



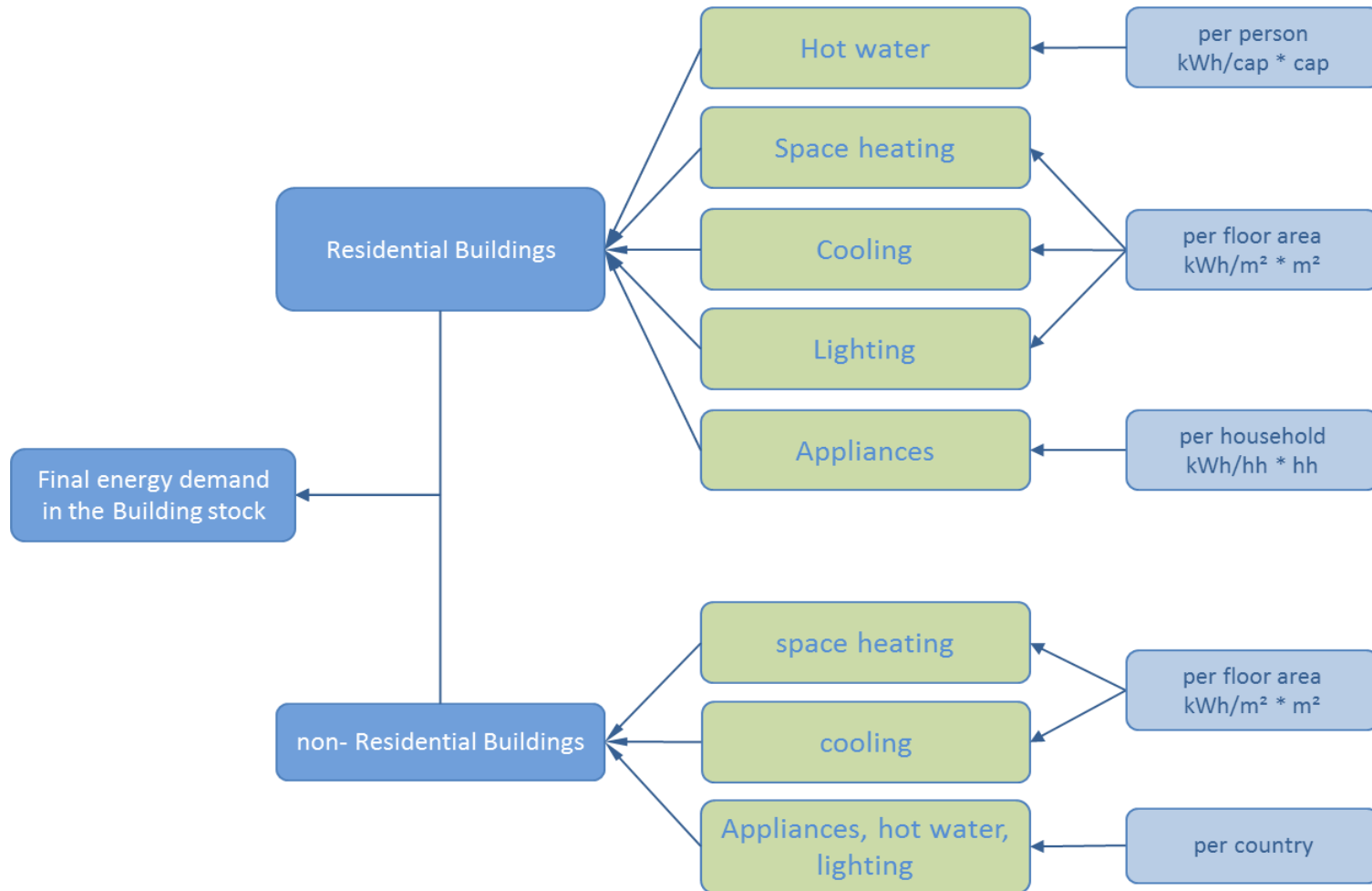
Explore sustainable European futures

The Building Module

