#UKPHC19

Passivhaus 2030 Roadmap: responding to the climate emergency

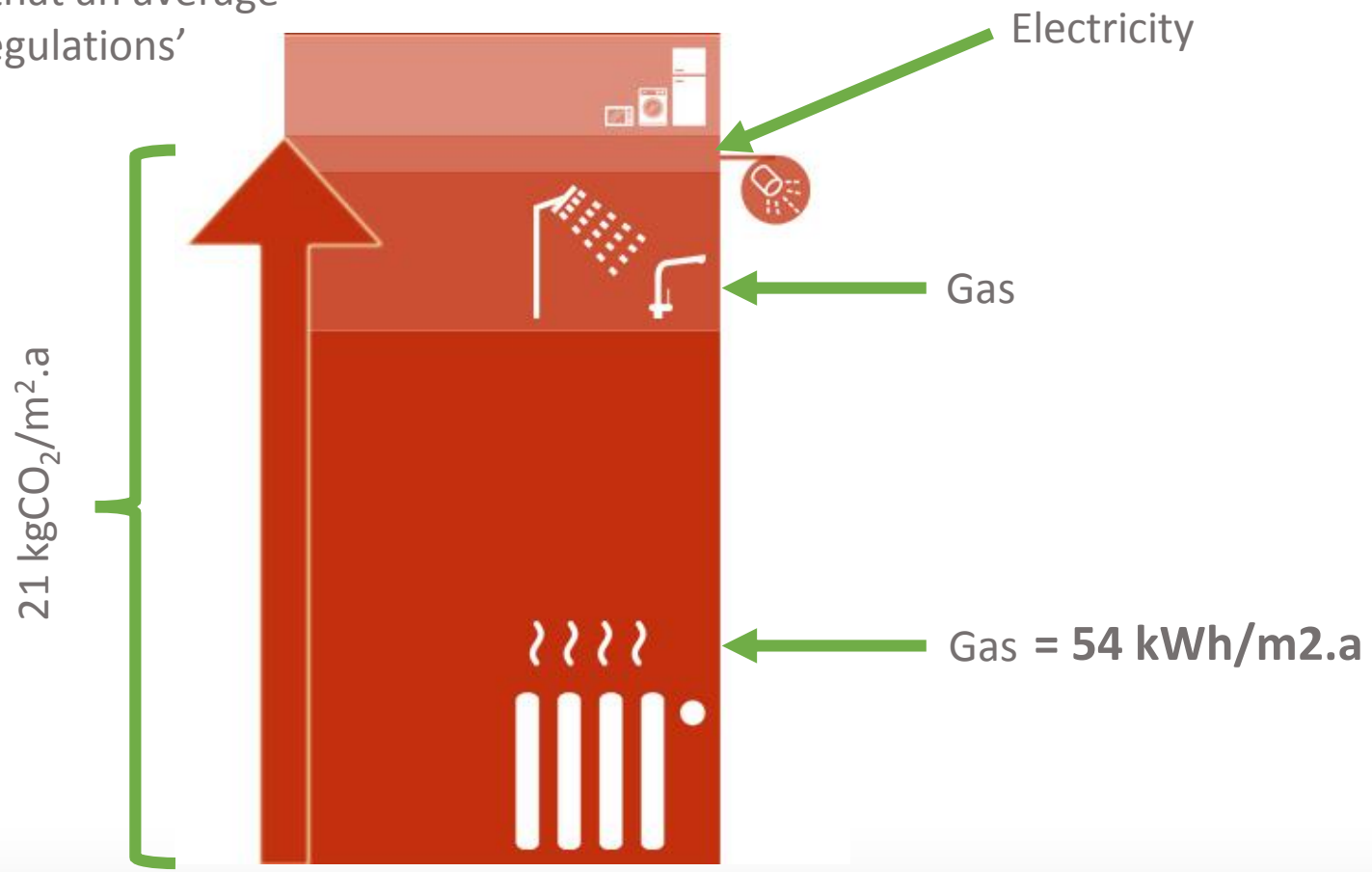
John Palmer

Passivhaus 2030 Roadmap

- Where are we coming from and where do we want to get to?
- What are the challenges?
- How could we get there?

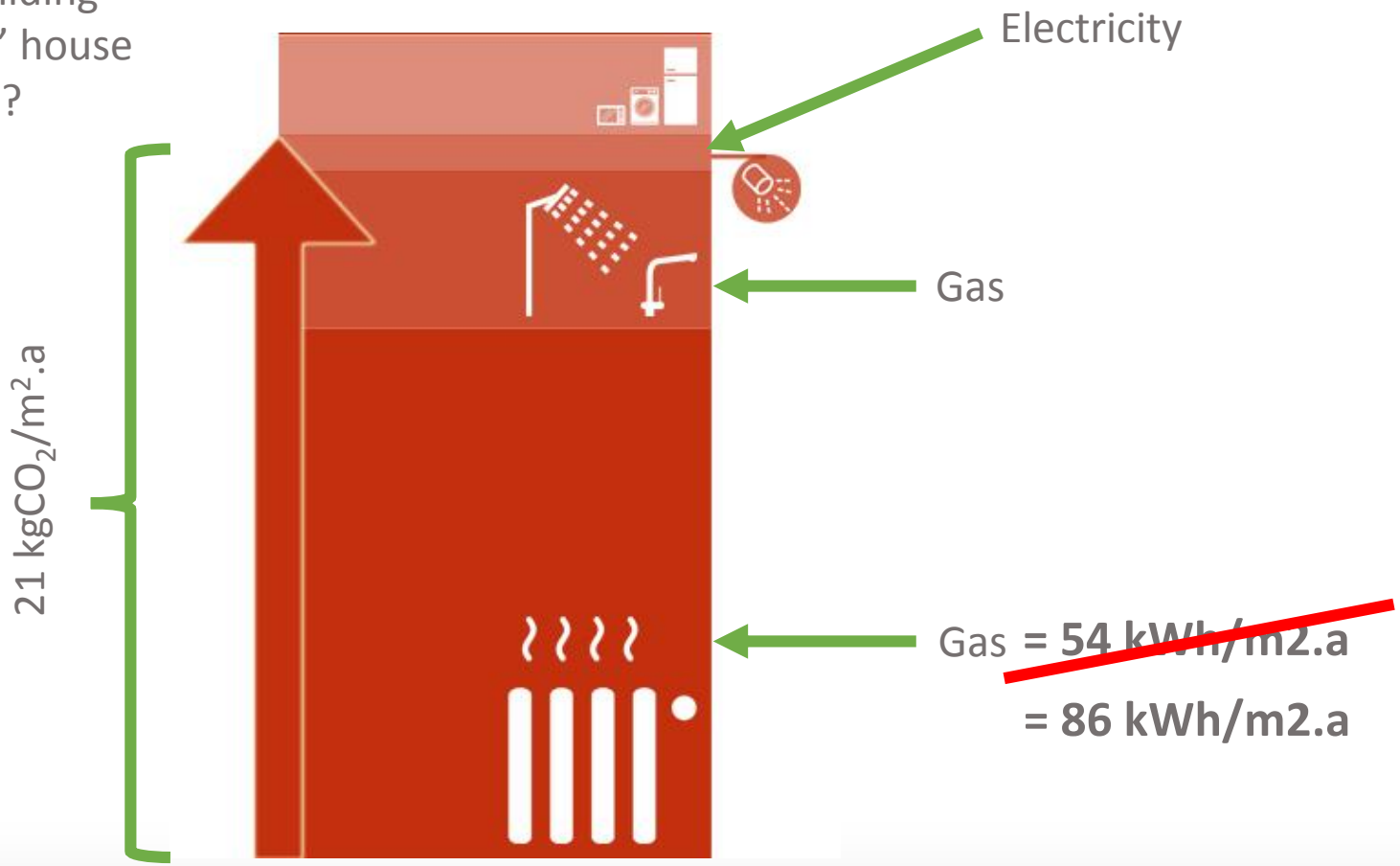
Where are we coming from?

