

Energy production for Zero Carbon Buildings



Philip Wolfe

Renewable Energy Association

This presentation

▲ Drivers in the built environment

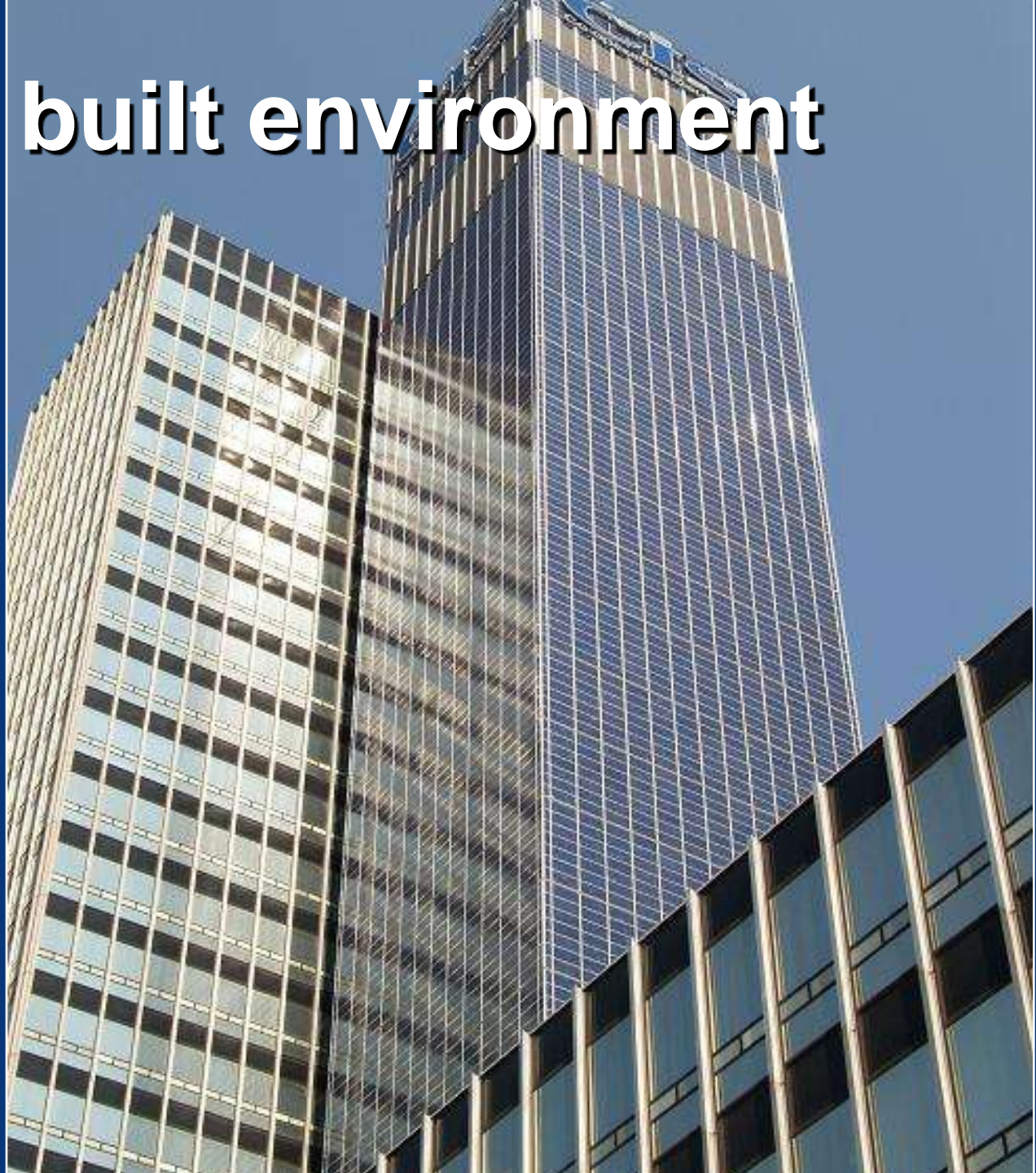
▲ Drivers in the energy sector

> **Energy supply = bulk power, fuels & heat**

> **Decentralised = user-scale applications**

▲ Zero carbon energy options

The built environment



Existing drivers – buildings

- ▲ National incentives and regulation
 - > Code for Sustainable Homes & ZC 2016
 - > Planning Policy (PPS1)
- ▲ Local regulation
 - > ‘Merton Rule’
- ▲ Customers
 - > Energy Performance Certificates

