

New Zealand's energy efficiency and sustainability in the built environment

A presentation by Tina Schirr
Senior Policy Advisor - Energy and Innovation
BusinessNZ Energy Council (BEC)
[www.bec.org.nz]

 @BusNZEnergy @TinaSchirr

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What I would like to discuss today

1 A brief introduction

2 Why bother?

3 New Zealand a comparison

4 Greater energy efficiency outcomes

01

**A brief
introduction**

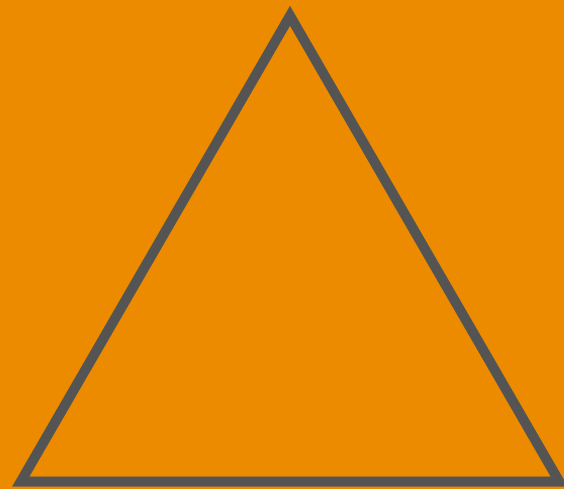
Who are we?



VIDEO: World Energy Council Introduction, <https://www.youtube.com/watch?v=a4sp3L8kYI0>



What are our flagships?



**ENERGY
TRILEMMA**



**ENERGY
ISSUES**



**ENERGY
SCENARIOS**

02

Why bother?

What are the benefits of energy efficient and sustainable buildings?

New Zealand
lower carbon footprint
increased productivity

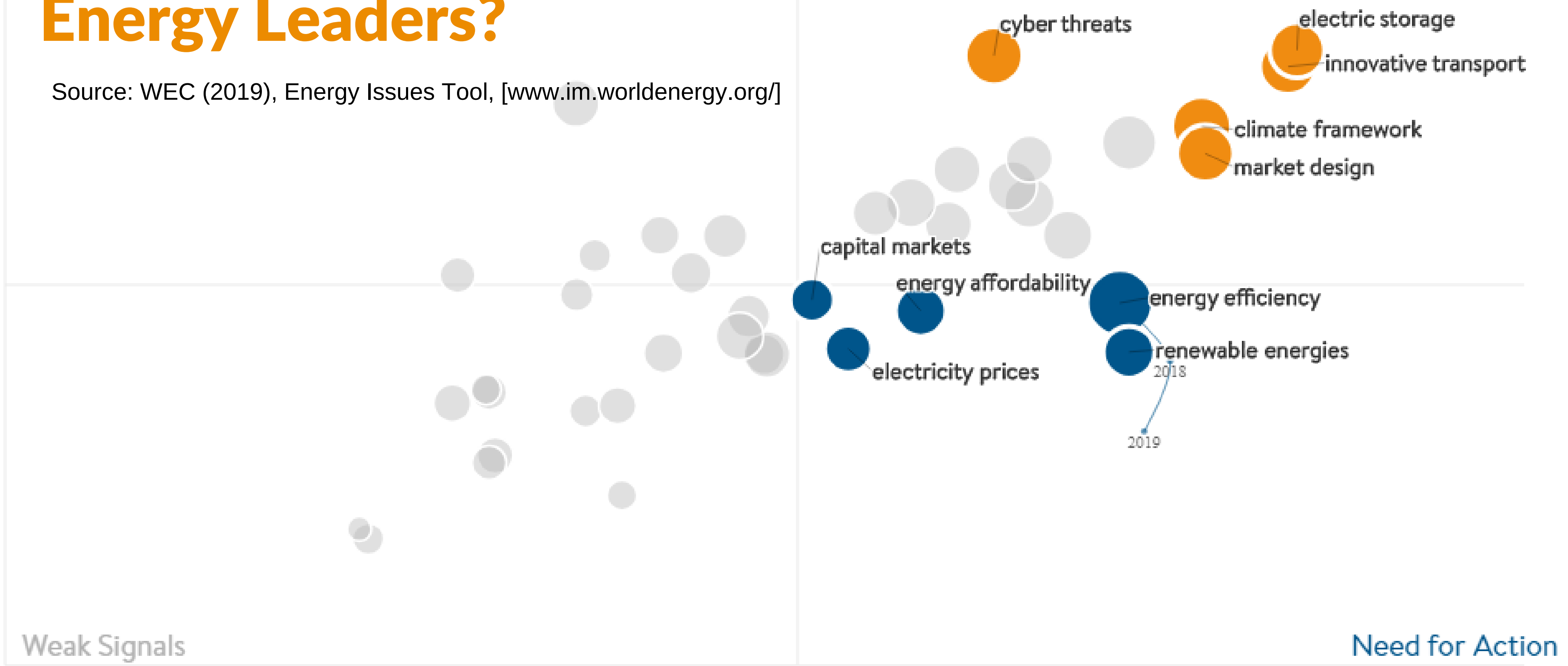
Individuals
Comfort
emotional well-being
healthcare costs savings
higher resale value
operating costs savings

03

**New Zealand
a comparison**

What's in the mind of New Zealand's Energy Leaders?

Source: WEC (2019), Energy Issues Tool, [www.im.worldenergy.org/]



Weak Signals

Need for Action

Government targets

**100%
RENEWABLE
ELECTRICITY**

BY 2035

**NET ZERO
GHG
EMISSIONS**

BY 2050

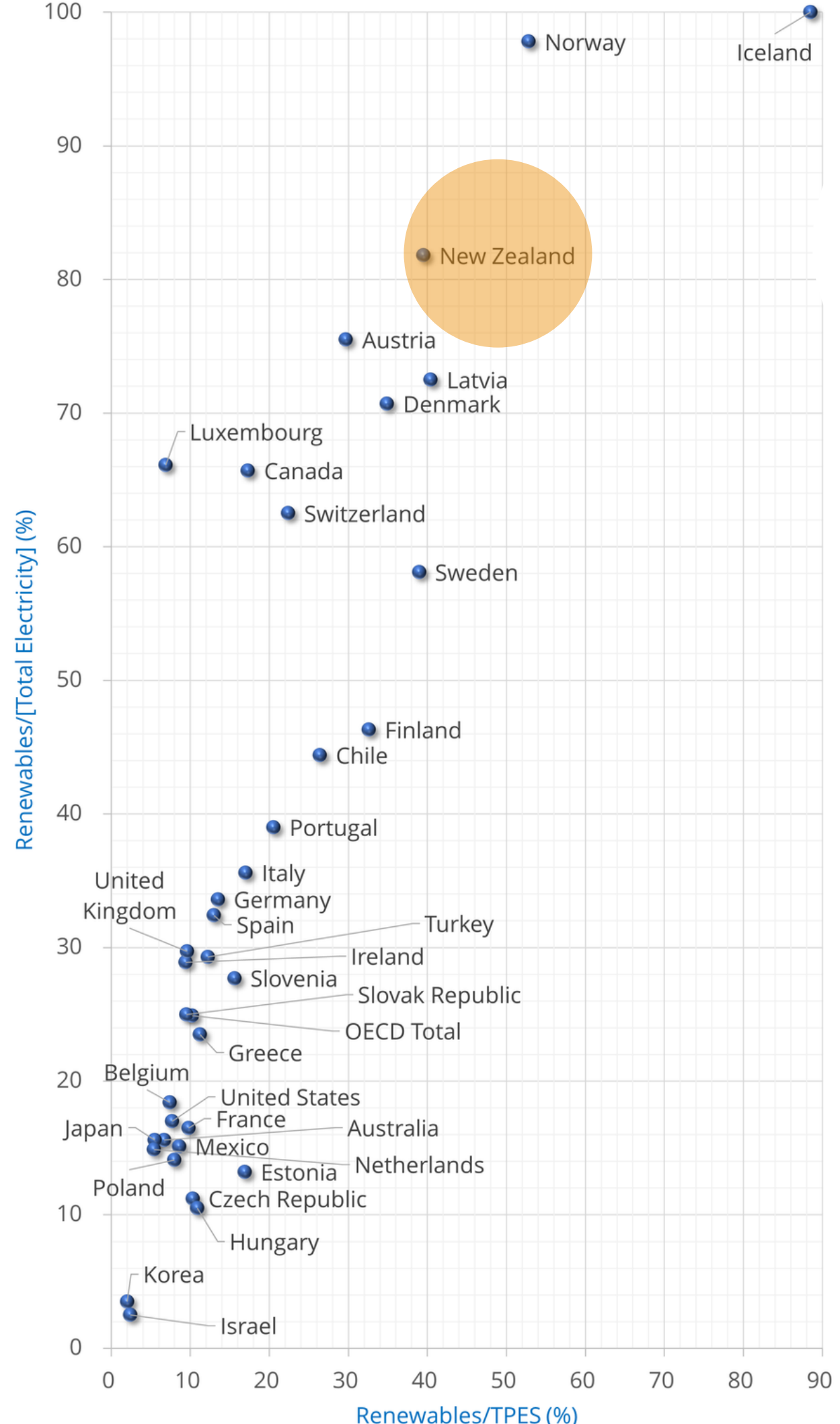
**100,000
AFFORDABLE
HOUSES**

IN 10 YEARS

Are we renewable energy leaders in the OECD countries? **YES**

NZ's renewable energy share 40%
4th highest in the OECD

NZ's renewable electricity 85%
3rd highest share in the OECD



Source: International Energy Agency (2018),
Renewables Information 2018 Paris, France: IEA Publications