Judit Kockat, BPIE

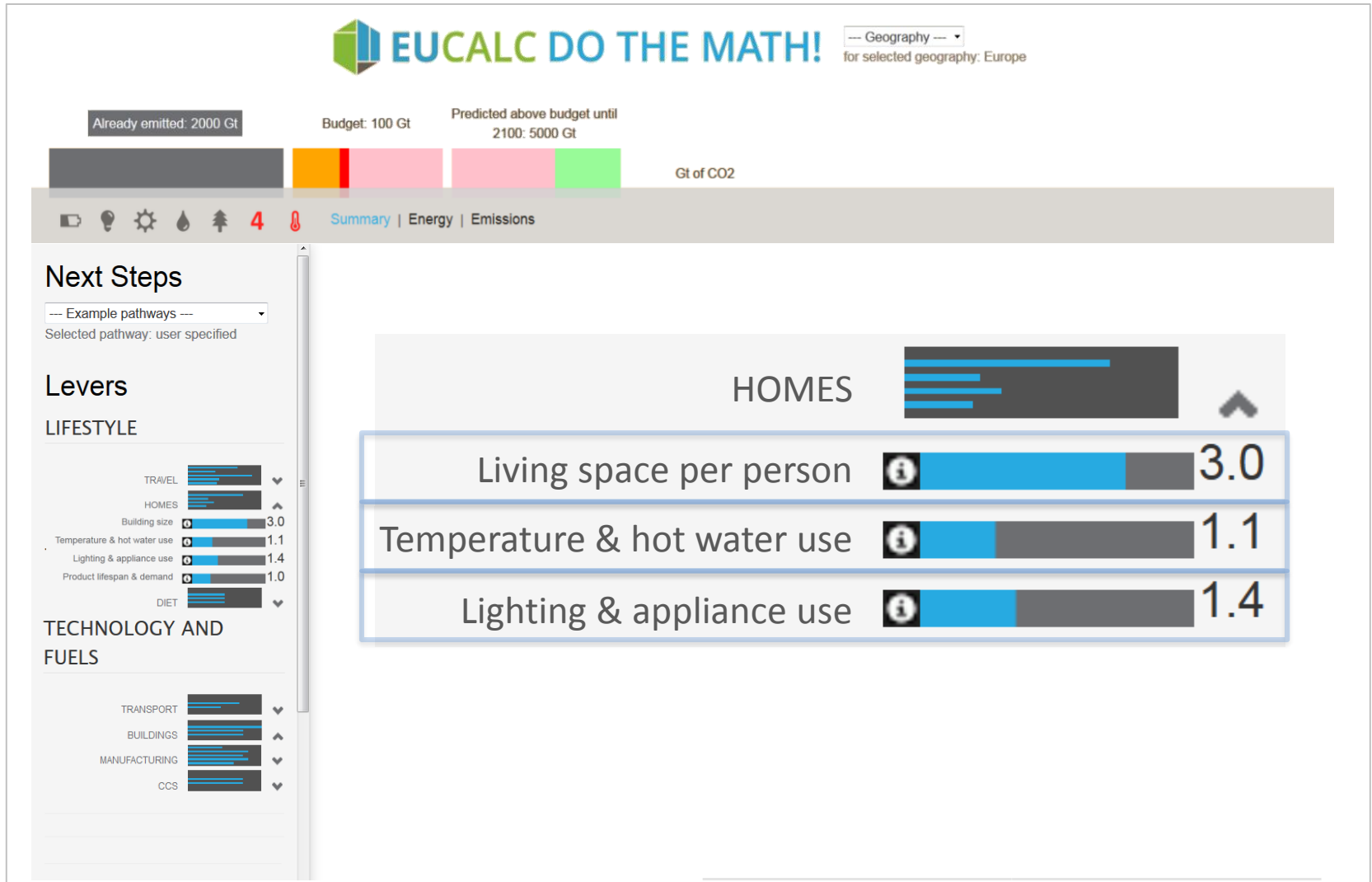
*June 4th 2018, Workshop on
Decarbonising European Buildings*

