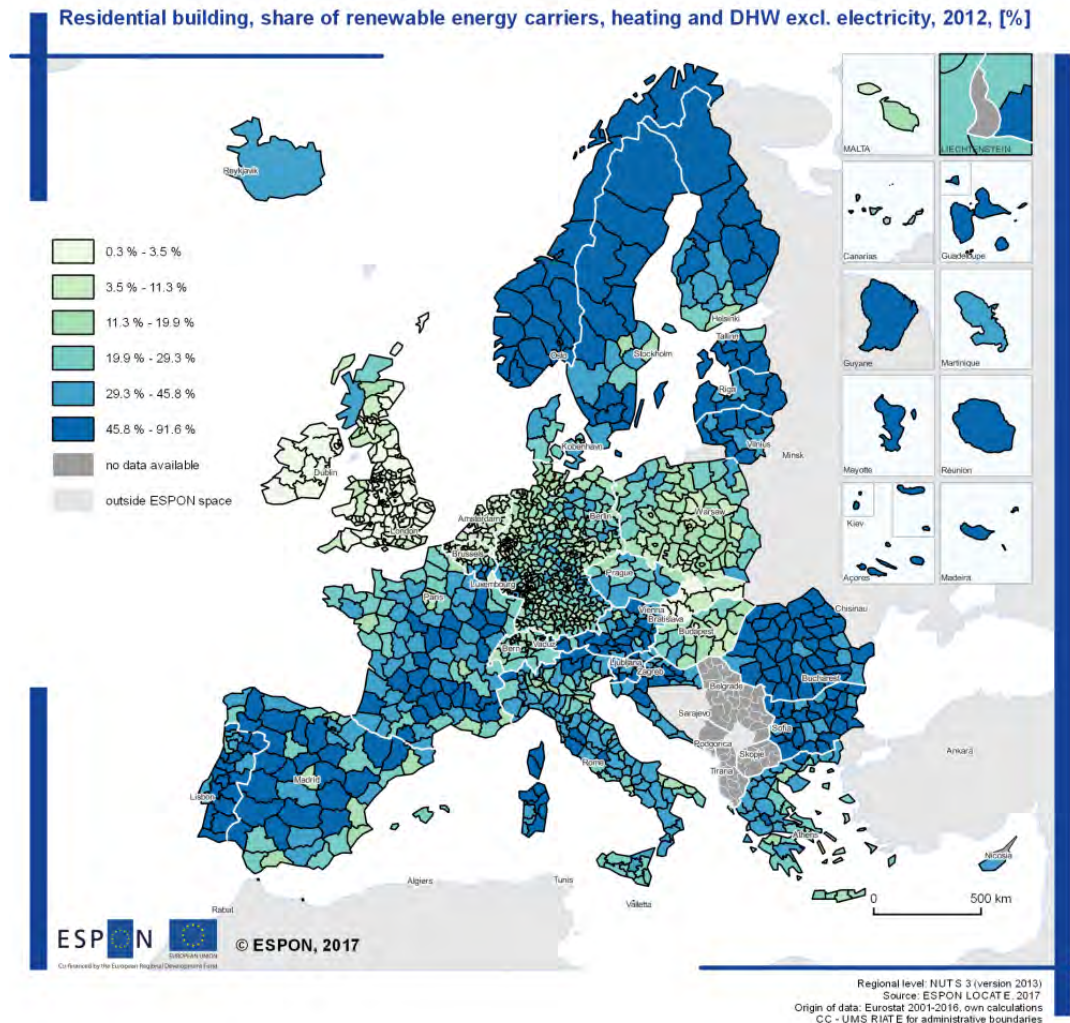
Source: ESPON LOCATE, Schremmer et al., 2017