New drivers – buildings

- ▲ National incentives and regulation
 - > Building Regulations
 - > ‘Code for Sustainable Buildings’ & ZC 2019
 - > Fiscal measures: stamp duty concessions etc
- ▲ Local regulation
 - > Planning and Energy Bill (Act)’
- ▲ Customers
 - > ‘Green consumers’
 - > Corporate social responsibility

The energy sector



Existing drivers – energy

Renewables target for 2010

- > 10% of electricity

Energy suppliers

- > Energy Efficiency Commitments (EEC)

Energy users

- > Carbon reporting (and general CSR)
- > Low Carbon Buildings Programme (LCBP)

Energy producers

- > Renewables Obligation (RO)
- > Renewable Transport Fuels Obligation (RTFO)

New drivers – energy

Energy targets for 2020

- > 20% energy efficiency
- > 20% renewables in total energy
- > 10% renewables in transport fuel

Energy suppliers

- > Carbon Emissions Reduction Target (CERT)

Energy users

- > Carbon Reduction Commitment (CRC)
- > Renewable Energy Tariff (feed-in tariff FIT)

Energy producers

- > Extended Renewables Obligation (RO)

The EU commitments for 2020

- ▲ Emissions reductions Binding
 - > 20% unilateral, or
 - > 30% if multilateral
- ▲ Energy conservation Non-binding
 - > 20% below current projections
- ▲ Renewables Binding
 - > 20% of total energy
 - > 10% of transport fuels

First: Cut energy consumption

- ▲ The built environment
 - > More efficient energy usage
- ▲ Energy sector
 - > More efficient energy generation
- ▲ Consumers
 - > Energy conservation measures
- ▲ UK consumption in 2020 same as now?

Energy White Paper

“The 20% renewables target is an ambitious goal ... by 2020, on the basis of existing policies, renewables would contribute around 5% of the UK’s consumption ... we will bring forward the appropriate measures, beyond those set out in this White Paper, to make our contribution to meeting these targets.”

HM Government



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MEETING THE ENERGY CHALLENGE

A White Paper on Energy

MAY 2007

Existing energy policies

Merchant power

- > Renewables Obligation, now being banded
- > Planning Bill – to overcome problems???
- > Transmission access – strategic approach???