**multiple
dimension
of a sustainable
and energy
efficient
buildings**

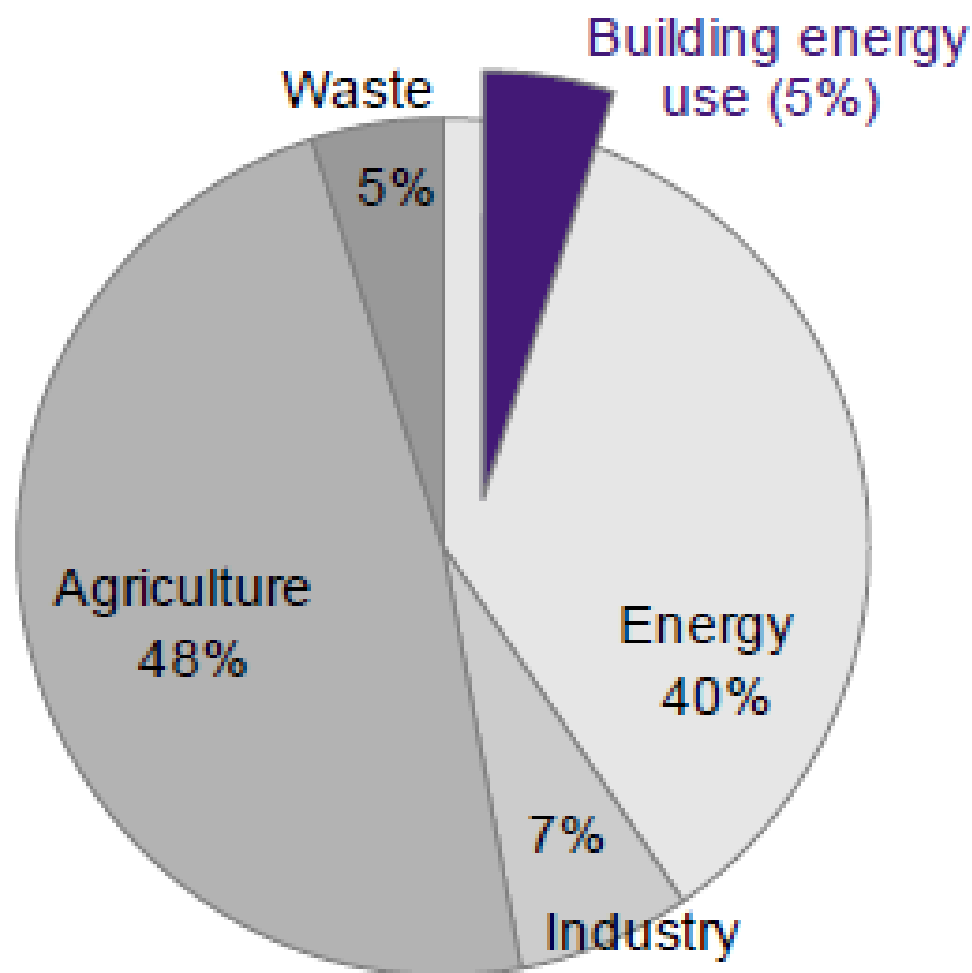
- design (material, location, insulation,...)
- equipment energy consumption
- energy source

**carbon
footprint**

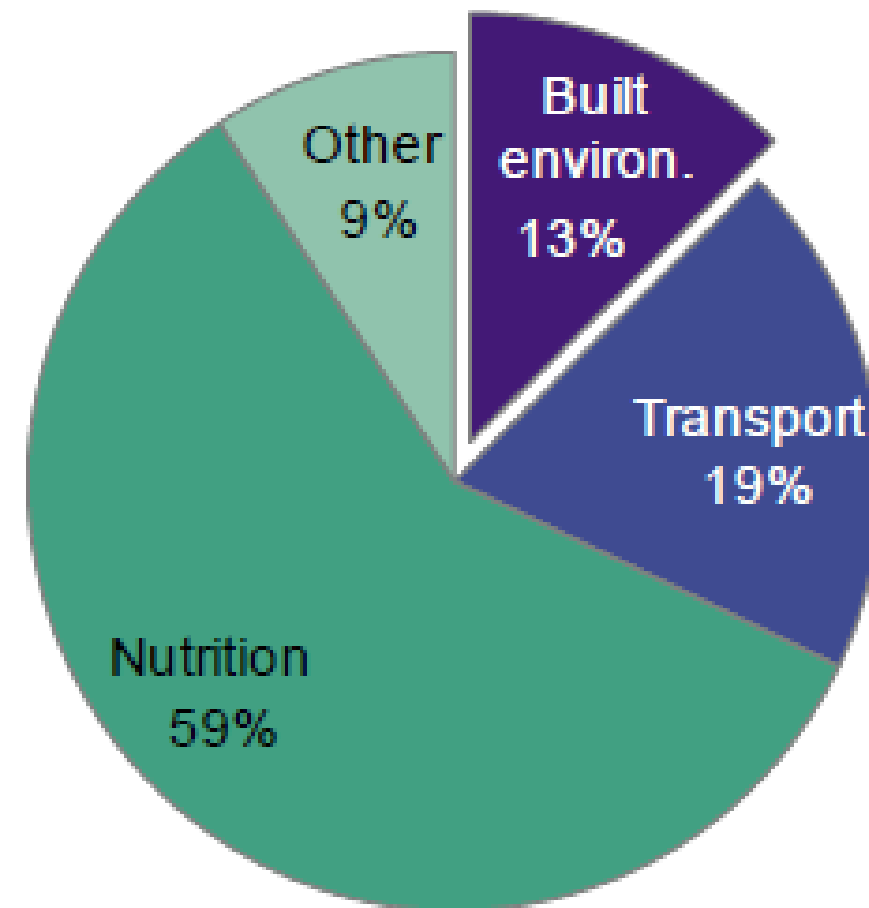


New Zealand's carbon footprint in the built environment 2017 (%)

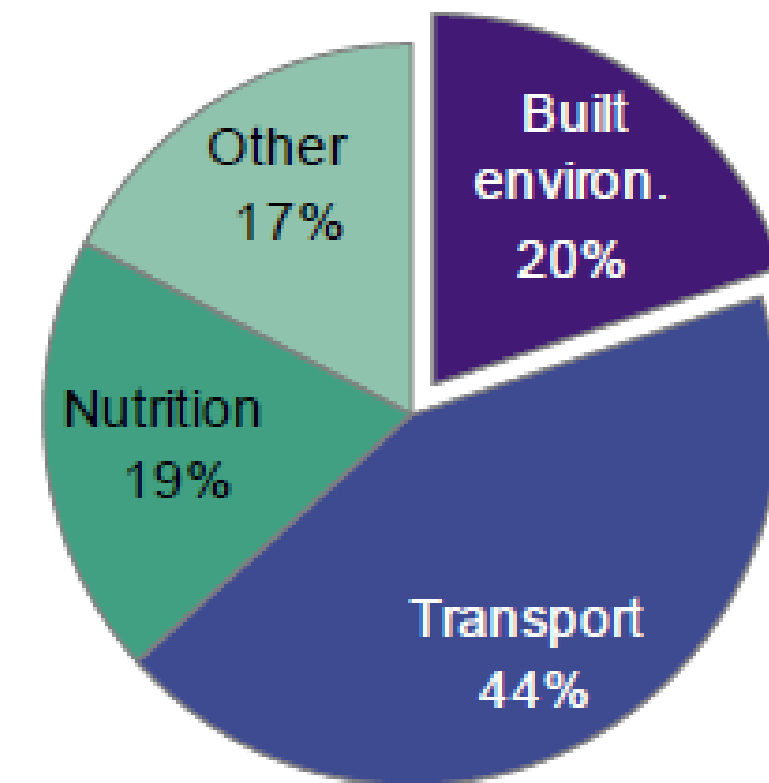
(a) Production-oriented view



(b) Life cycle perspective (excluding international trade)