- ▣ Module approach
 - ▣ Levers
 - ▣ Levels of ambition
-



LEVERS

drivers of GHG emissions in
in Buildings



Already emitted: 2000 Gt

Budget: 100 Gt

Predicted above budget until
2100: 5000 Gt

Gt of CO2

Summary | Energy | Emissions

Next Steps

--- Example pathways ---

Selected pathway: user specified

Levers

LIFESTYLE

TRAVEL

HOMES

DIET

TECHNOLOGY AND

FUELS

TRANSPORT

BUILDINGS

Building insulation 4.0

Heating & cooling efficiency 3.0

Appliance & lighting efficiency 3.0

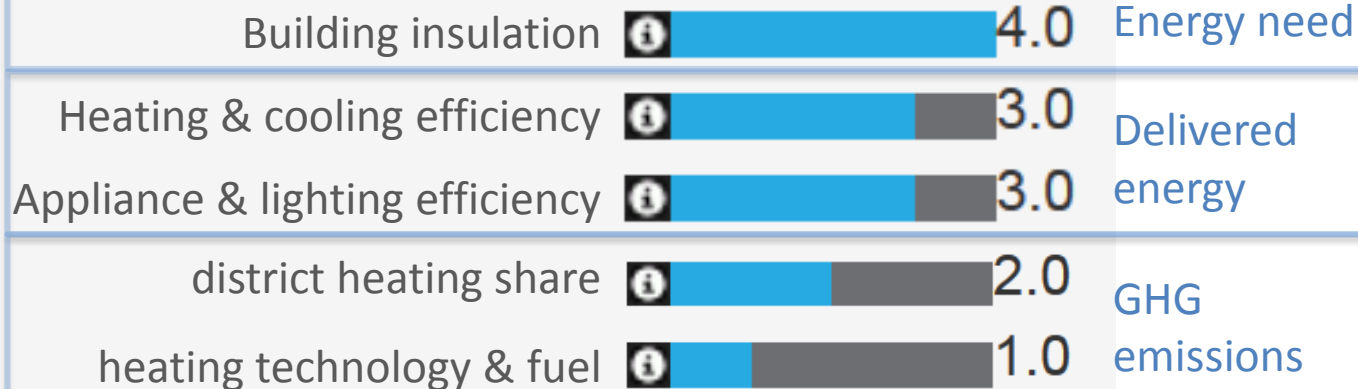
district heating share 2.0

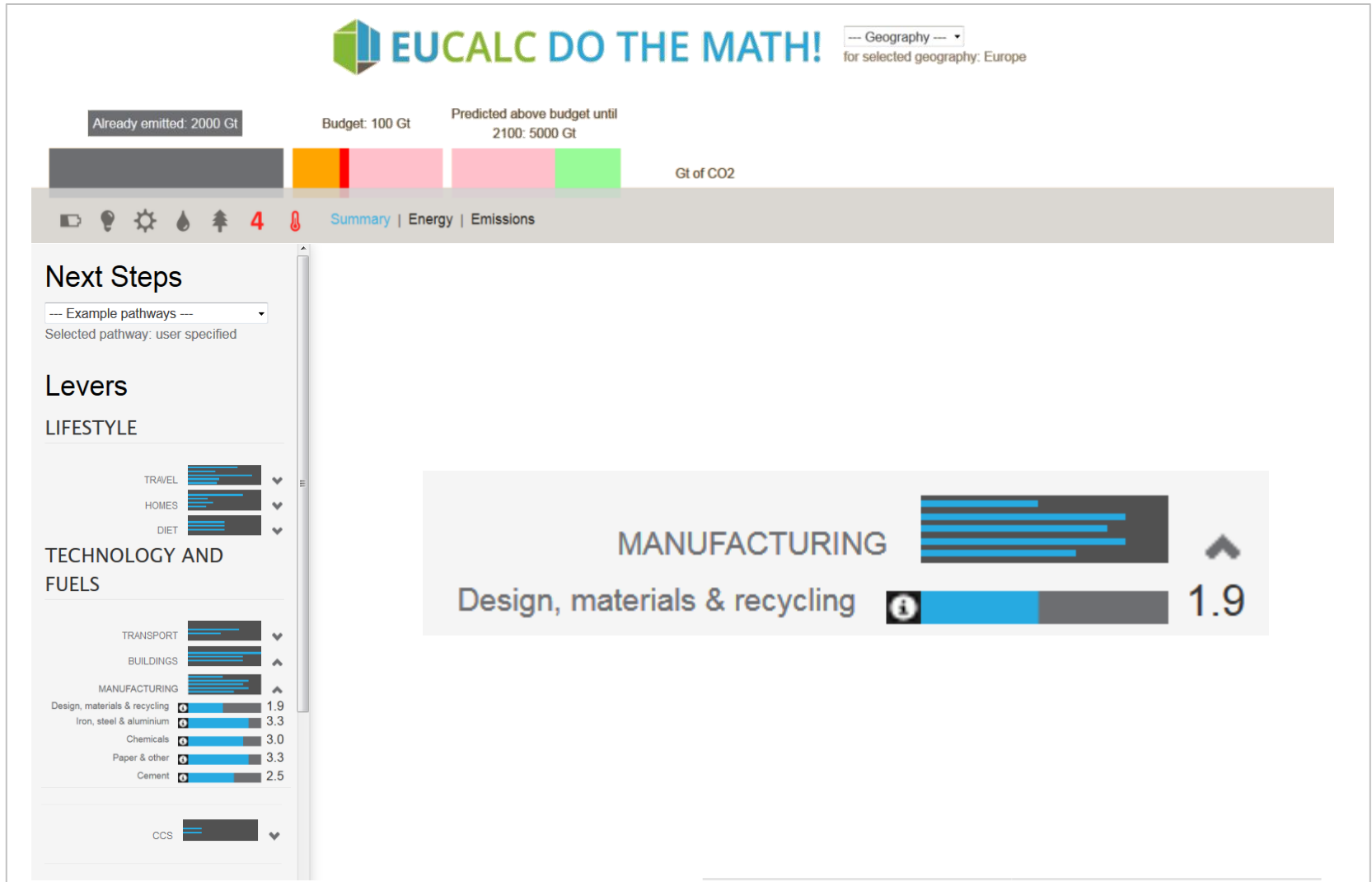
heating technology & fuel 1.0

MANUFACTURING

CCS

BUILDINGS

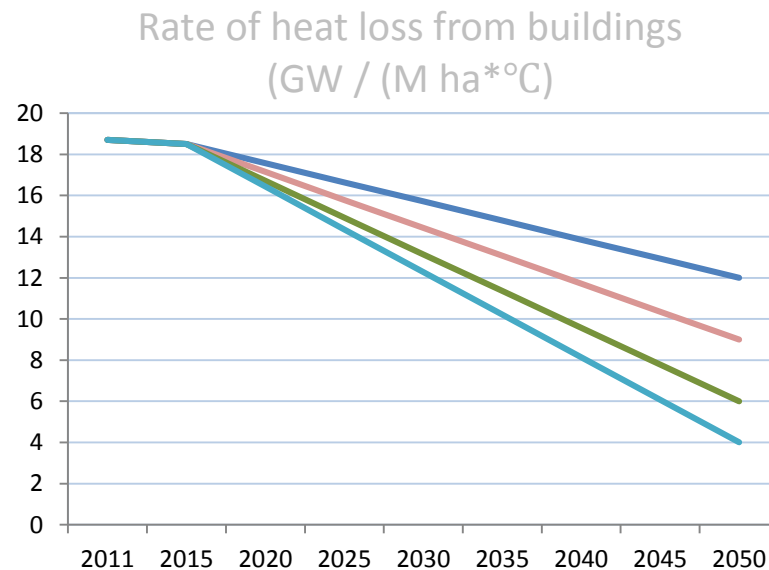




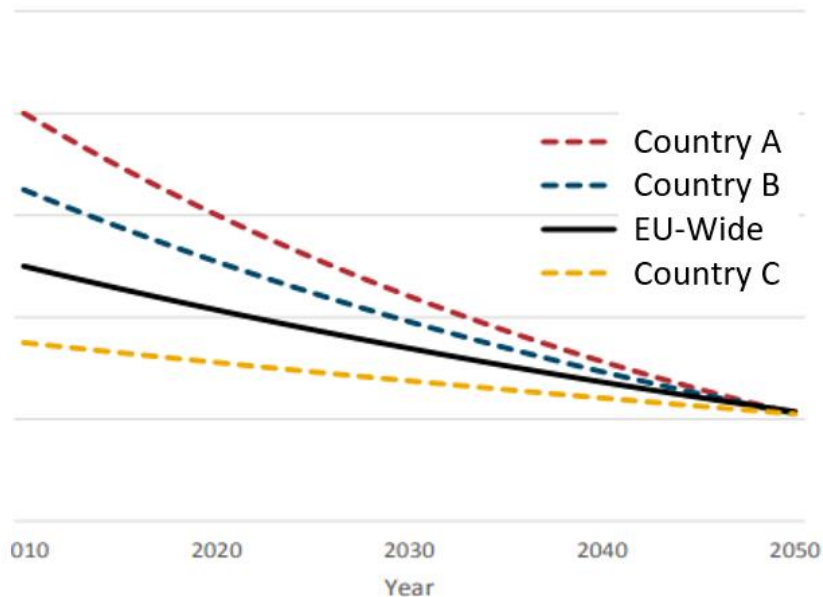