How much energy does SAP tell us that an average 'Building Regulations' house use?



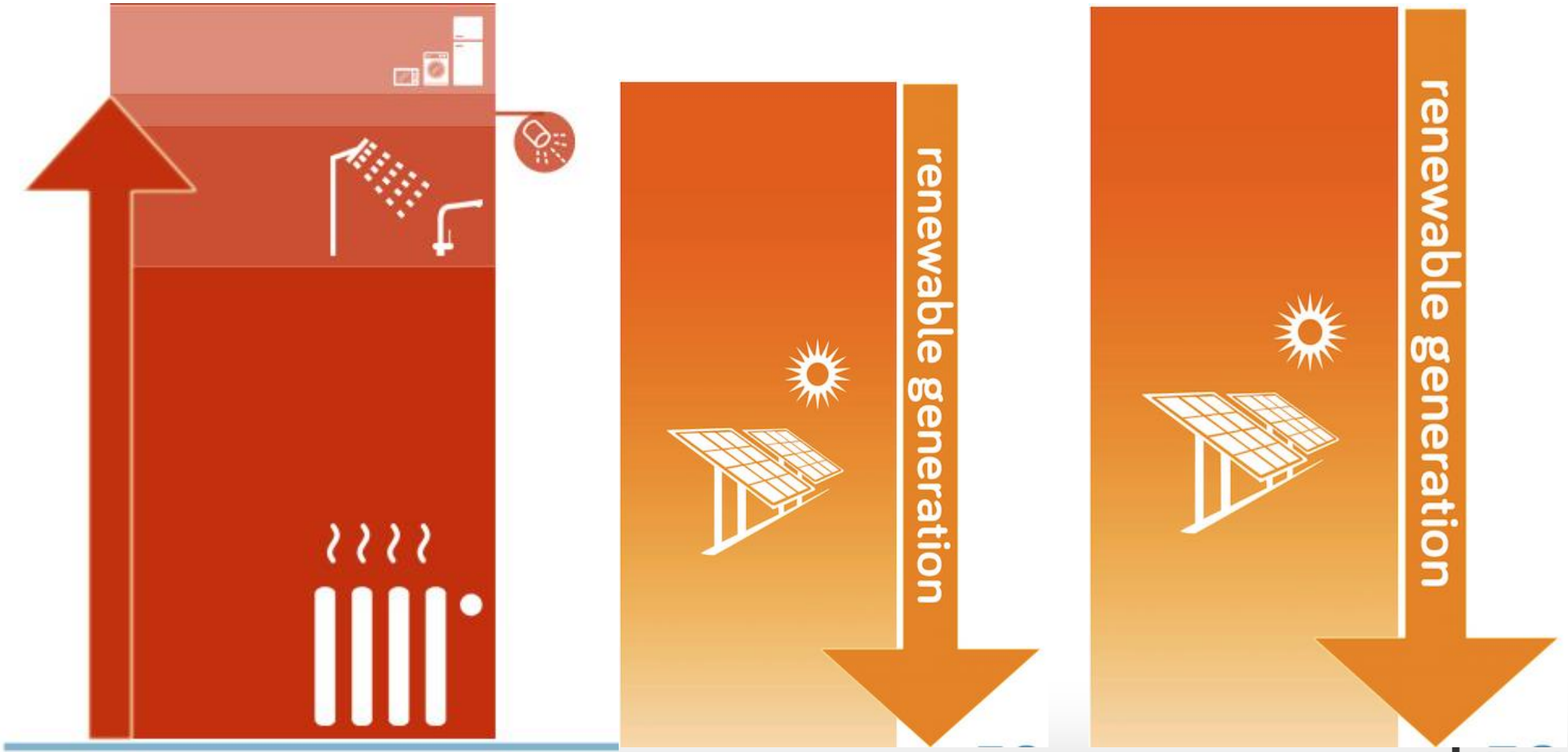
Where are we coming from?

How much energy does an average 'Building Regulations' house actually use?



Where do we want to get to?

Zero Carbon?