(c) Consumption-oriented view (including international trade)



80,000 kt CO₂e
NZ's total footprint

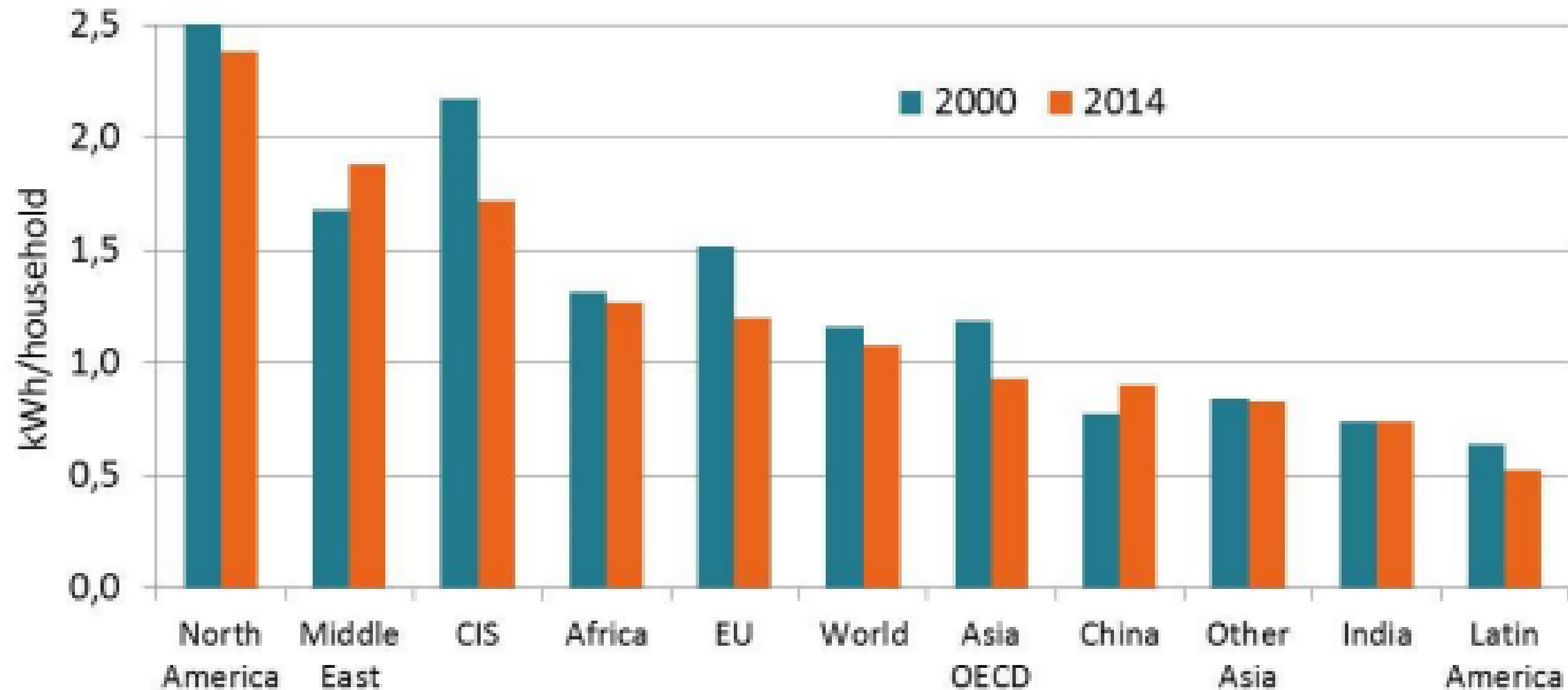
17 t CO₂e
per person

60,000 kt CO₂e
NZ's total footprint

13 t CO₂e
per person

Energy consumption per household 2014 (kWh)

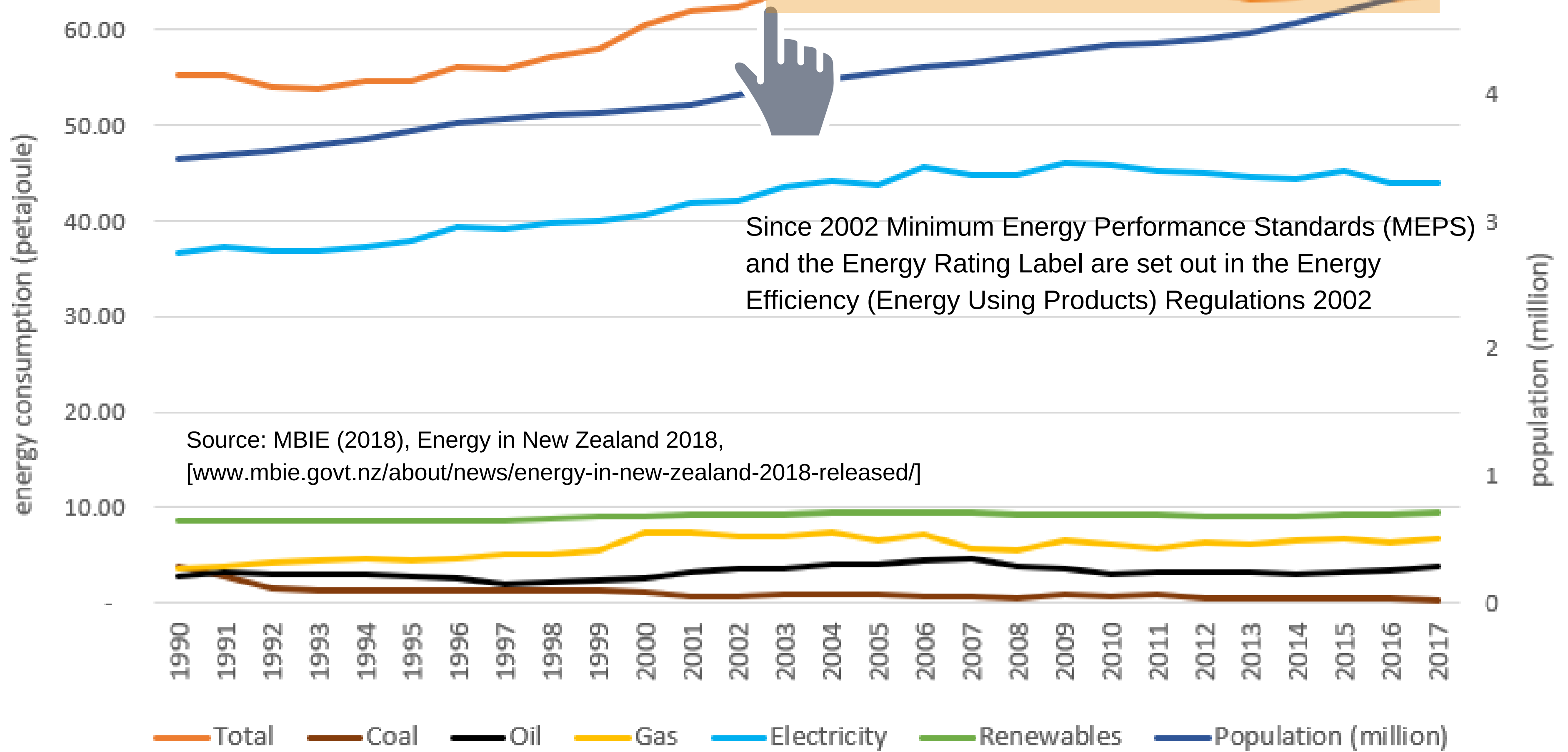
energy consumed per household has decreasing almost everywhere by approximately 0.4% per year at world level since 2000



Source: WEC (2016), Energy Efficiency: A straight path towards energy sustainability