Transport fuels

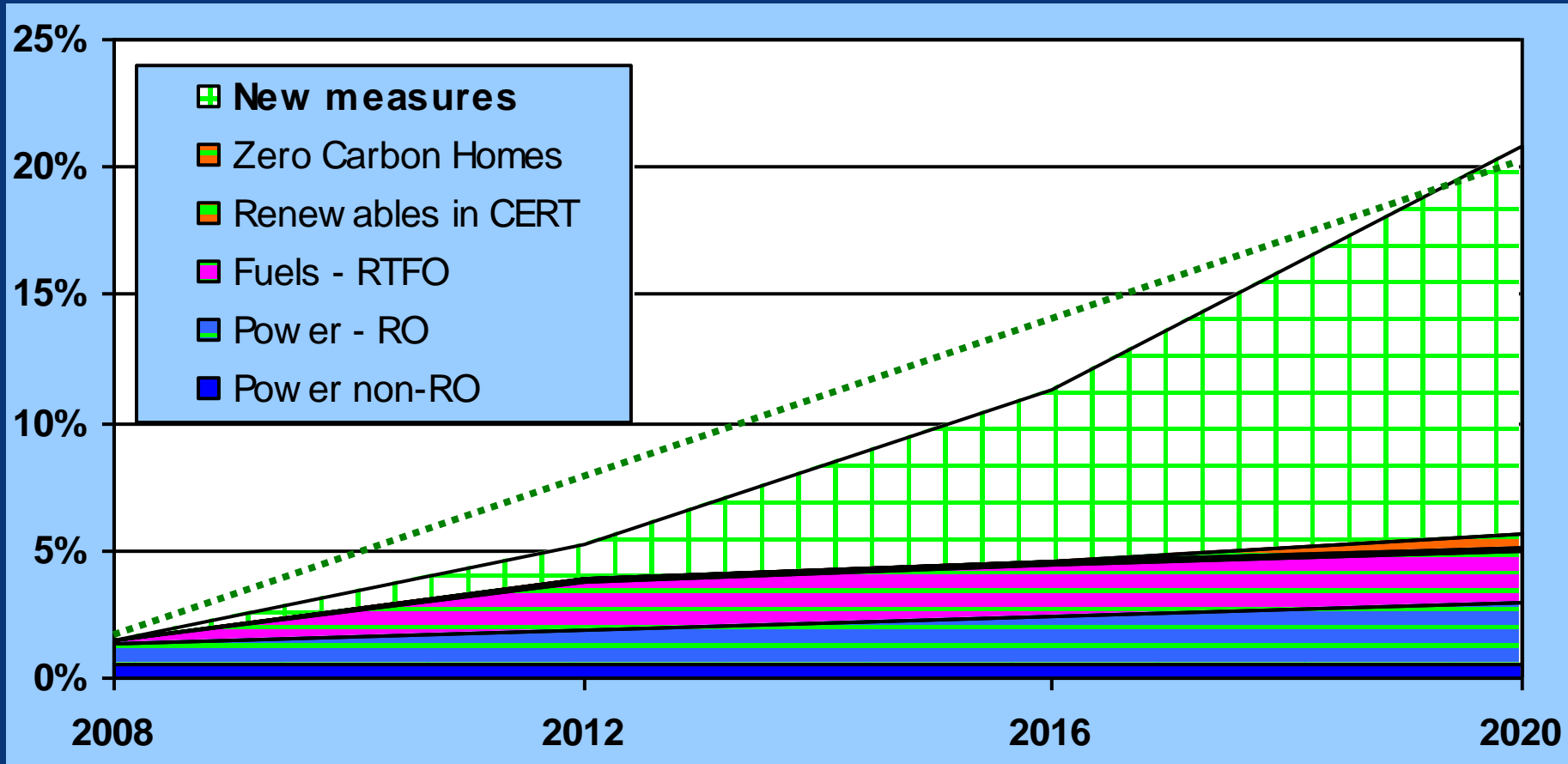
- > Renewable Transport Fuels Obligation
- > Sustainability standards

Buildings

- > Code for Sustainable Homes (new build only)
- > Carbon Emissions Reduction Target