Passivhaus 2030 Roadmap

- Where are we coming from and where do we want to get to?
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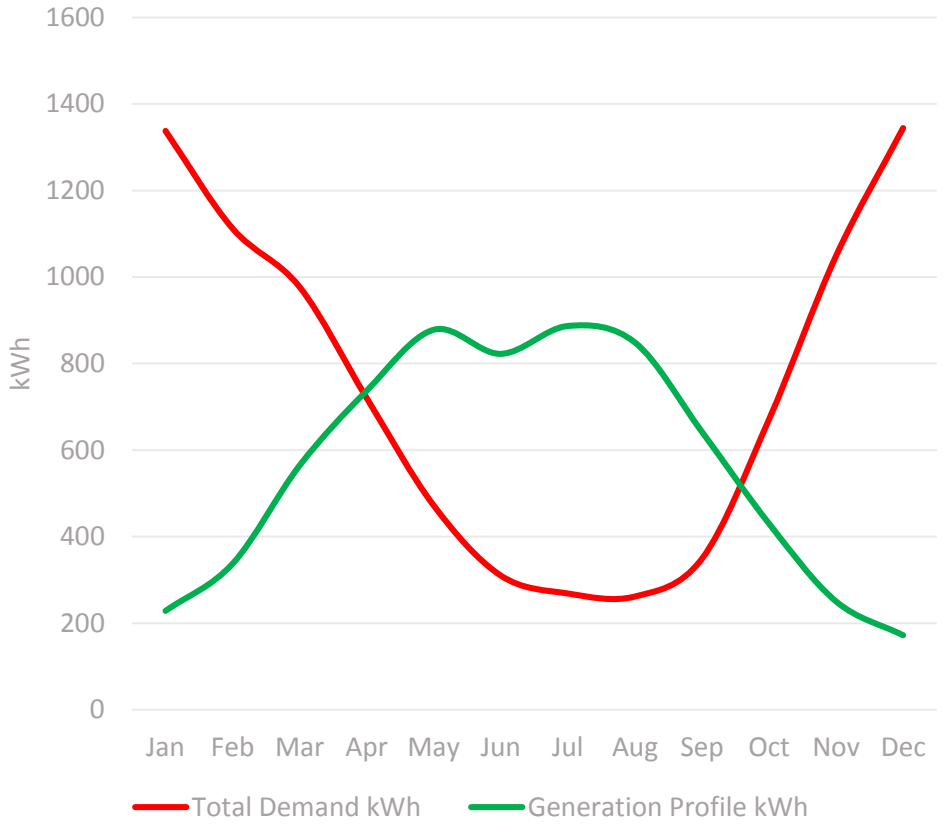
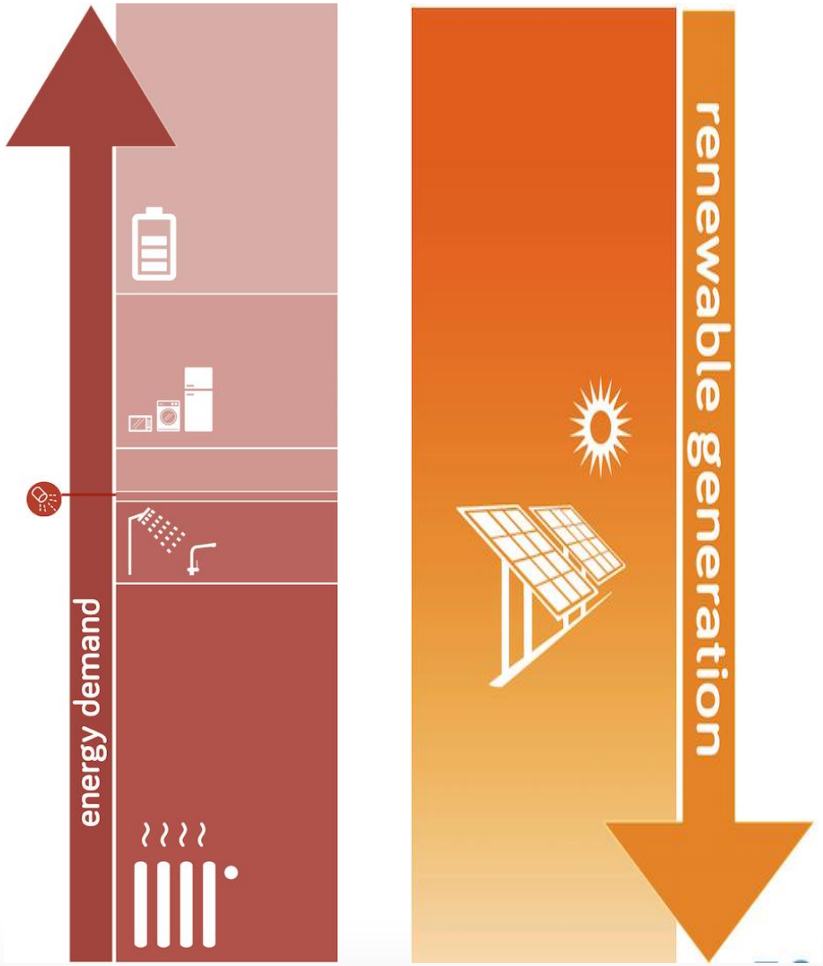
Challenges

- Renewable energy doesn’t always come when you want it
- Grid loading and decarbonisation
- How much renewable energy is there?