LEVELS OF AMBITION

defining the effort of measures
in Buildings and Homes

	Lever	Level 1	Level 2	Level 3	Level 4
2.	Building insulation - Through better insulation, the energy need of buildings improves by ... until 2050	29%	47%	64%.	76%.



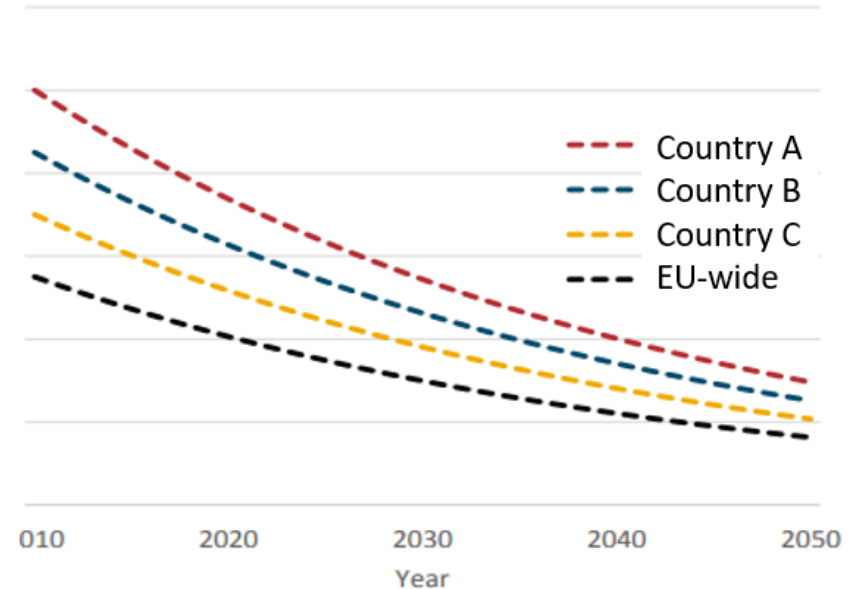
Convergence



Same *absolute* 2050 ambition
for all countries

(e.g. 50 kWh energy need/m² for single
family homes in 2050 in all countries)

Compression



Same *relative* 2050 ambition
for all countries

(e.g. -30% kWh electricity/year for one
appliance by 2050 vs 2015 in each country)

	Lever	Level 1	Level 2	Level 3	Level 4
2.	Building insulation - Through better insulation, the energy need of buildings improves by ... until 2050	29%	47%	64%.	76%.