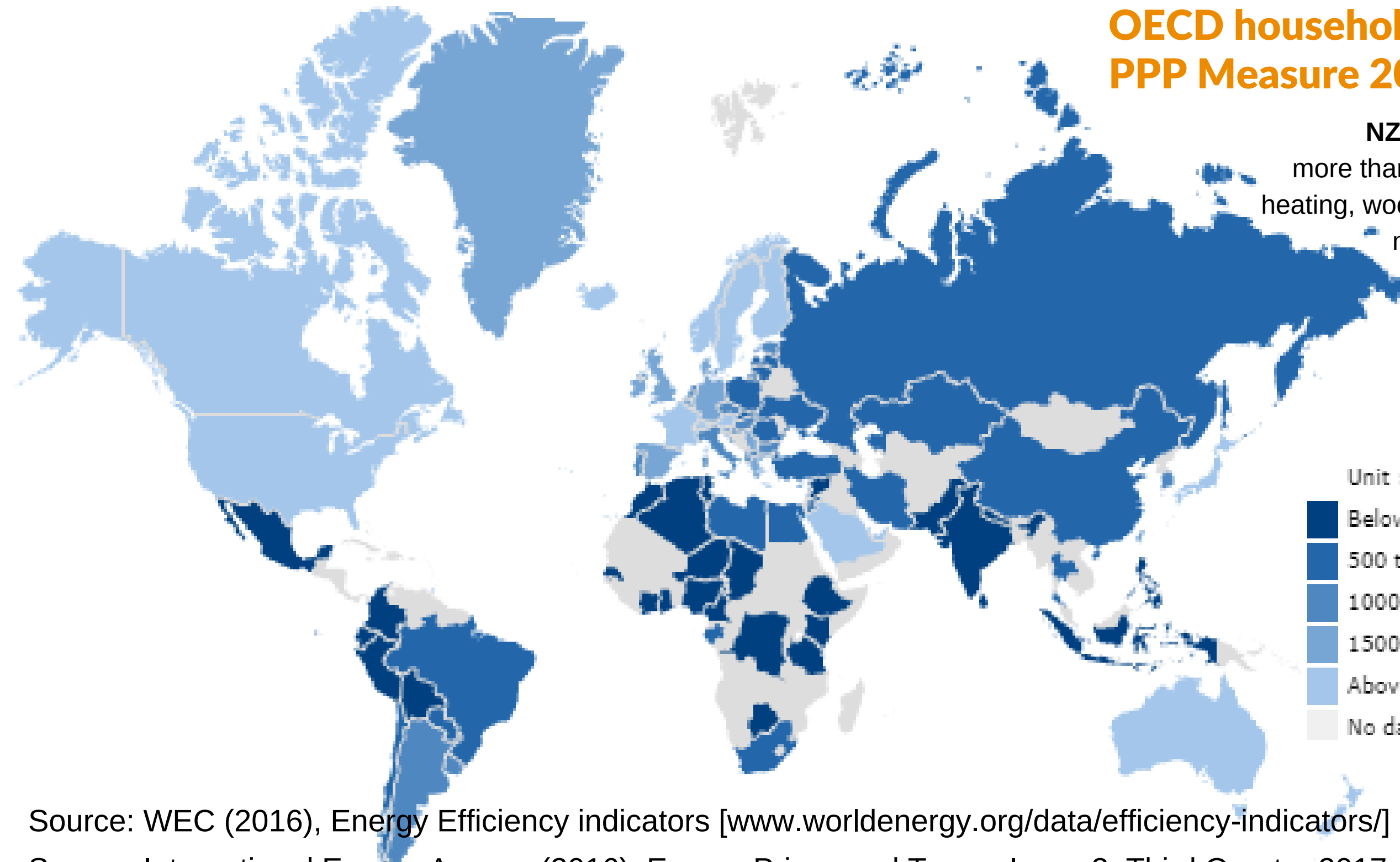
[www.worldenergy.org/publications/2016/energy-efficiency-a-straight-path-towards-energy-sustainability/]

New Zealand's residential energy consumption by fuel Type 2016/2017 (Petajoules)

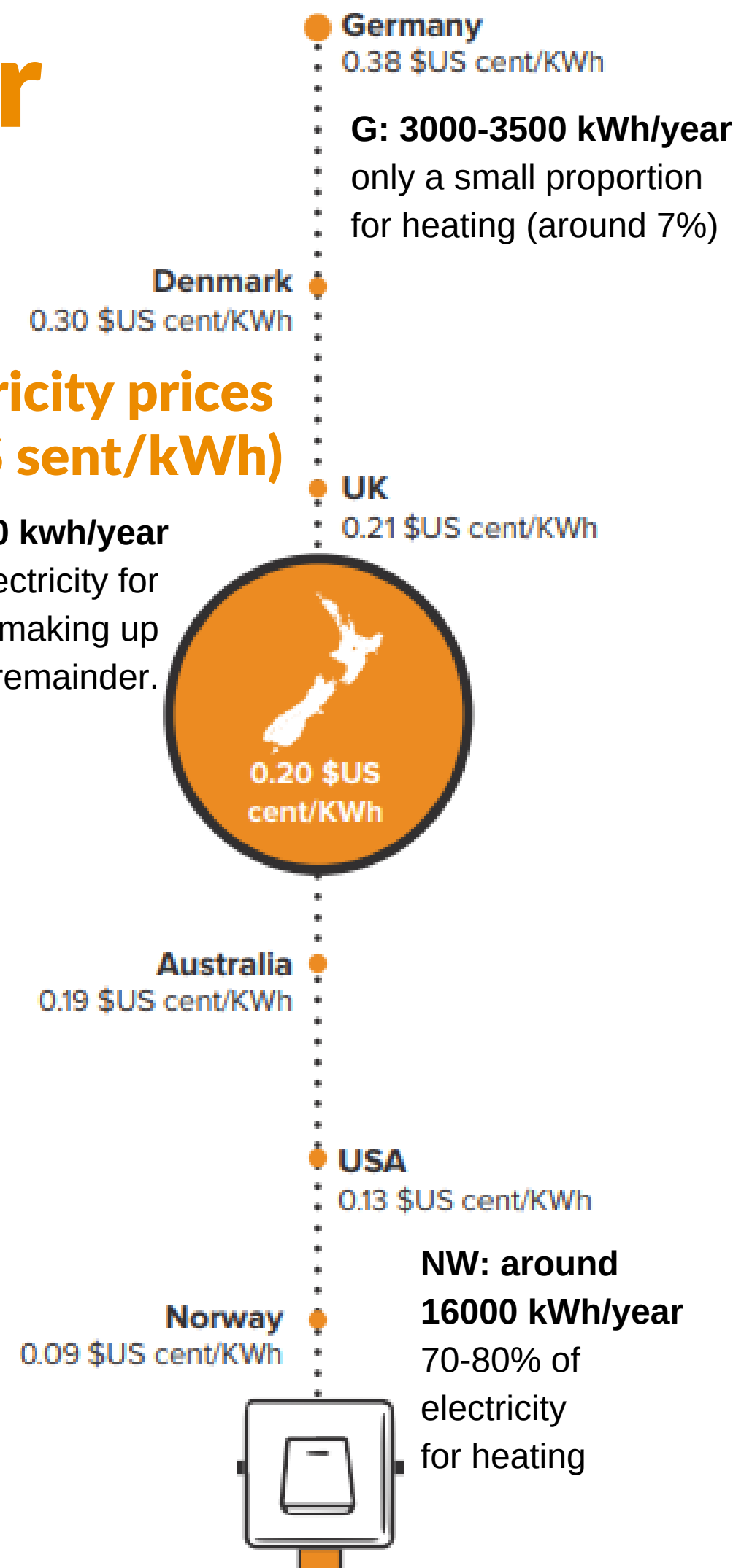


Source: MBIE (2018), Energy in New Zealand 2018, [www.mbie.govt.nz/about/news/energy-in-new-zealand-2018-released/]

Average electricity consumption per household 2014 (kWh/cap)

