

Energy production for Zero Carbon Buildings



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This presentation

▲ Drivers in the built environment

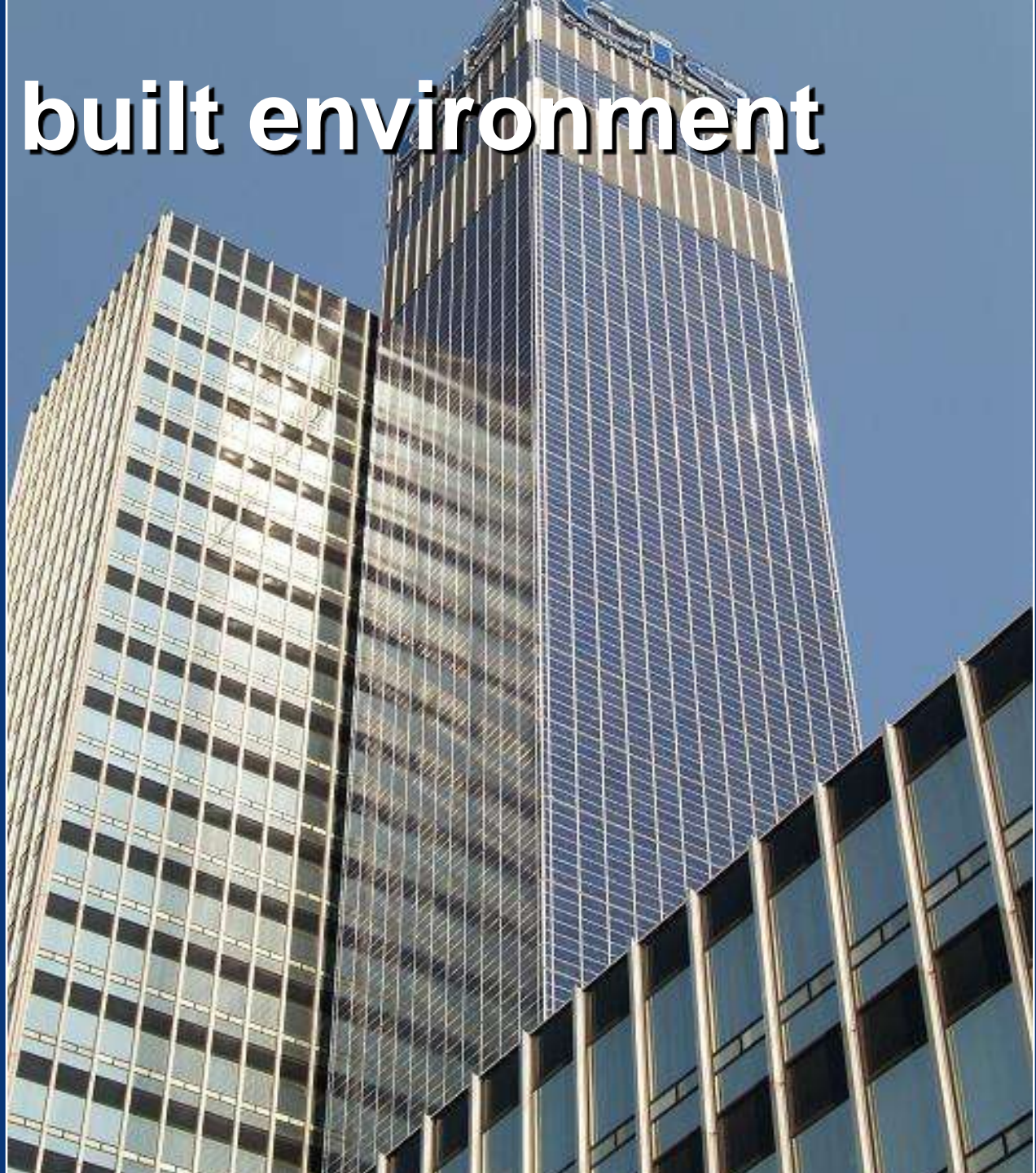
▲ Drivers in the energy sector