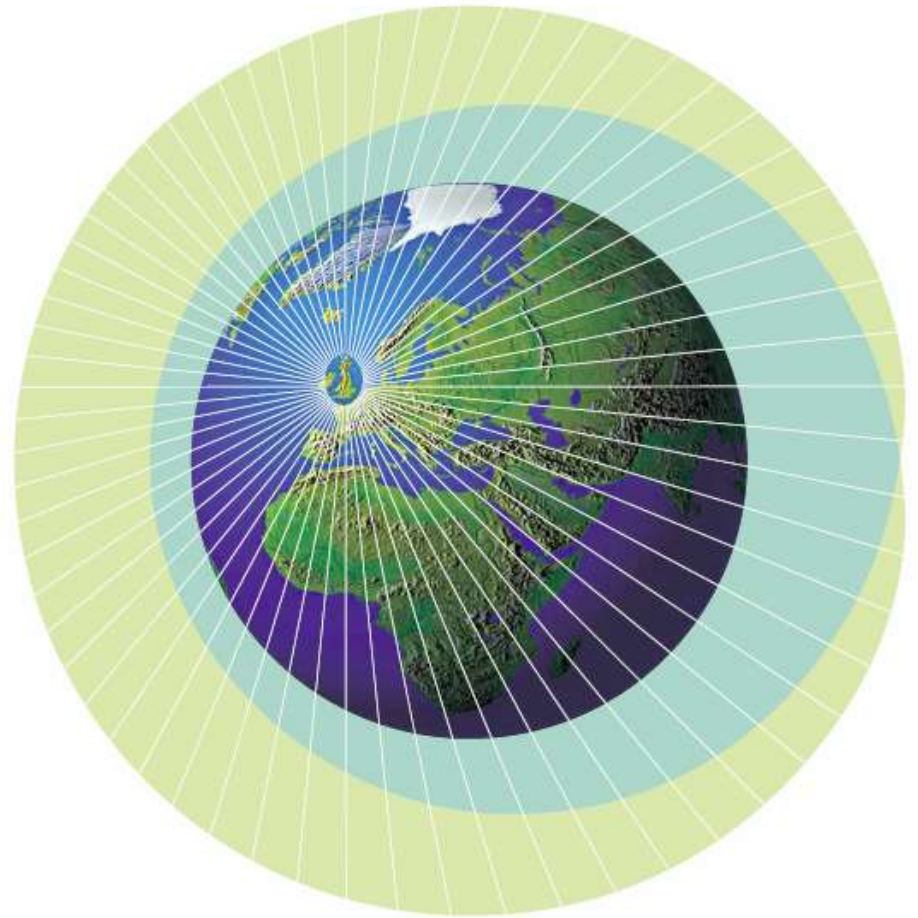
Routemap to 2020

New measures needed



Renewable Energy Strategy (RES)

 HM Government



Emerging bulk energy policies

▲ Merchant power and heat

- > Increased RO¹ objective ~22% in 2020
- > Tidal lagoons, barrages & new large hydro?
- > Incentives for large scale heat and CHP⁷
- > Measures to deliver biomass strategy

▲ Transport fuels

- > Higher RTFO³ quotas – 13% (by volume) in 2020
- > Availability of high blend fuels
- > Second generation bio-fuels
- > Incentives for high blend and flex-fuel vehicles