The problem with renewables …



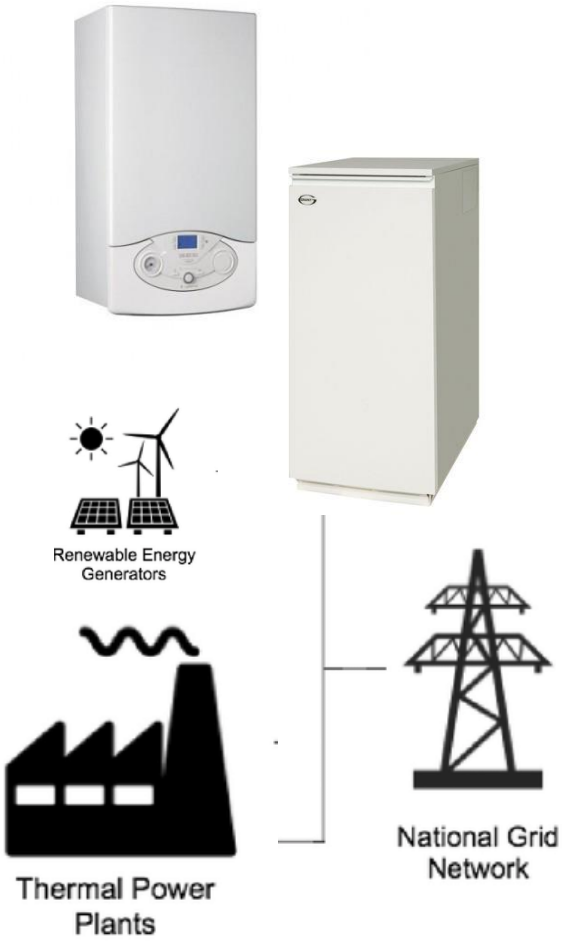
So real net zero is …

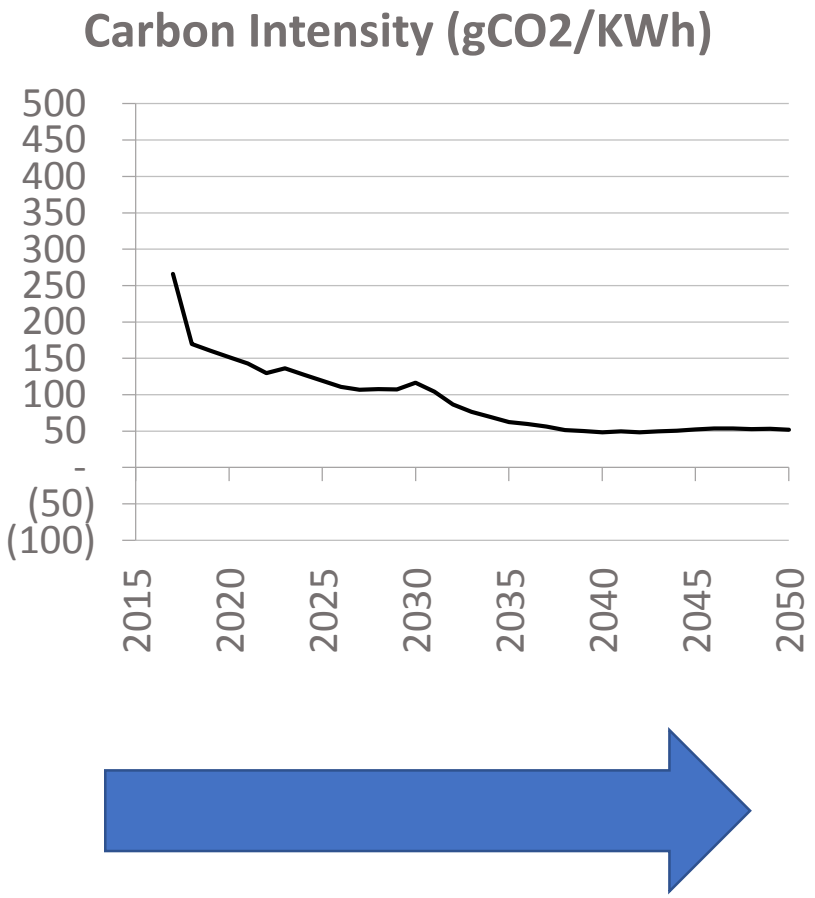


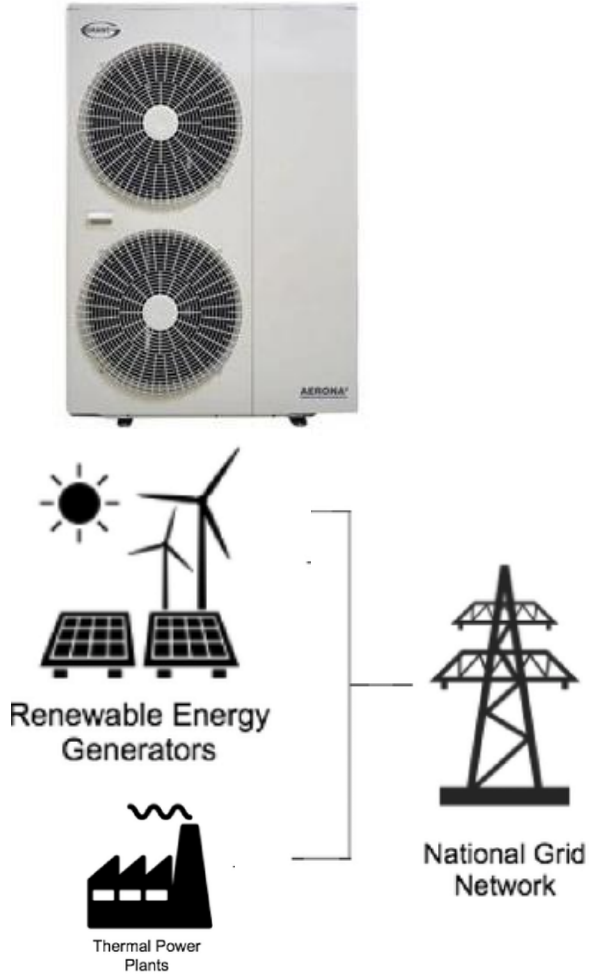
How much renewable energy?

Achievable?