> **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



dti

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

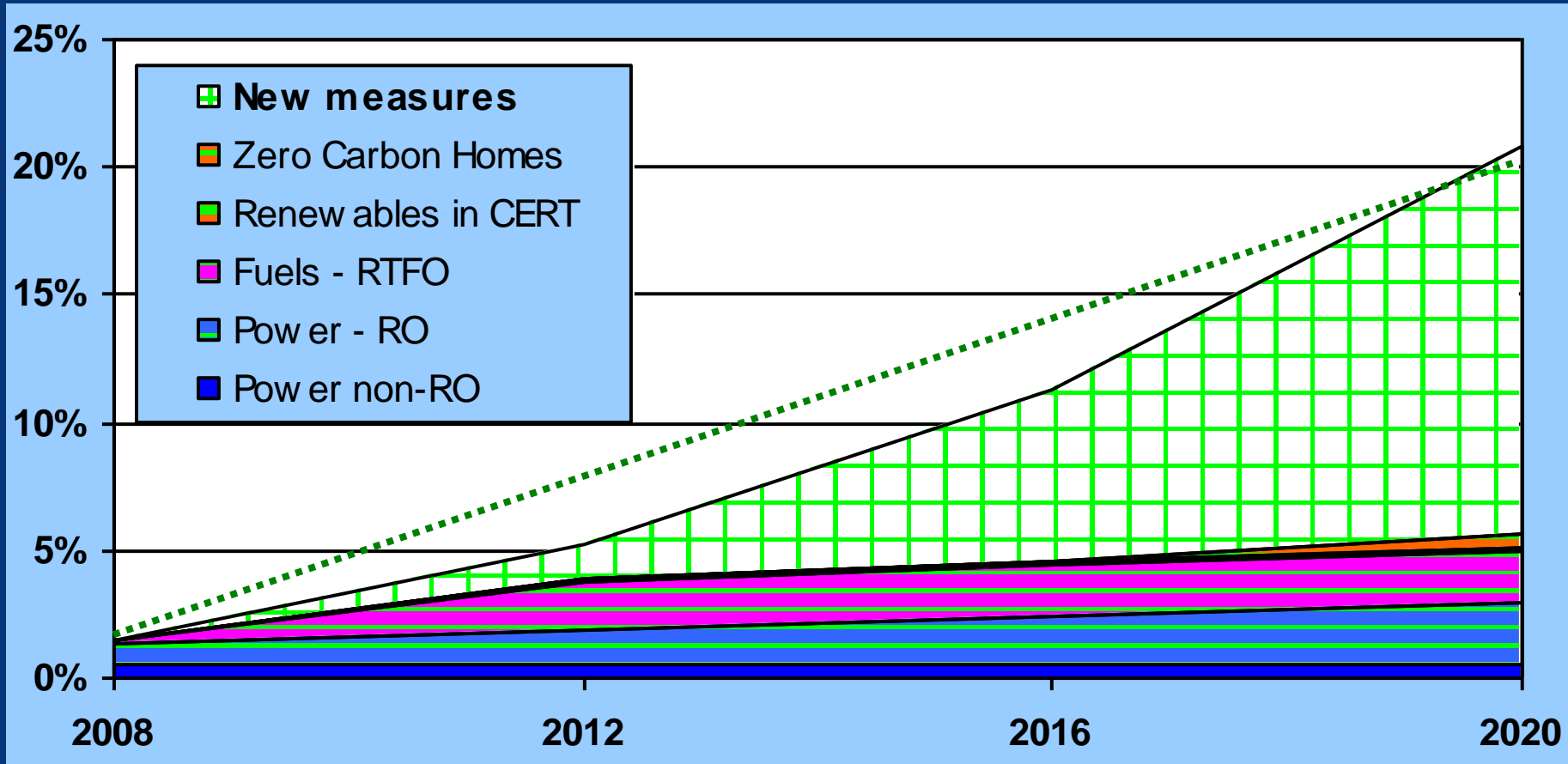
- > Renewable Transport Fuels Obligation
- > Sustainability standards