## **Selected results (3):**

**Share of renewable energy carriers for space heating  
and hot water in residential buildings**



# Share of renewable energy carriers for space heating and domestic hot water production of residential buildings

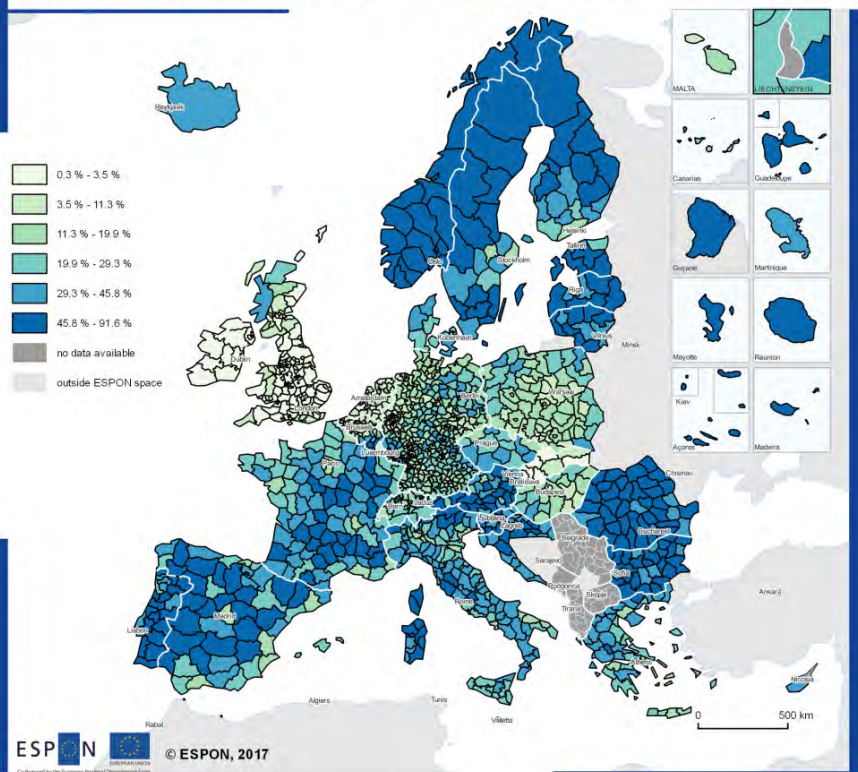


Source: ESPON LOCATE, Schremmer et al., 2017



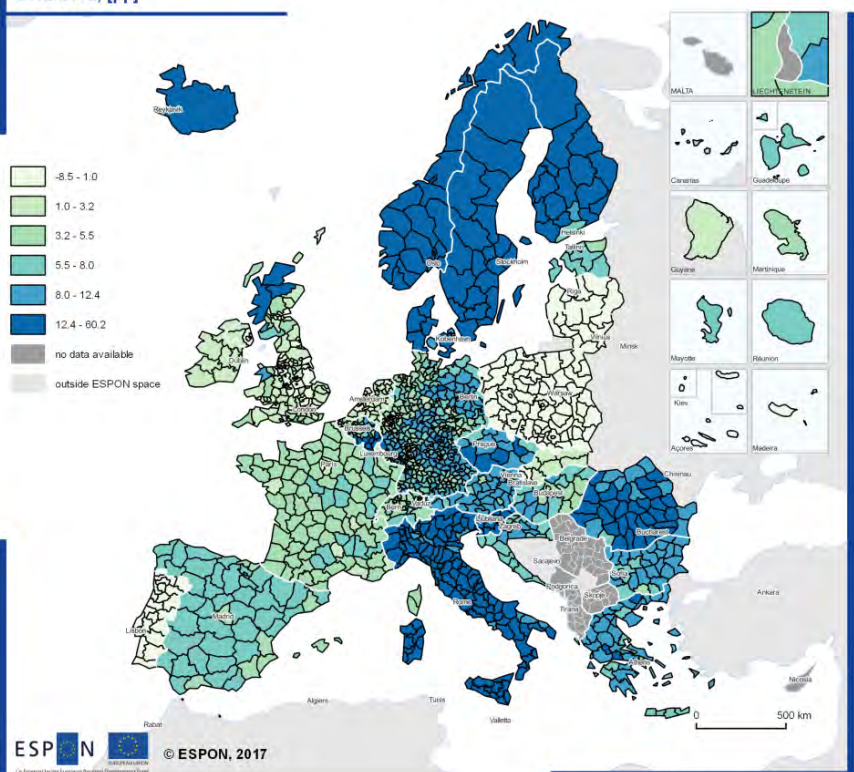
# Share of renewable energy carriers for space heating and domestic hot water production of residential buildings

Residential building, share of renewable energy carriers, heating and DHW excl. electricity, 2012, [%]



Regional level: NUTS 3 (version 2013)  
Source: ESPON LOCATE, 2017  
Origin of data: Eurostat 2001-2016, own calculations  
CC - BY-NC-SA for administrative boundaries