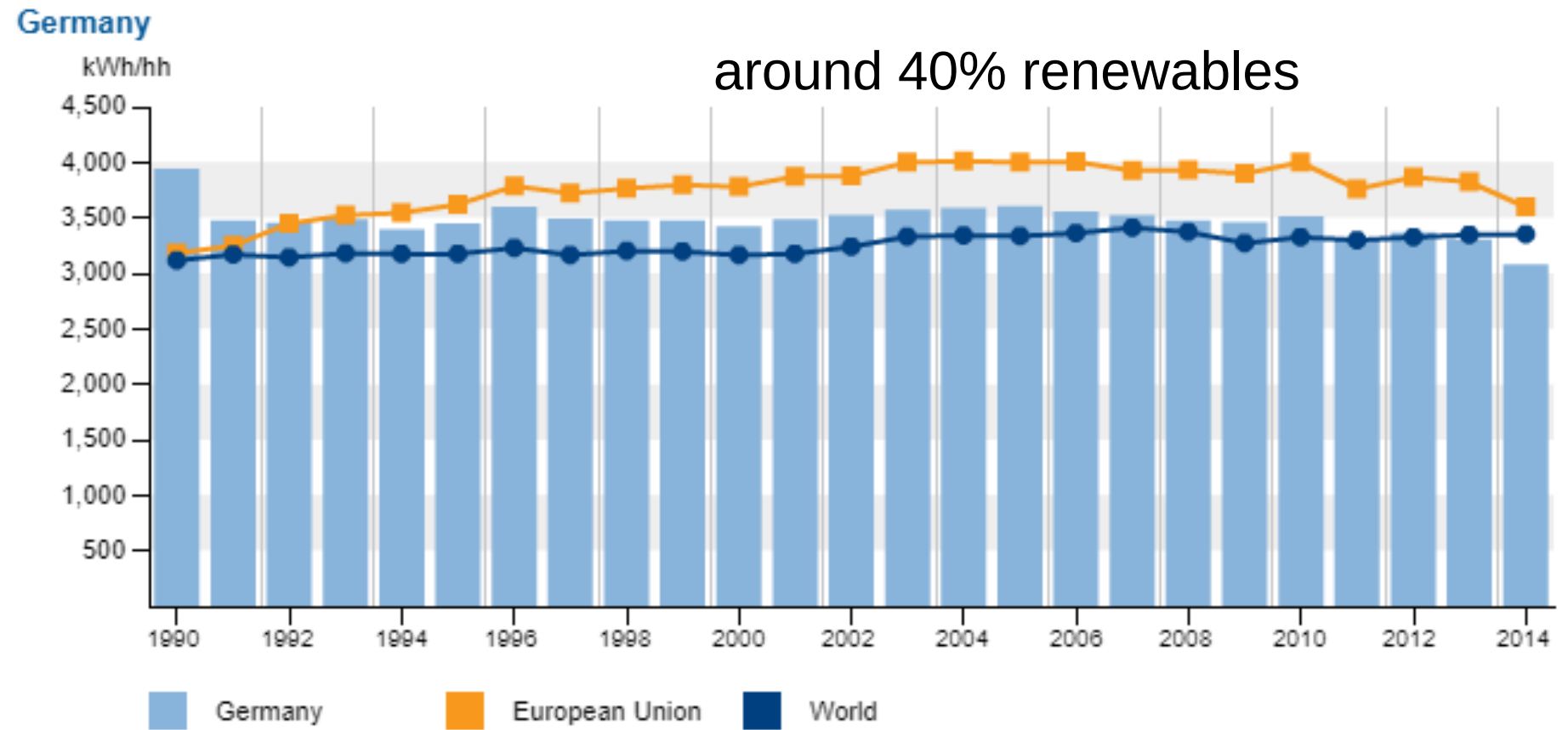
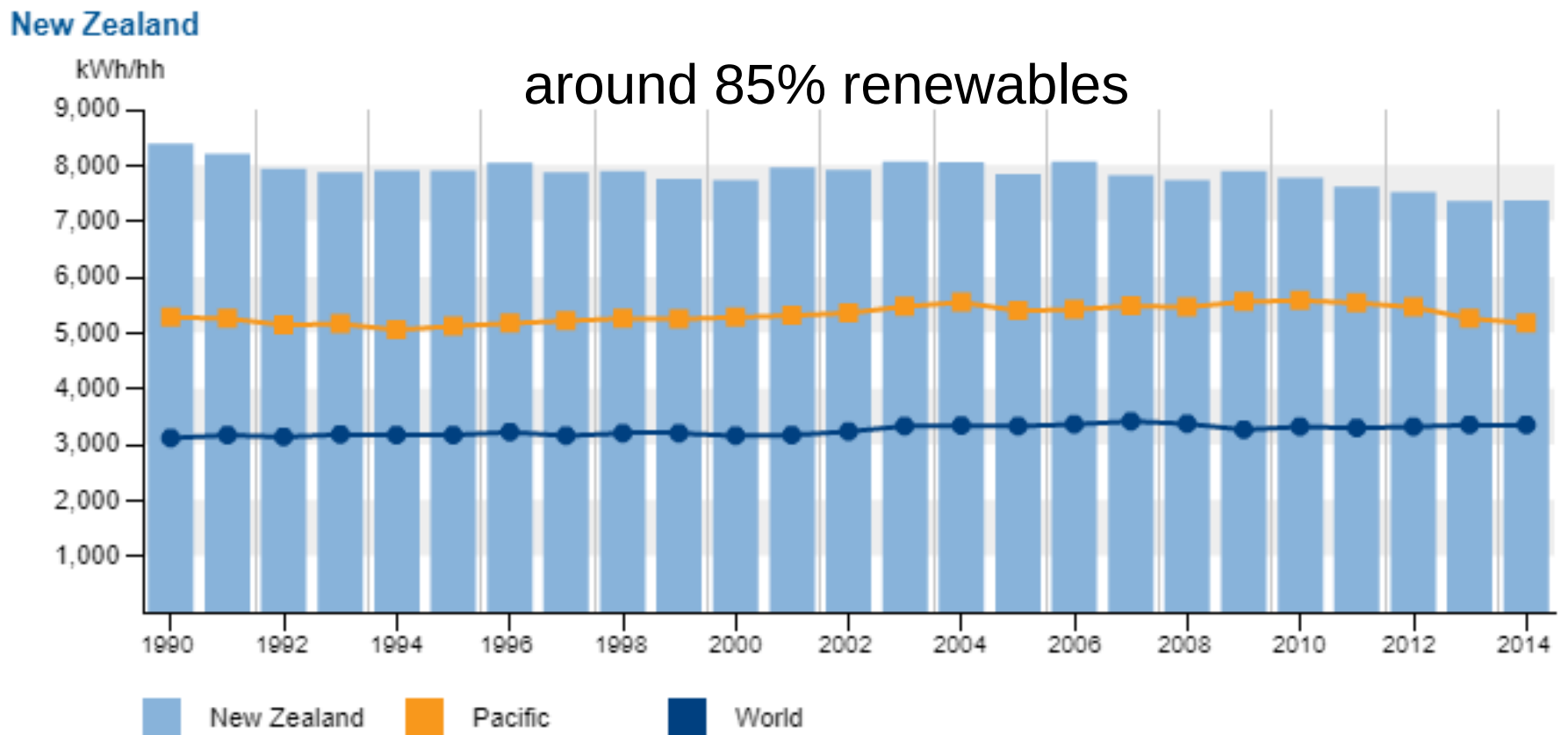
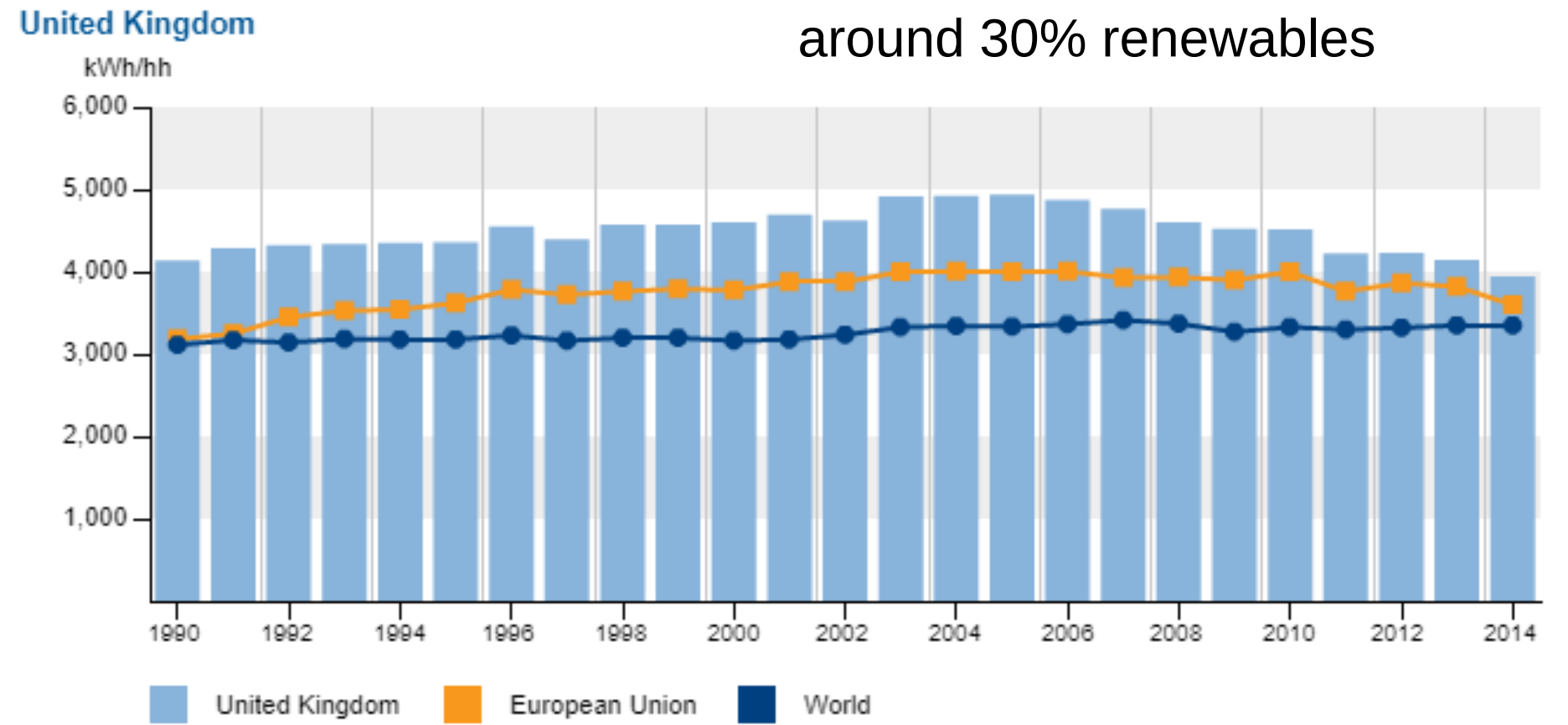
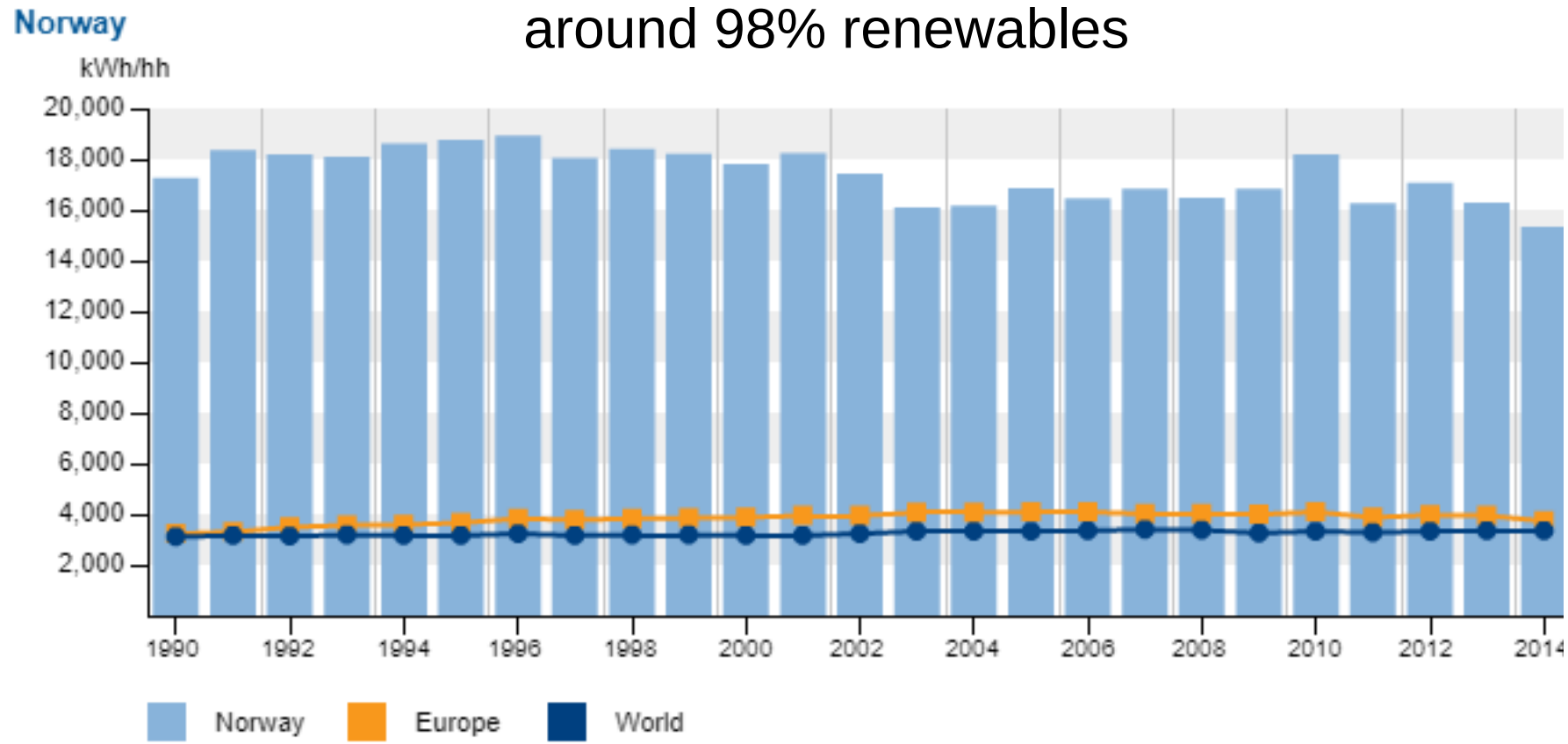