Differences in Countries

- diverse building stocks and ownership
 - different energy mixes and infrastructures
 - various social and economical conditions
 - different climates
-

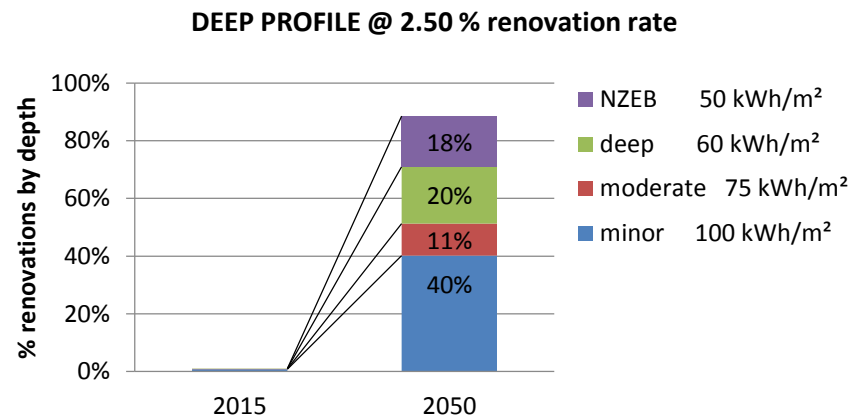
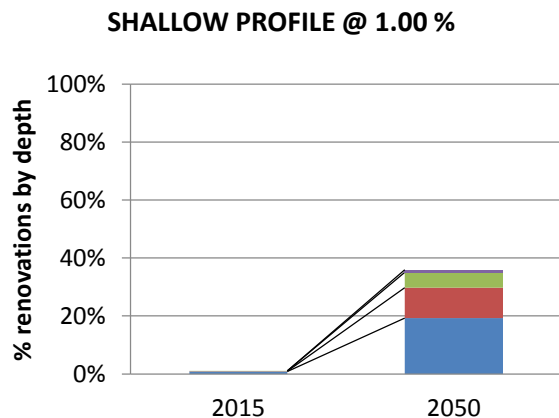


- Did we choose the right levers?
Are any levers missing?
 - Are our levels of ambition realistic?
-

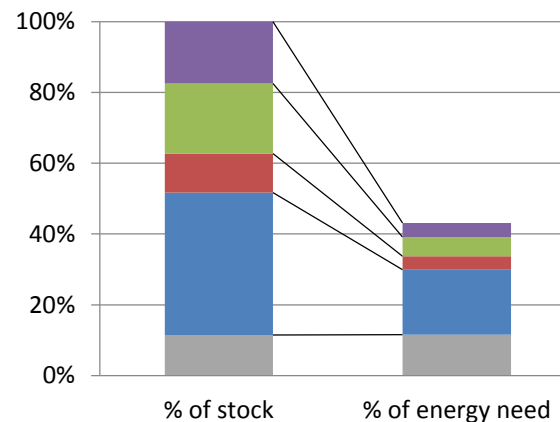
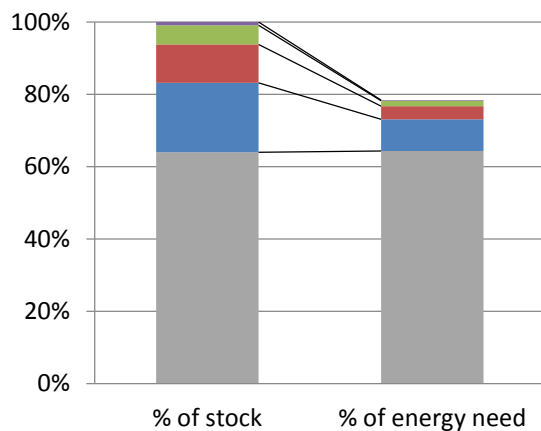
Any questions, data, unclarities, follow-up?

BRING THEM UP. THANK YOU.

Renovation shares for different ambition levels



energy shares for renovations of different ambition levels



	Lever	Level 1	Level 2	Level 3	Level 4
1.	Living space demand per person	55 m ²	45 m ²	40 m ²	39 m ²

How much space is enough?