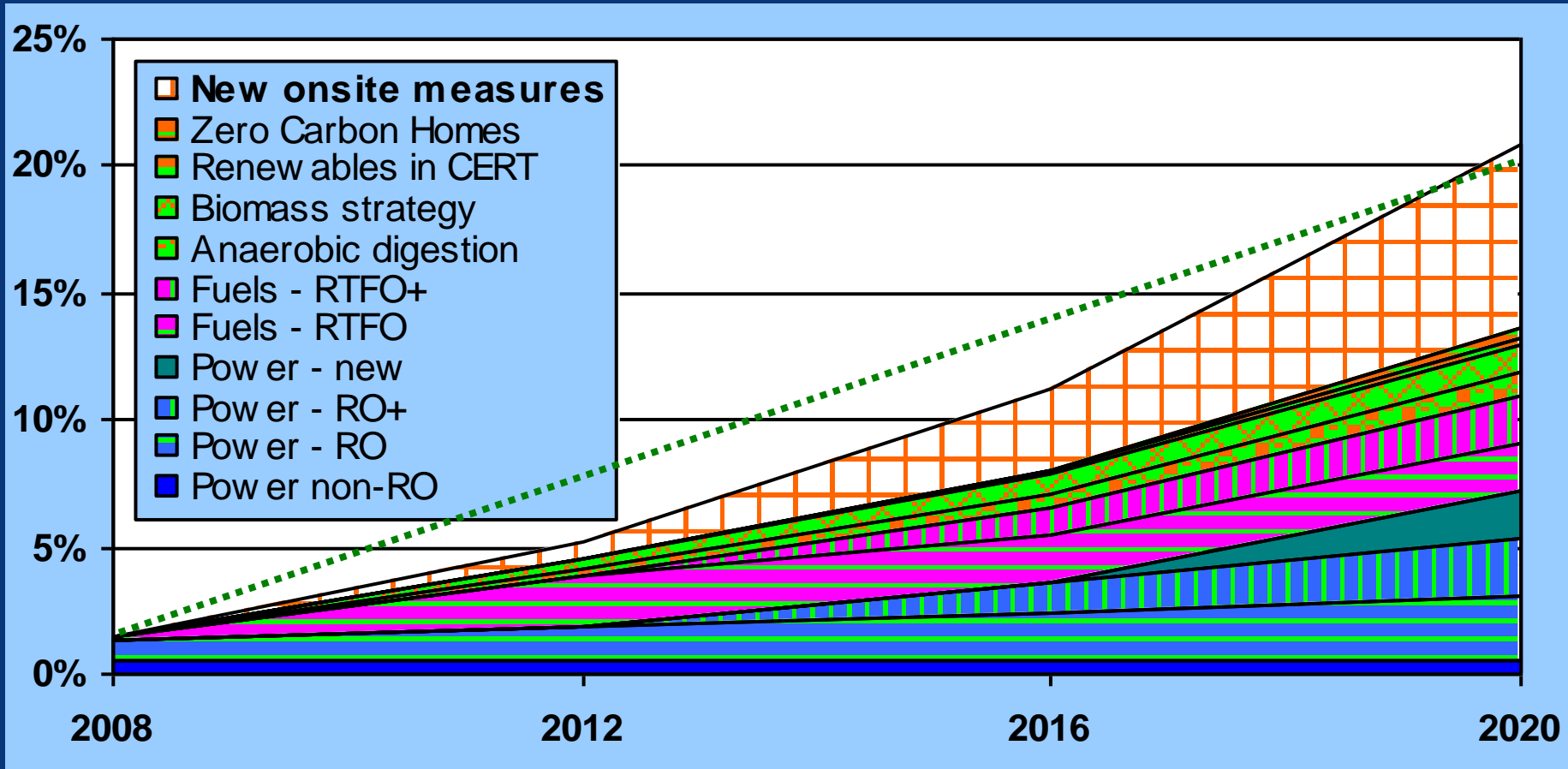
1. Renewable (electricity) Obligation

3 Renewable Transport Fuels Obligation

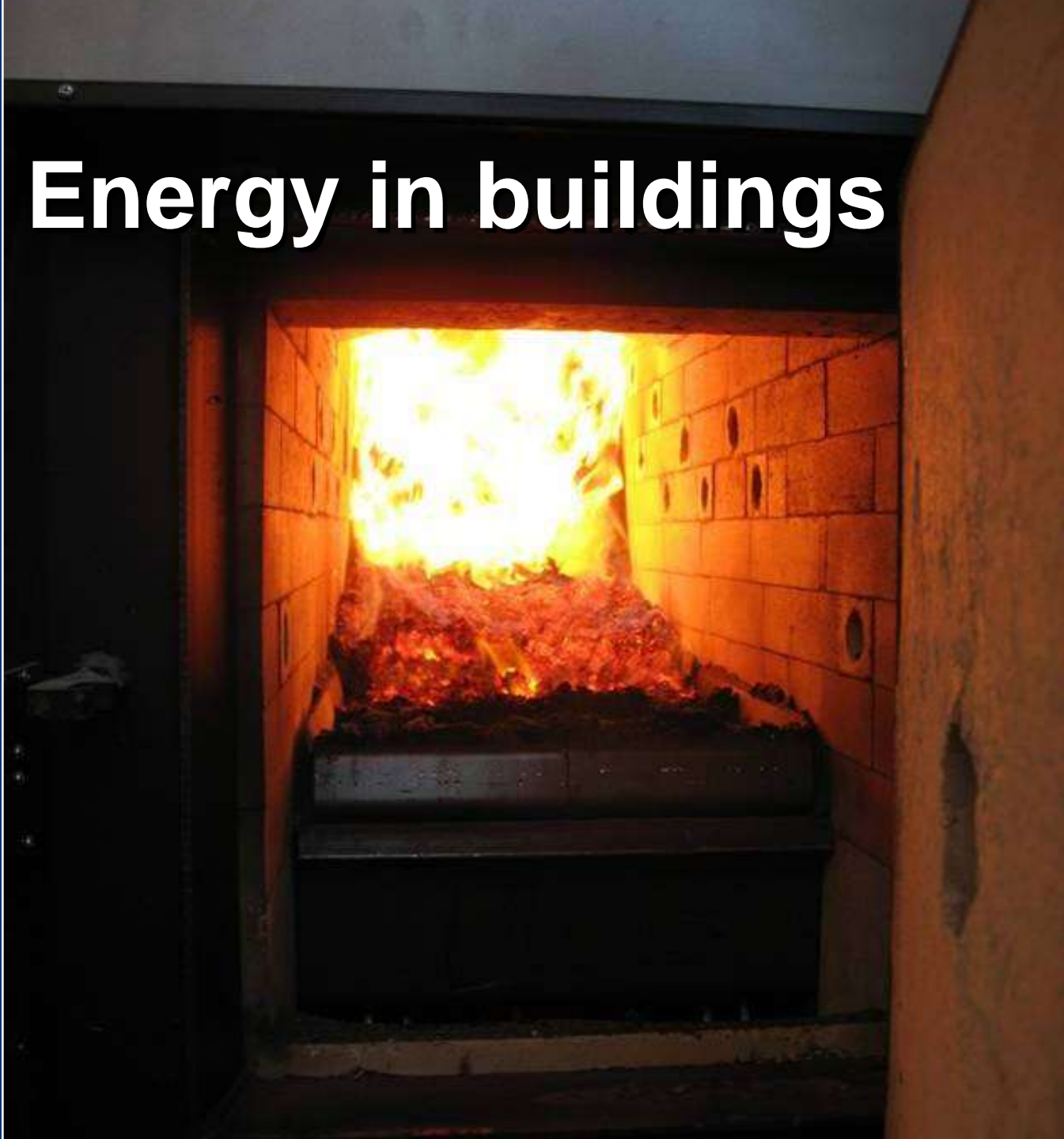
7 Combined heat and power

Routemap to 2020

New on-site measures needed



Energy in buildings



New residential energy options

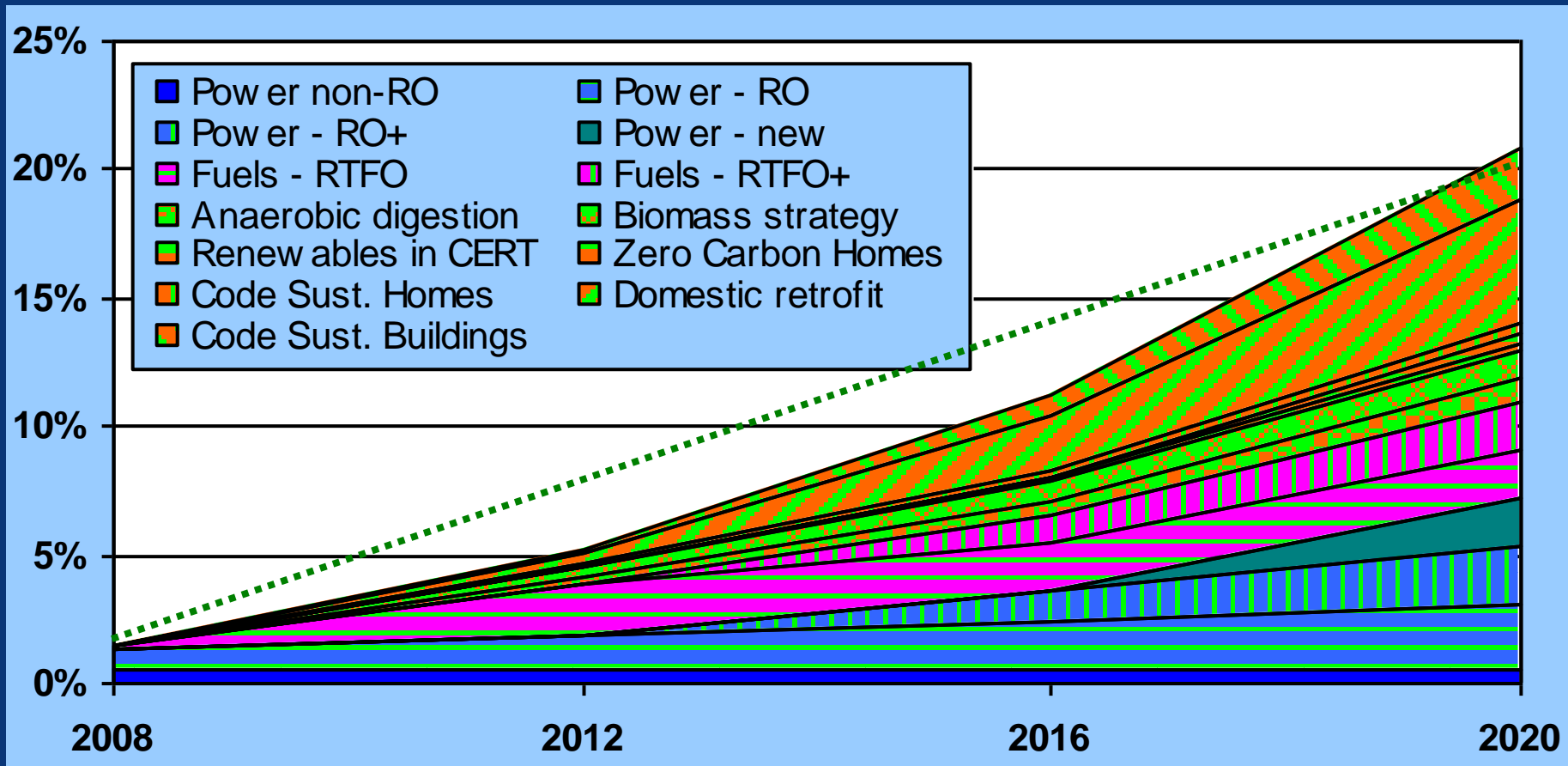
- ▲ Smart metering roll-out programme
- ▲ Retrofit programme for existing houses
 - > Owner occupiers and private landlords:
 - > Feed-in tariffs for electricity; similar for heat
 - > Stamp duty breaks, council tax concessions
 - > Financing measures, mortgages and loans
 - > Social rented and fuel poor:
 - > Funded from central government
 - > Via local authorities & housing associations