So let's just decarbonise the grid …



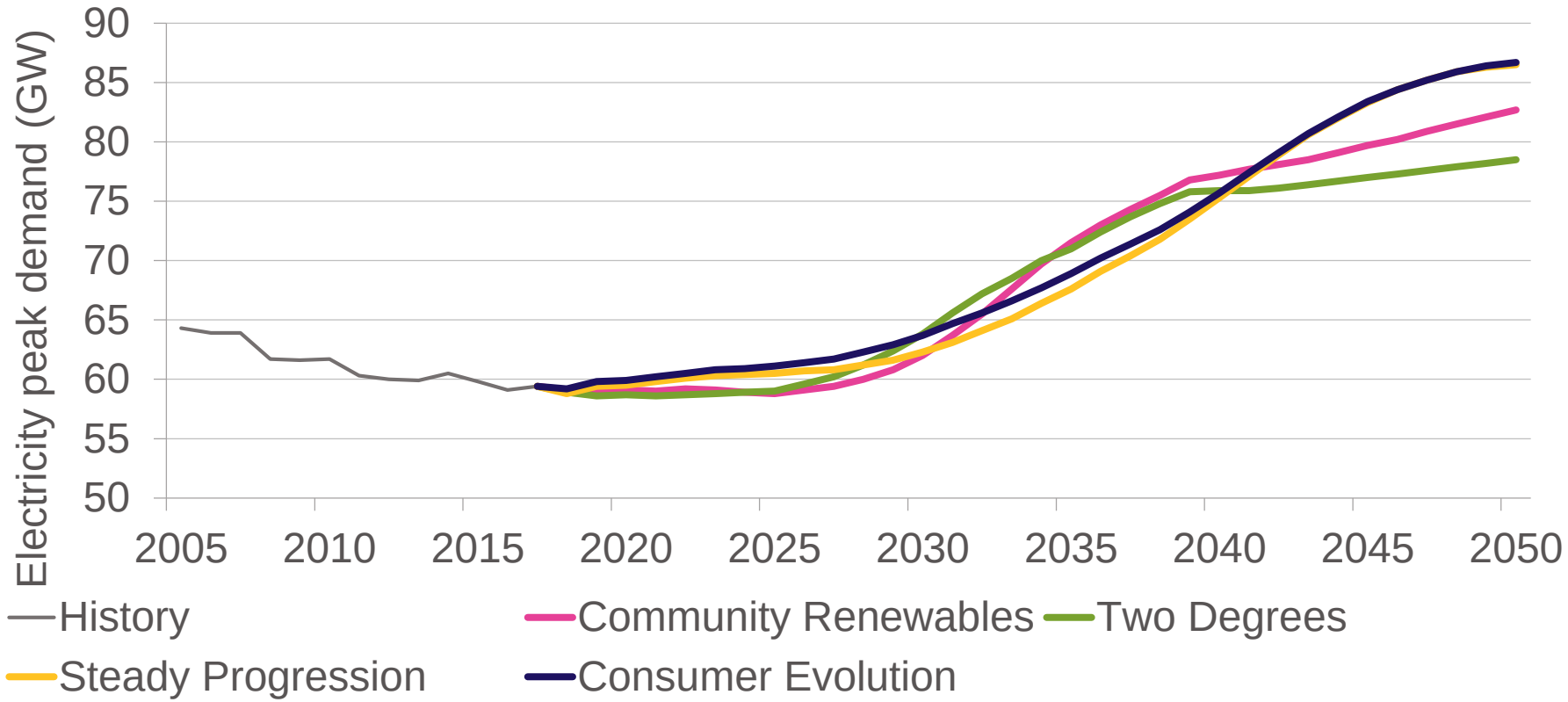




So let's just decarbonise the grid …

- 26M Homes in the UK – most heated by gas or oil
- Need to move many of these to use electricity for both to be able to capitalize on grid decarbonization …
- The rest … low carbon heat?
- That's a huge additional load on the grid …
- E.g. 5kW additional load per household is up to an additional 130GW … is that a lot?

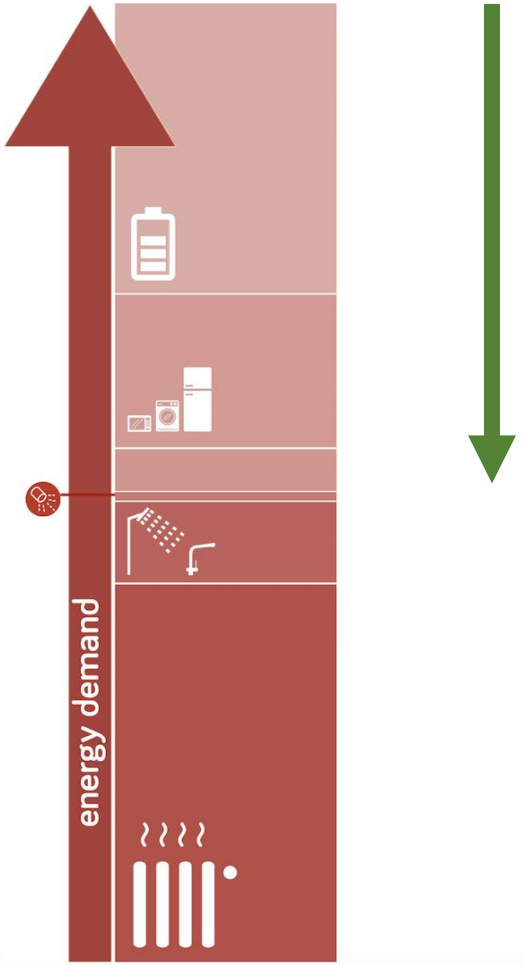
So let's just decarbonise the grid …



… just relying on grid decarbonization would require a massive increase in grid peak load capacity