Residential building, change in share of renewable energy carriers, heating and DHW excl. electricity, 2012-2002, [pp]

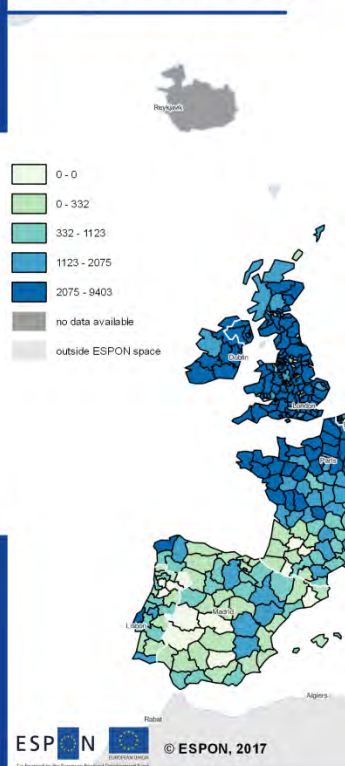


Regional level: NUTS 3 (version 2013)  
Source: ESPON LOCATE, 2017  
Origin of data: Eurostat 2001-2016, own calculations  
CC - BY-NC-SA for administrative boundaries

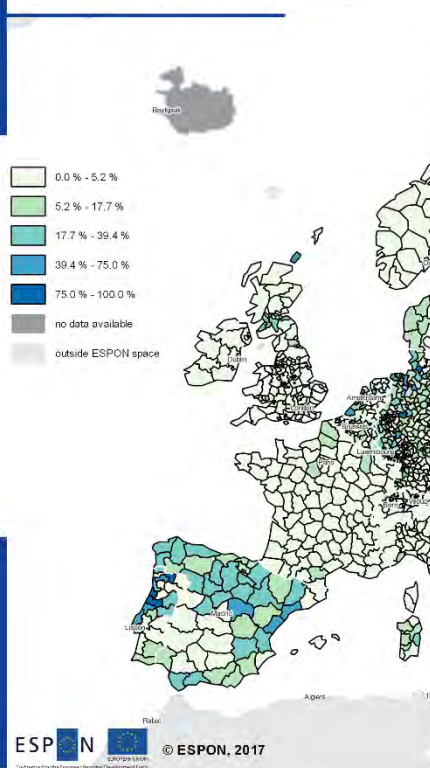
## **Selected results (4): Wind energy potentials**

# Wind onshore: potential, exploitation rate, growth 2002-2012

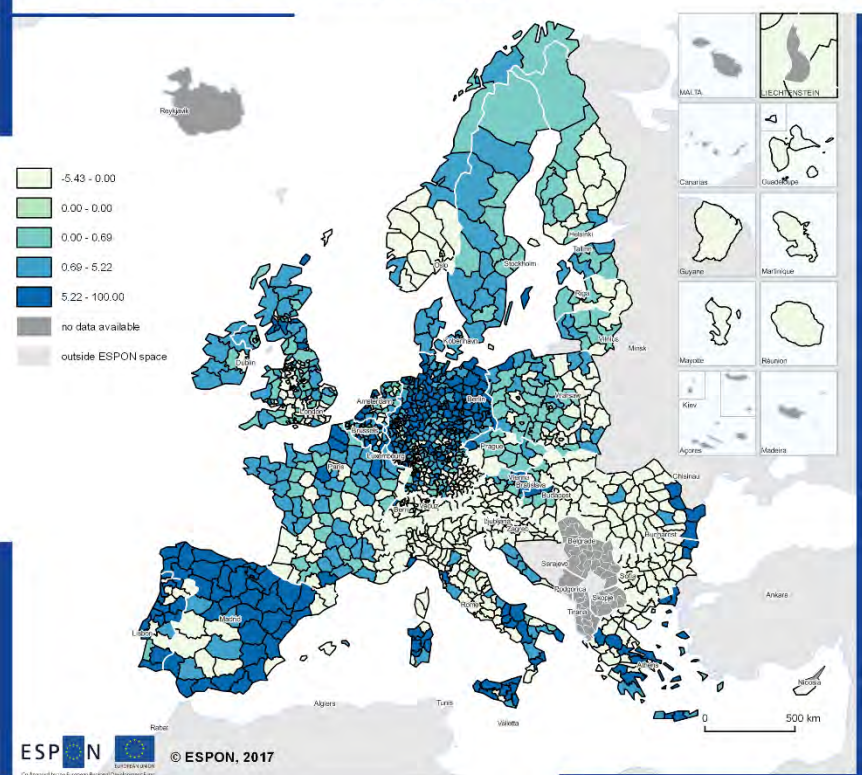
Wind onshore, potential for electricity generation, [MWh/km<sup>2</sup>]