Non-residential energy options

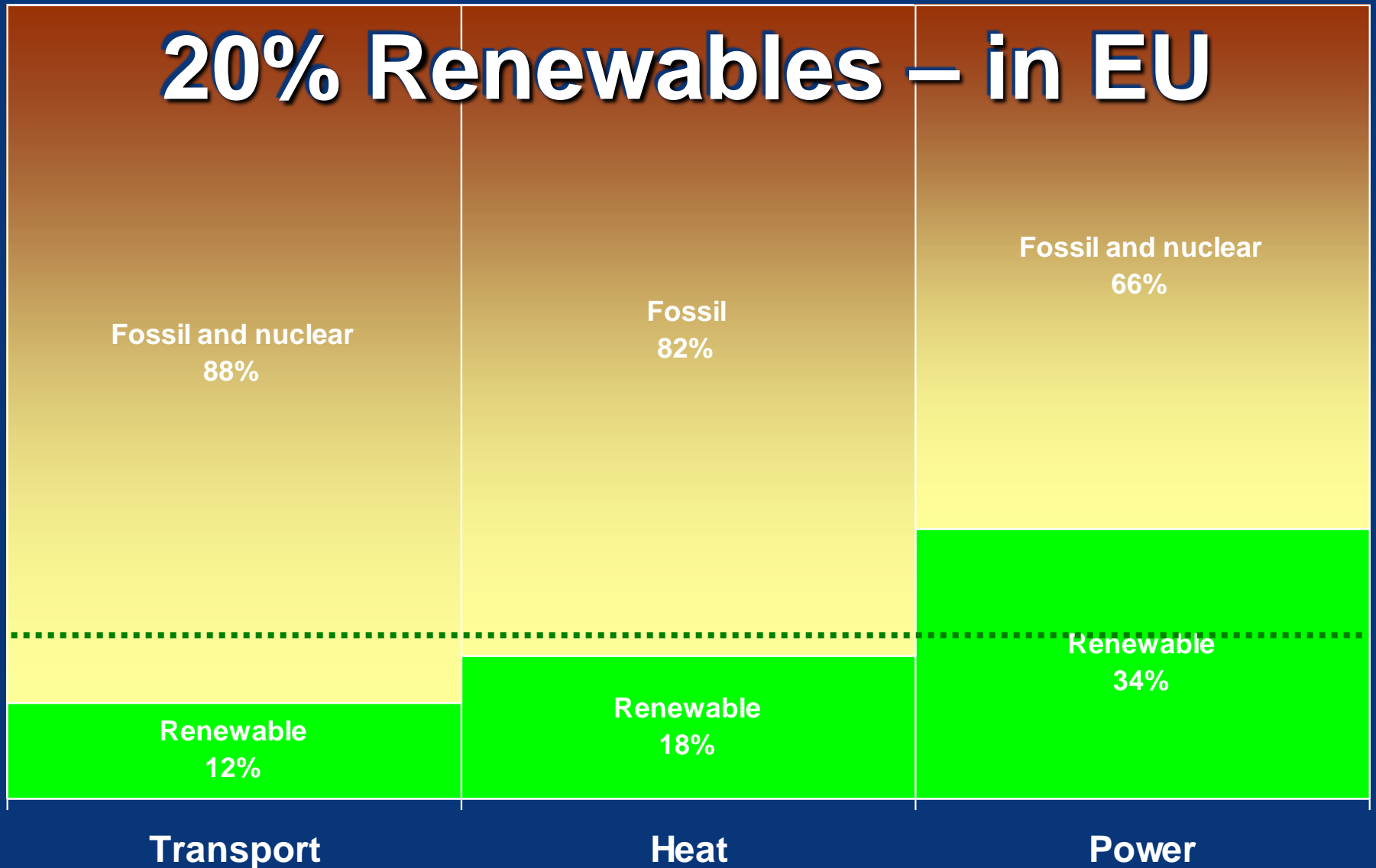
- ▲ Efficiency / renewables in new development
- ▲ Retrofit programme for existing buildings
 - > Feed-in tariffs for electricity; similar for heat
 - > Enhanced capital allowances
- ▲ Novel approaches
 - > E.g: Anaerobic digestion
- ▲ Infrastructure
 - > Smart load management
 - > Heat networks
 - > Energy service companies