Source: National Grid Future Energy Scenarios, July 2018, Chart 4.2

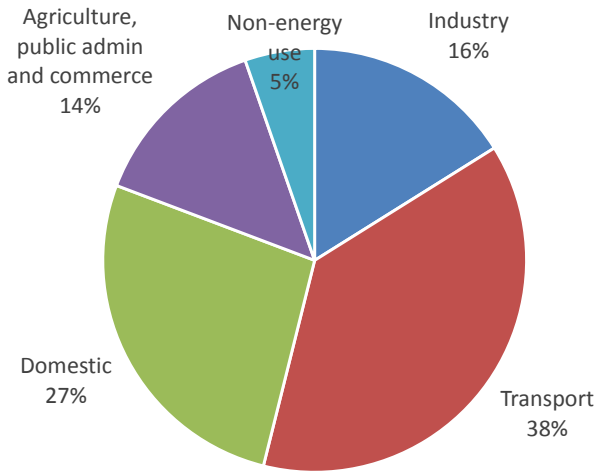
So we need to minimise load …

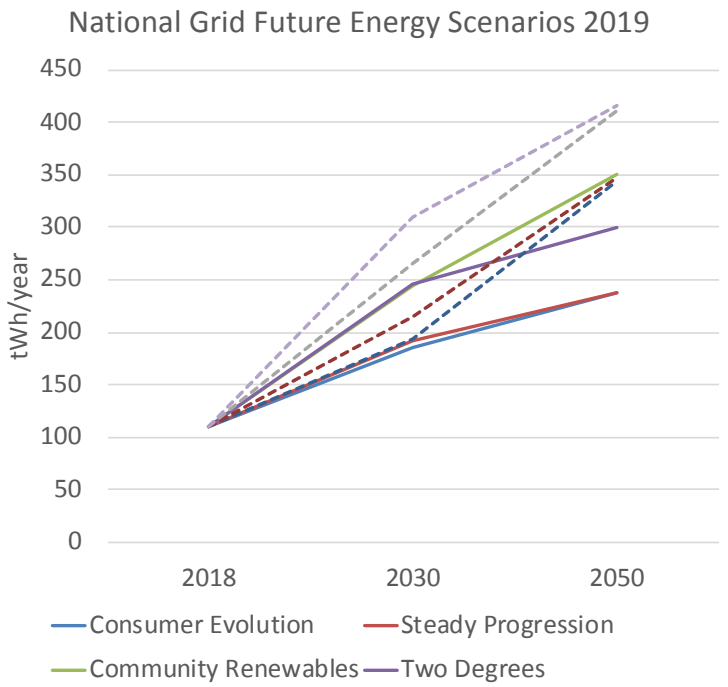


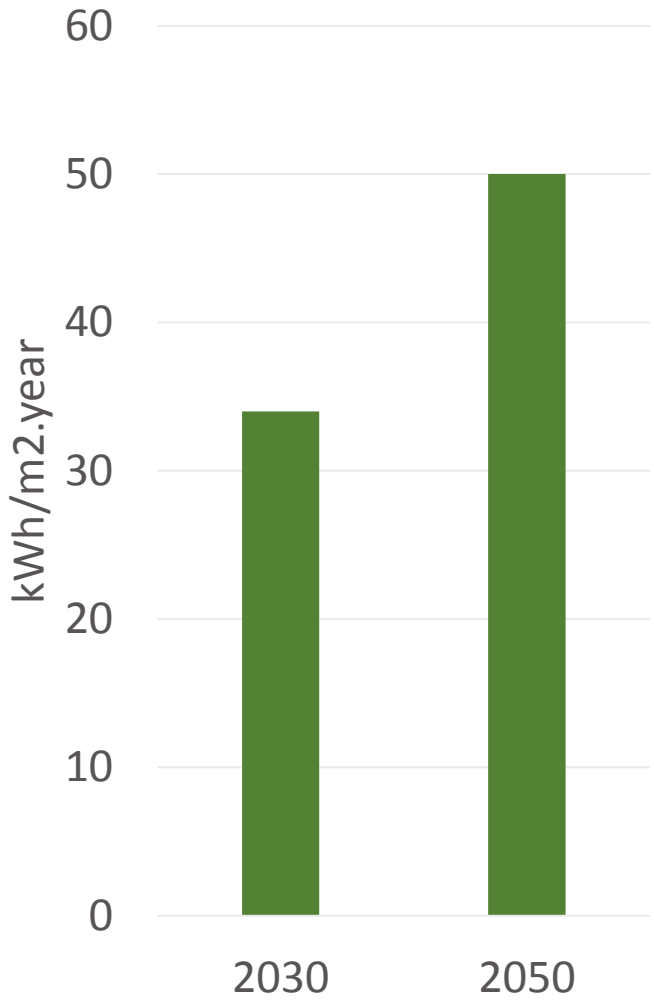
Available Renewable Energy

Best scenario, plus nuclear:
310 tWh in 2030, 416 tWh in 2050

Domestic dwellings - 27% of generation







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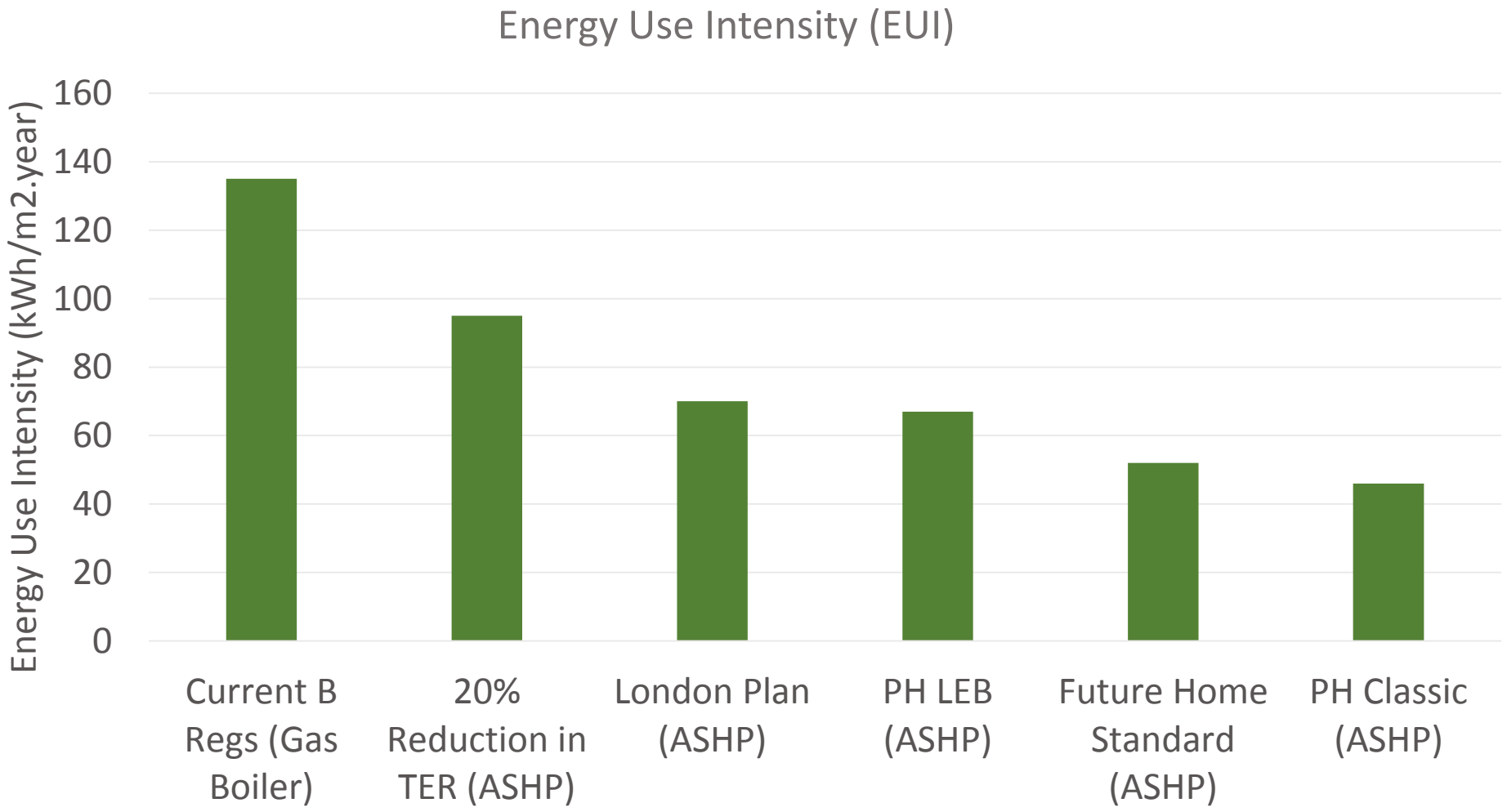
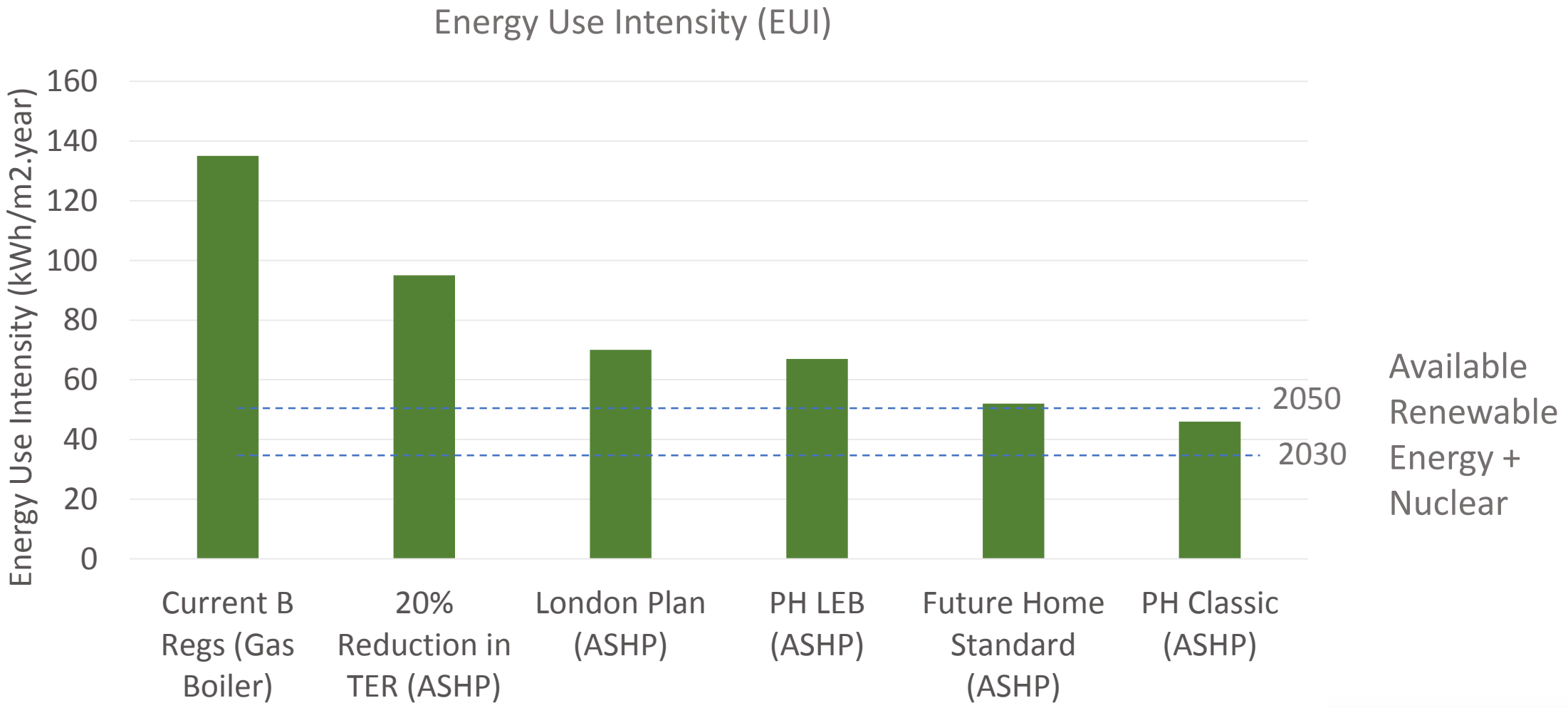
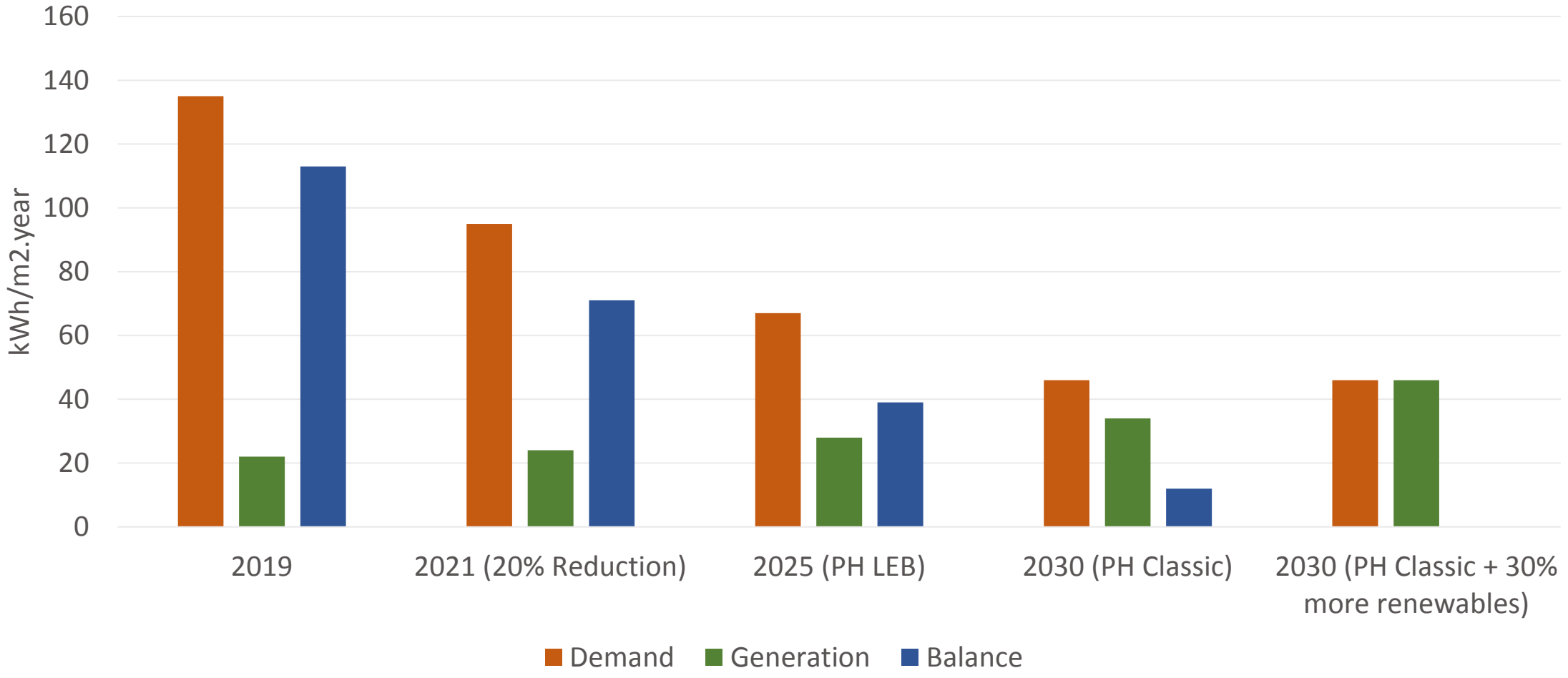
How could we get there?