Average residential floor space per capita in m²



Note: data for 2009 builds, * China figures urban only, assumes average national household size

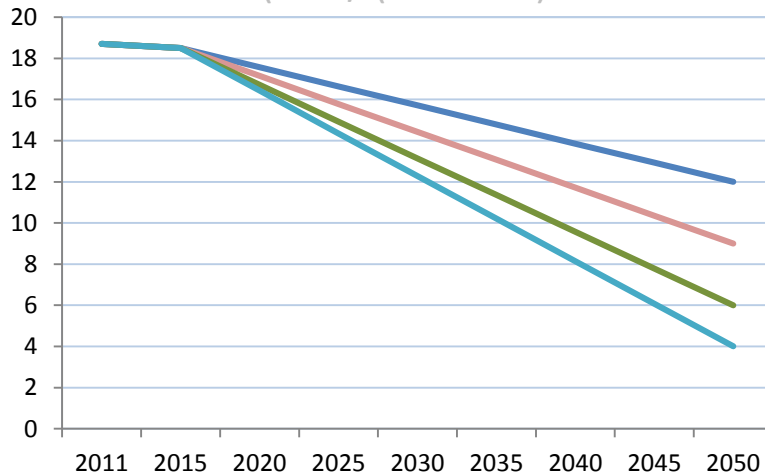
Sources: CommSec, RBA, UN, US Census

shrinkthatfootprint.com

	Lever	Level 1	Level 2	Level 3	Level 4
1.	Living space demand per person	42 m ²	41 m ²	40 m ²	39 m ²
3.	Indoor temperature and hot water demand	20°C in winter, 24°C in summer	19°C in winter, 25°C in summer	18°C in winter, 26°C in summer	17°C in winter, 27°C in summer
8.	Lighting, cooking and appliance use	6.3 large appliances (refrigerator, clothes washer and dryer, dishwasher and TV) and 5.0 small appliances (e.g. laptop, DVD player).	5.5 large appliances (refrigerator, clothes washer and dryer, dishwasher and TV) and 4.2 small appliances (e.g. laptop, DVD player).	4.9 large appliances (refrigerator, clothes washer and dryer, dishwasher and TV) and 3.6 small appliances (e.g. laptop, DVD player).	4.1 large appliances (refrigerator, clothes washer and dryer, dishwasher and TV) and 3.0 small appliances (e.g. laptop, DVD player).

Lever	Level 1	Level 2	Level 3	Level 4
2. Building insulation - Through better insulation, thermal performance of urban residential buildings improves by ...	29%	47%	64%.	76%.

Rate of heat loss from buildings
(GW / (M ha*°C))

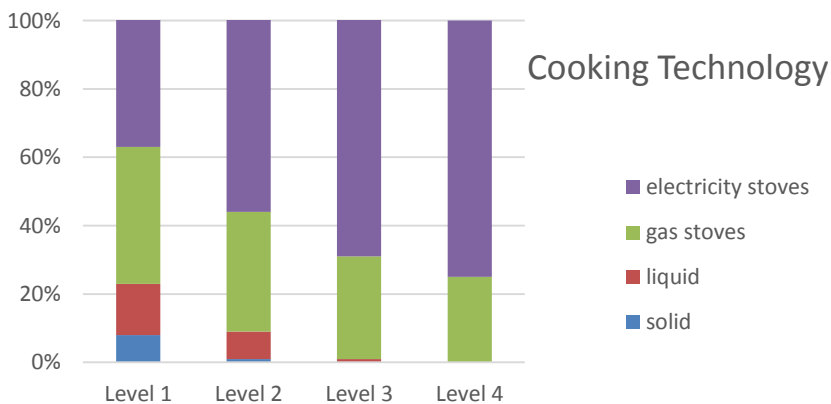
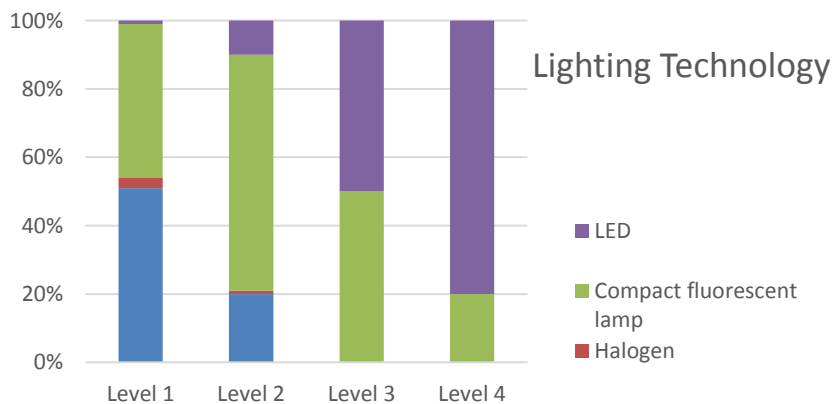