Routemap to 2020

Enhanced energy policy



20% Renewables – in EU



20% Renewables – in UK

Where it is

90%

72%

51%

- Onboard
- On farm
- Nearshore
- Fossil & nuclear
- Onsite
- Onshore
- Offshore

10%

23%

12%

11%

7%

16%

2%

3%

2%

Transport

Heat

Power

Renewables in energy supply

What are the options?		Power	Heat	Fuel
Elemental	Geothermal & geopressure	✓	✓	
	Heat pumps: ground, air, water		✓	
	Hydro	✓		
	Solar	✓	✓	
	Tidal	✓		
	Wave	✓		
	Wind	✓		
Bioenergy	Bio-fuels	✓	✓	✓
	Biomass combustion & co-firing	✓	✓	
	Gasification & pyrolysis	✓	✓	✓
	Gas capture: landfill, sewage	✓	✓	✓
	Microbial & anaerobic digestion	✓	✓	✓

Renewables in low carbon buildings

What are my options?		Considerations	
Elemental	Geothermal & geopressure	Suitable geology	
	Heat pumps	ground	Ground loops / borehole space
		air	Locations (noise)
		water	Nearby lake / pond / river
	Hydro	Local stream / river, head	
	Solar	S (or E or W) roofs & facades	
Wind	Wind regime		
Bioenergy	Bio-fuels	Fuel supply	
	Biomass heat, CHP	Fuel supply, fuel storage	
	Renewable gas	Imported through gas network	
	Microbial & anaerobic digestion	Scale	

Primary renewable options

- ▲ On-site, district & community heat
 - > Solar thermal
 - > Biomass and pellet boilers, bio-fuel boilers
 - > Ground- and air-source heat pumps
- ▲ On-site electricity
 - > Photovoltaics
 - > 'Micro' wind
- ▲ Combined heat and power
 - > Biomass [and gas-fired] CHP, [fuel cells]
- ▲ Off-site renewables
 - > 'Offsetting' as a safety valve where on- and near-site options not viable

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