OECD household electricity prices PPP Measure 2016 (US sent/kWh)



Source: WEC (2016), Energy Efficiency indicators [www.worldenergy.org/data/efficiency-indicators/]

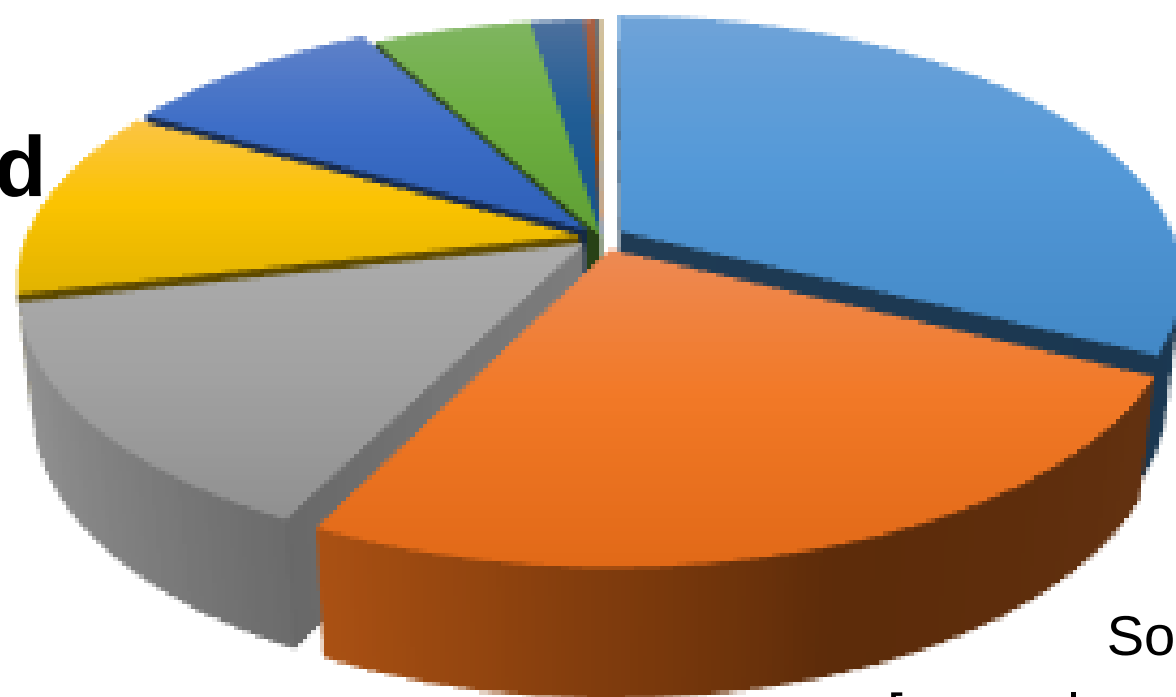
Source: International Energy Agency (2016), Energy Prices and Taxes, Issue 3: Third Quarter 2017