Wind onshore, exploitation rate, 2012, [%]



Wind onshore, change in exploitation rate, 2012-2002, [pp]



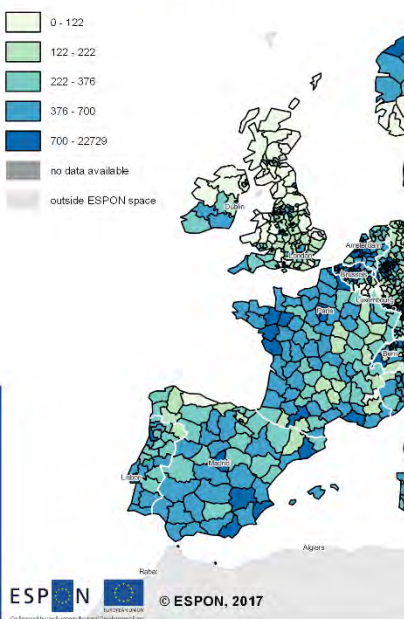
Regional level: NUTS 3 (version 2013)  
 Source: ESPON LOCATE, 2017  
 Origin of data: Eurostat 2016, own calculations  
 CC - UMS RIAT E for administrative boundaries

## **Selected results (5): PV potentials**

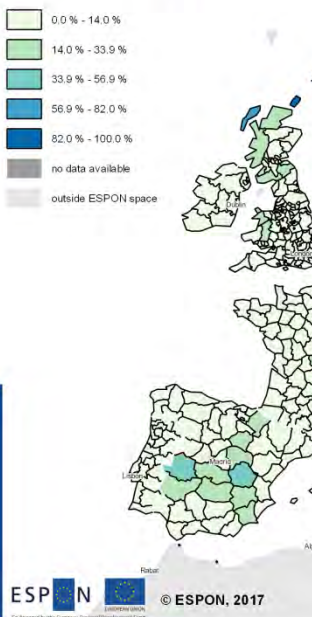


# PV: potential, exploitation rate, growth 2002-2012

PV, potential for electricity generation, [MWh/km<sup>2</sup>]



PV, exploitation rate, 2012, [%]



PV, exploitation rate, 2012-2002, [pp]



Regional level: NUTS 3 (version 2013)  
 Source: ESPON LOCAT E, 2017  
 Origin of data: Eurostat 2016, own calculations  
 CC - UMS RIAT E for administrative boundaries

# Summary

- ▶ Comprehensive data set is available on NUTS3 level
- ▶ Energy consumption of space heating and cooling are (amongst others) driven by
  - Climatic conditions (higher consumption in Central and Northern European Countries)
  - Energy performance of buildings (increasing from 2002-2012)
  - Economic wealth and resulting levels of energy services (increasing from 2002-2012 at least in some regions)
- ▶ Renewable energy potentials show considerable variances due to geographical and climatic differences. Regions with high wind energy potentials are in particular North Sea and Baltic Sea, Northern France, Germany, Netherlands, Denmark, United Kingdom, Poland as well as Southern regions of Scandinavia.
- ▶ The change in the exploitation of renewable energy potentials from 2002 to 2012 was mainly triggered by national policies.
- ▶ The qualitative analysis of case studies showed the power of building a narrative of political autonomy linked to the idea of energy self-sufficiency (in the analysed period).

# Thank you!

<https://www.espon.eu/low-carbon-economy>

Schremmer, C., Derszniak-Noirjean, M., Keringer, F., Koscher, R., Leiner, M., Mollay, U., Stifter, E., Tordy, J., Kranzl, L., Fallahnejad, M., Liebmann, L., Müller, A., Resch, G., Steinbach, J., Elsland, R., Kühn, A., Mayer, F., Pudlik, M., Schubert, G., Davoudi, S., Cowie, P., Gazzola, P., 2017. Territories and low-carbon economy (ESPON Locate).