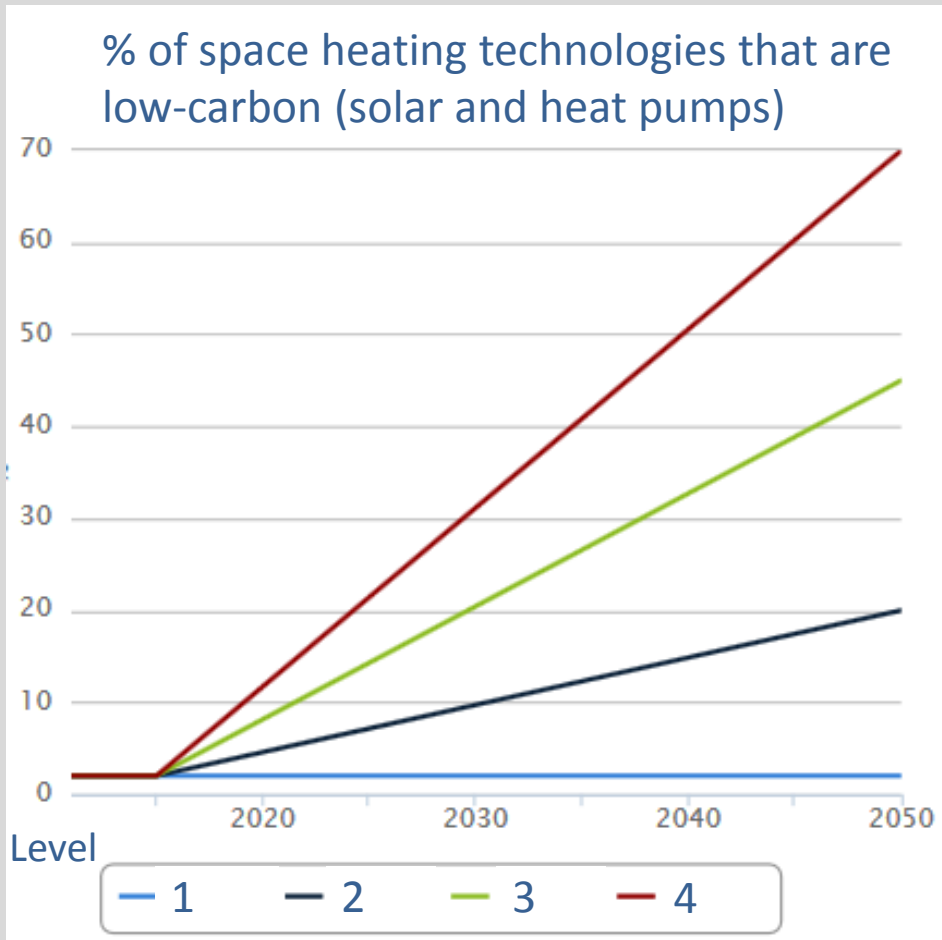
Differences in Countries

- diverse building stocks and ownership
- different energy mixes and infrastructures
- various social and economical conditions
- different climates

	Lever	Level 1	Level 2	Level 3	Level 4
5.	Heating and cooling system efficiency				
	solid boilers	50%	65%	80%	90%
	liquid boilers	75%	80%	90%	96%
	gas boilers	80%	100%	150%	200%
	heat pumps	200%	300%	400%	500%
	electricity heater	100%	100%	100%	100%
	solar	50%	60%	70%	80%
	Micro chp	50%	60%	65%	70%
	District heating	56%	70%	80%	90%

Lever	Level 1	Level 2	Level 3	Level 4
8. Appliance and lighting efficiency				
Refridgerator	82%	68%	61%	52%
Dishwasher	79%	71%	63%	50%
Clothwasher	80%	68%	60%	52%
Clothdryher	88%	79%	70%	62%
TV	97%	83%	77%	70%