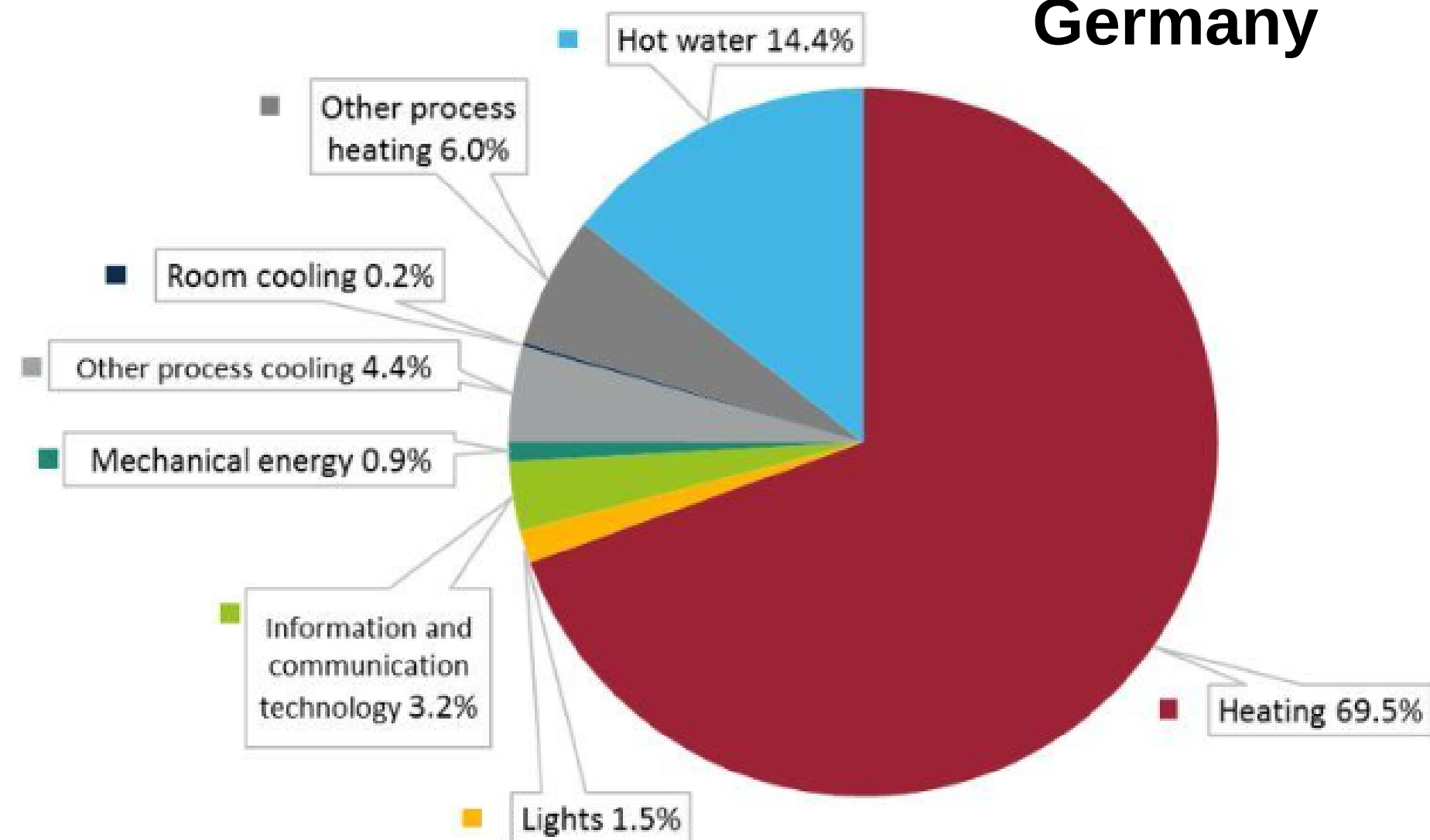
Source: WEC (2016), Energy Efficiency Indicators [www.worldenergy.org/data/efficiency-indicators/]

Residential energy consumption by end use 2016 (%)

New Zealand



Germany



Source: Clean Energy Wire (2019), Germany's energy consumption and power mix [www.cleanenergywire.org/factsheets/germanys-energy-consumption-and-power-mix-charts]

- Low Temperature Heat (<100 C), Space Heating - 32%
- Low Temperature Heat (<100 C), Water Heating - 25%
- Electronics and Other Electrical Uses - 14%
- Refrigeration - 12%
- Lighting - 9%
- Intermediate Heat (100-300 C), Cooking - 5%
- Low Temperature Heat (<100 C), Clothes Drying - 2%
- Motive Power, Stationary - 0.4%
- Space Cooling - 0.1%
- Motive Power, Mobile - 0.1%

Source: EECA (2017), Energy-End-Use Database, [www.eeca.govt.nz/resources-and-tools/tools/energy-end-use-database/]

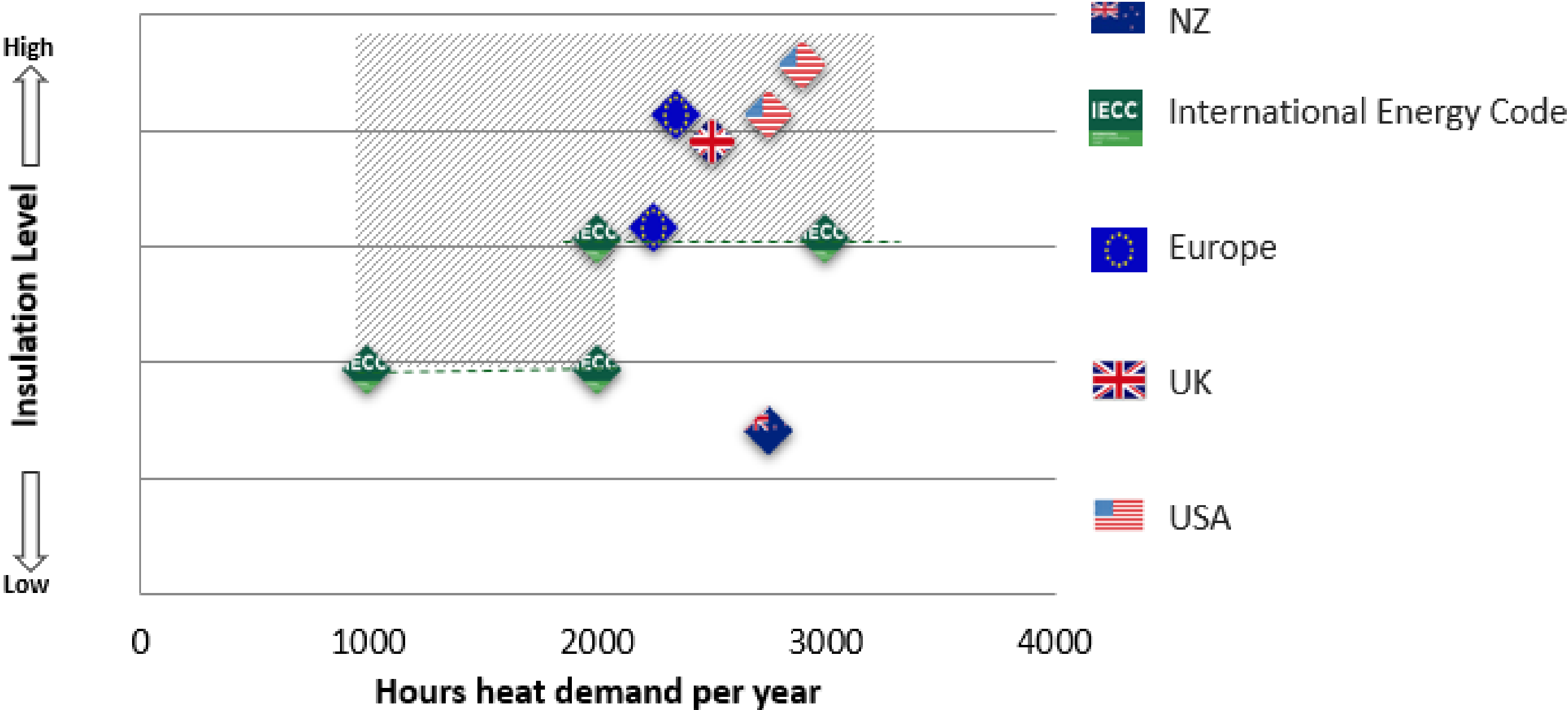
Building better than the Code

“The New Zealand Building Code is below the standards required of most IEA countries with comparable climates”

Source: International Energy Agency, Energy Policies of IEA Countries 2017 Review, 2017

“Government should consider modernising the Building Code; it’s building standards are less stringent than those of many OECD countries”

Source: OECD, Environmental Performance Review of New Zealand 2017



Source: New Zealand Green Building Council (2019), [www.nzgbc.org.nz]

Source: Consumer NZ (2019), Dinging the New Zealand Building Code [www.consumer.org.nz/articles/fixing-the-new-zealand-building-code]

04

**Greater energy
efficiency outcomes**

"Energieausweis"

WHAT?

THE ENERGY CERTIFICATE!