How could we get there?



Getting to 2030 …

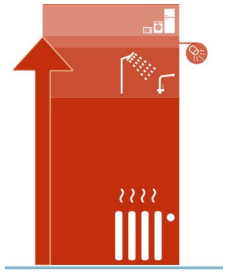


What does that look like?

	Baseline	2021 (20% TER)	2025 Option A (London Plan)	2025 Option B PH LEB	2030 (PH Classic)
Airtightness (ACH@50Pa)	5	1.5	1	1	0.6
Fabric Performance Gap (%)	60	60	60	20	0
Average u-value	0.17	0.14	0.15	0.15	0.14
Glazing	Double	Double	Triple	Triple	Triple
Ventilation Strategy	Natural	Natural	MVHR	MVHR	MVHR
Thermal Bridges	Typical	Typical	Improved	Good	Good
Form Factor	Typical	Typical	Typical	Improved	Improved
Glazing Proportion	Typical	Typical	Typical	Optimised	Optimised
Domestic Hot Water Design	Typical	Typical	Improved	Good	Good

So … to summarise

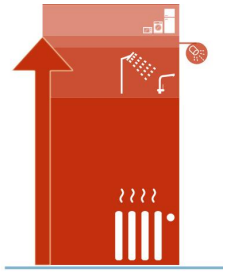
- To have any chance of getting to Zero, we need to build to high levels of fabric efficiency - Passivhaus … or beyond?
- The Performance Gap remains a challenge that we haven't dealt with
- Maximise renewable generation – we need more than we're planning for 2030 …
- Grid decarbonization will help … but we need to minimize and spread the load



… and how do we get there …

- “Passivhaus is coming …”
- Performance gap … skills, technology and supply chains
- Need to give the industry time

- 2020: Clear signals from government setting out trajectory
- 2020-2025: Build experience and volume of Passivhaus
- 2025-2030: Passivhaus fabric targets on all projects
- 2030: Full Quality Assured Passivhaus plus renewables



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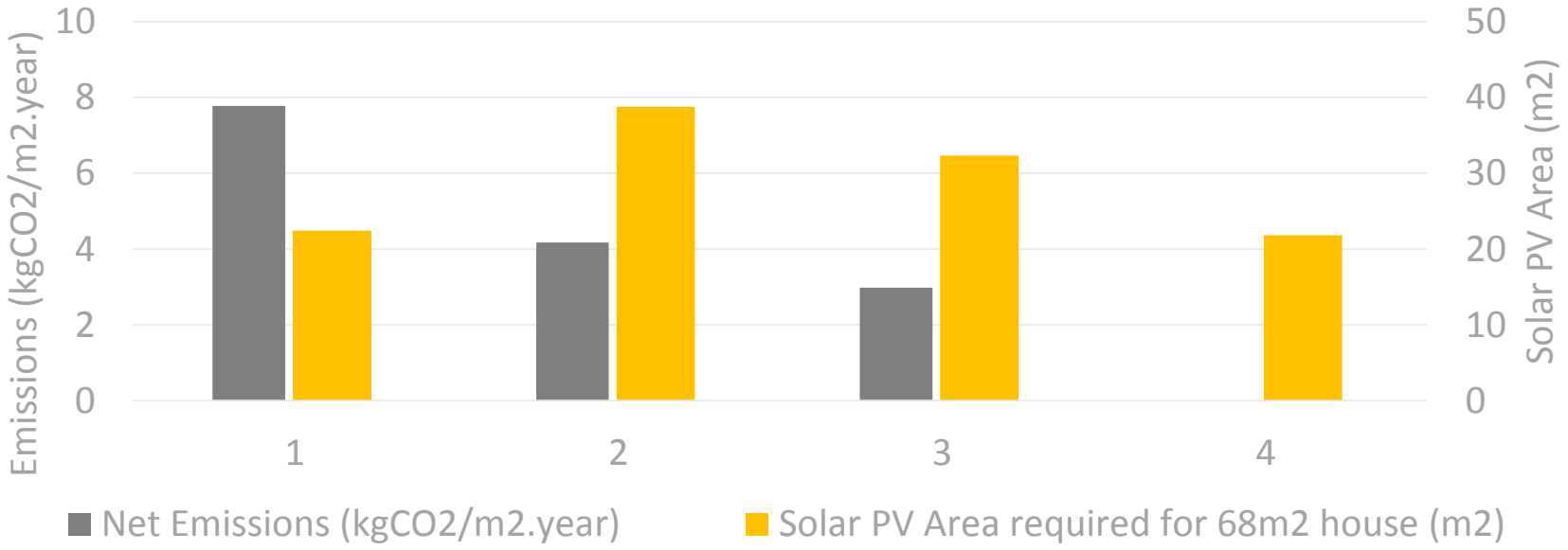
Thank you…

Ignoring the Performance Gap …



Scenario 1	Current situation – existing carbon factors, assuming a gas boiler and including the performance gap. Renewable energy sufficient to offset all energy.
Scenario 2	2020 Carbon Factors with an ASHP and renewable energy sufficient to offset all energy including storage losses.
Scenario 3	2020 Carbon Factors with an ASHP, but with Part L requiring a further 20% reduction in TER. Renewable energy sufficient to offset all energy including storage losses.
Scenario 4	Passivhaus with ASHP and sufficient generation to offset all energy including storage losses.