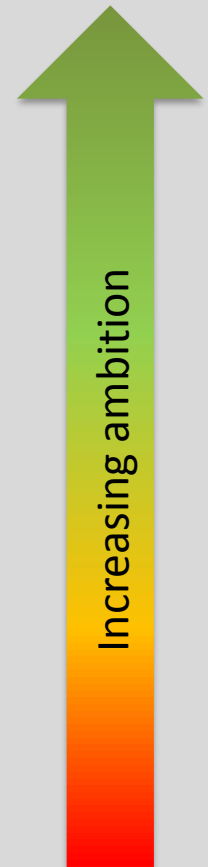


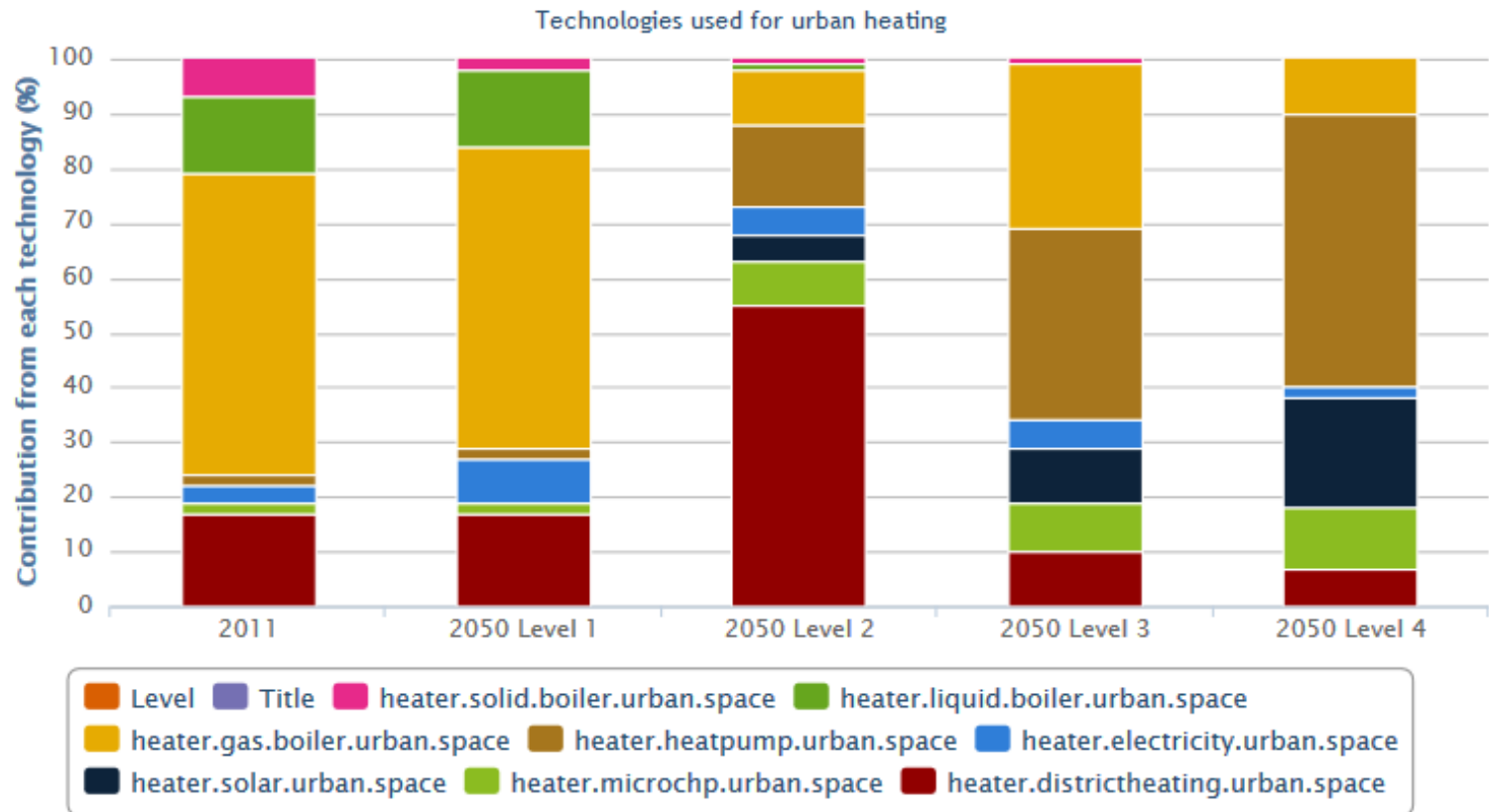
Level 4
70% of space heating
20% of cooling

Level 3
45% of space heating
15% of cooling

Level 2
20% of space heating
10% of cooling

Level 1
2% of space heating
5% of cooling





	Lever	Brief description
1.	Living space demand per person	This lever controls the average living space per person.
3.	Indoor temperature and hot water demand	This lever controls the average room temperature during warm and cold times of the year, and also controls the hot water demand per person per year.
8.	Lighting, cooking and appliance use	This lever controls the average number of appliances per urban and rural household. It also controls average cooking and lighting demand.

	Lever	Brief description	
2.	Building insulation	This lever controls the average heat loss which is reduced by insulation and affects the energy need per floor area.	Energy need
5.	Heating and cooling system efficiency	This lever controls the average energy loss in heating, cooling and ventilation systems.	Delivered energy
8.	Lighting, cooking and appliance efficiency	This lever controls the average rate of energy use for appliances, cooking and lighting.	
7.	Heating technology and fuel switch	This lever controls the mix of technologies used for space heating, space cooling, hot water, cooking and lighting.	GHG emissions
6.	District heating share	This lever controls the level of heating energy demand covered by district heating.	

	Lever	Brief description
2.	Material use	This lever controls - among other sectors' material use - the material used to construct or insulate a building and manufacture the HVAC systems.