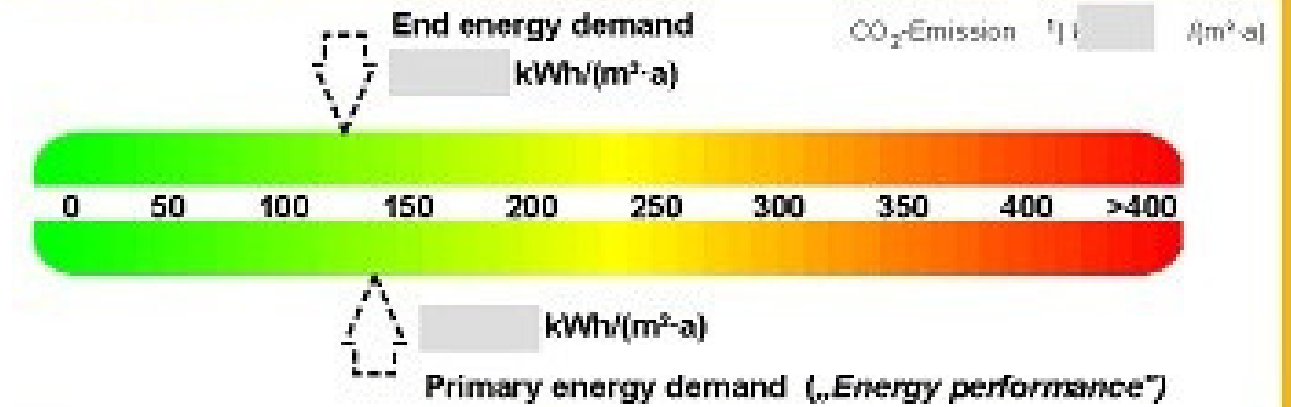
ENERGIEAUSWEIS für Wohngebäude

gemäß den §§ 16 ff. Energieeinsparverordnung (EnEV)

Calculated demand of energy

2

Calculated energy demand



Evidence of building permission § 3 oder § 9 Abs. 1 EnEV ²⁾

Primary energy		Quality of envelope	
building value	<input type="text"/> $\text{kWh}/(\text{m}^2 \cdot \text{a})$	building value	H_f <input type="text"/> $\text{W}/(\text{m}^2 \cdot \text{K})$
required value	<input type="text"/> $\text{kWh}/(\text{m}^2 \cdot \text{a})$	required value	H_f <input type="text"/> $\text{W}/(\text{m}^2 \cdot \text{K})$

End energy demand

Energy source	Annual energy demand $\text{kWh}/(\text{m}^2 \cdot \text{a})$ für			Total in $\text{kWh}/(\text{m}^2 \cdot \text{a})$
	Heating	Hot water	Auxiliary ¹⁾	

Other informations

Use of renewables proved?

nach § 9 EnEV vor Baubeginn geprüft

Renewables are used for:

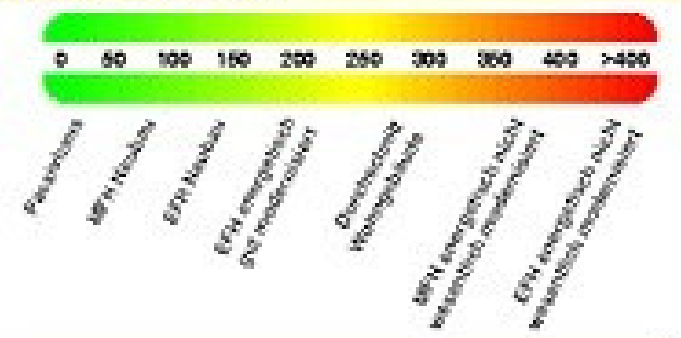
- Heating
- Hot water
- Ventilation
- Cooling

Ventilation

Ventilation is done through

- Fan without heat recovery
- Windows
- Fan with heat recovery

Reference values



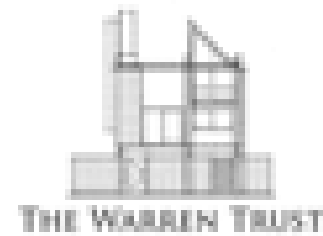
Comments to the calculation methodology

Das verwendete Berechnungsverfahren ist durch die Energieeinsparverordnung vorgegeben. Insbesondere wegen standardisierter Randbedingungen erlauben die angegebenen Werte keine Rückschlüsse auf den tatsächlichen Energieverbrauch. Die ausgewiesenen Bedarfswerte sind spezifische Werte nach der EnEV pro Quadratmeter Gebäudenutzfläche ($A_{G,N}$).

¹⁾ freiwillige Angabe ²⁾ ggf. einschließlich Kühlung
³⁾ nur in den Fällen des Neubaus und der Modernisierung auszufüllen ⁴⁾ EPH – Einfamilienhäuser, mFH – Mehrfamilienhäuser



New Zealand Green Building Council



What could help?

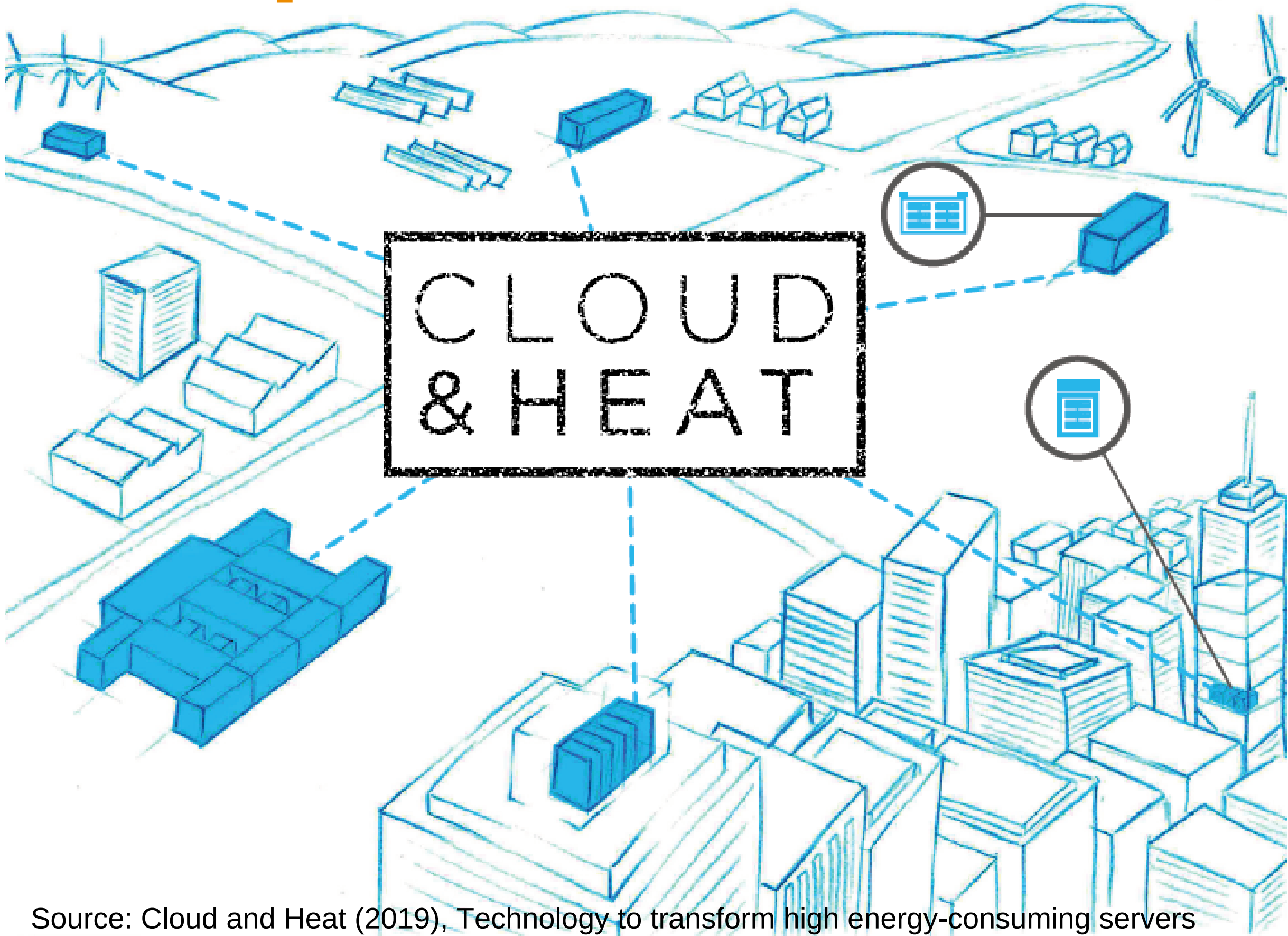
**1. THINK OF ENERGY
EFFICIENCY BEFORE
YOU DESIGN/BUILD**

**2. DON'T JUST MEETS
THE BUILDING CODE
REQUIREMENTS**

**3. THE GOVERNMENT
CAN HELP
TOO**

**4. JOIN
THE
DOTS**

best practice



Source: Cloud and Heat (2019), Technology to transform high energy-consuming servers into heat-producing assets to power cities and buildings, [www.cloudandheat.com]

thank you.

get in touch via
tschirr@bec.org.nz
bec.org.nz
[@BusNZEnergy](https://www.instagram.com/BusNZEnergy)
[@TinaSchirr](https://www.instagram.com/TinaSchirr)