Buildings

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

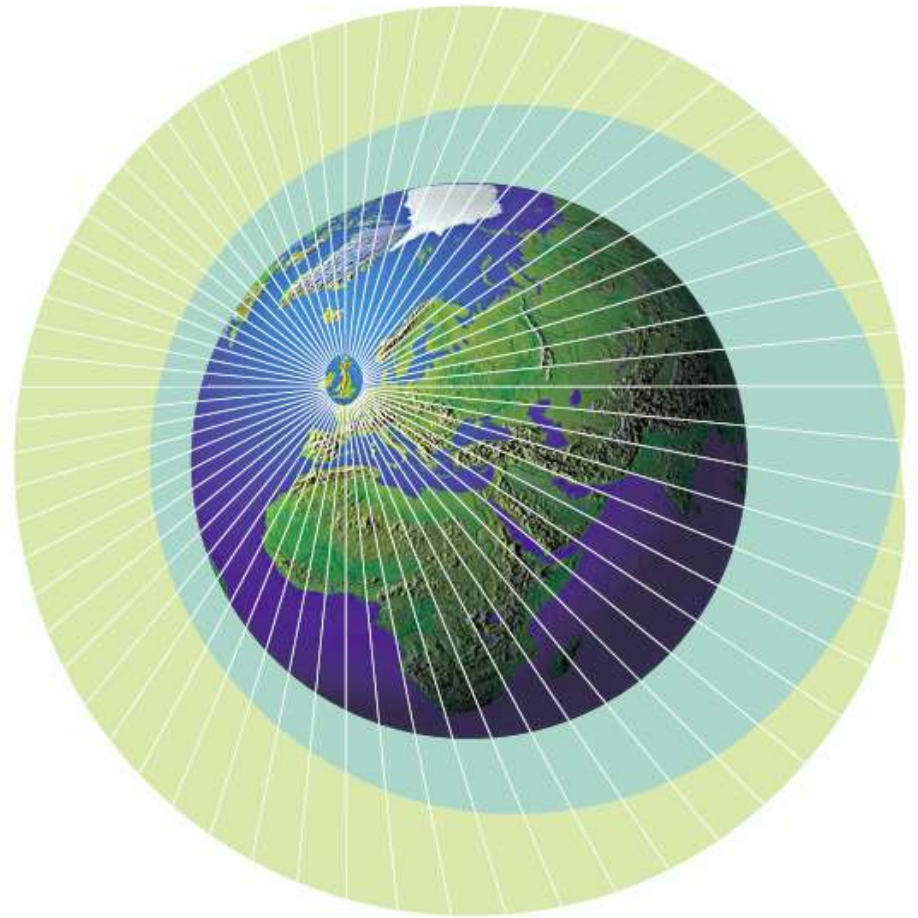
Routemap to 2020

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

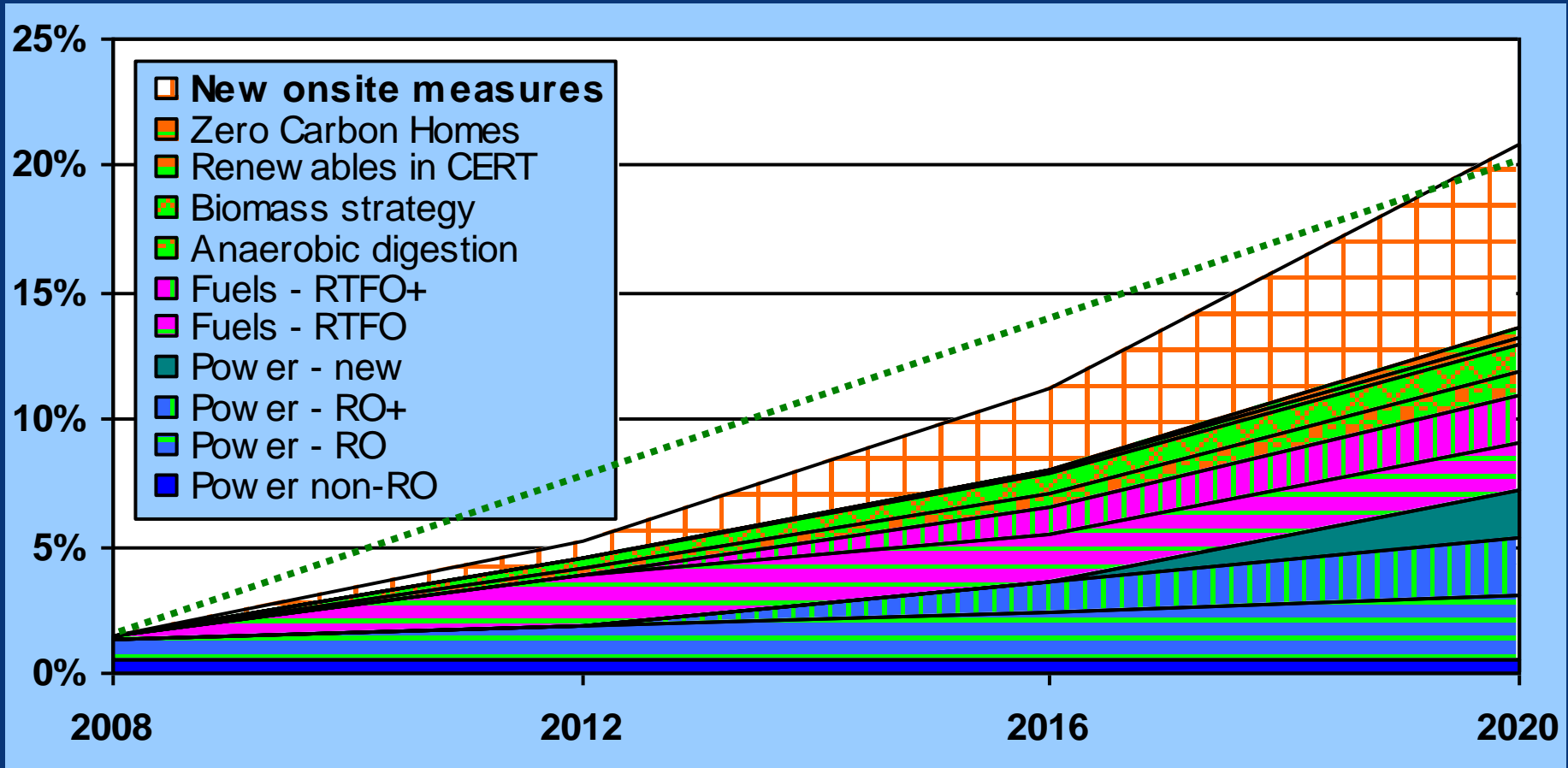
1. Renewable (electricity) Obligation

3 Renewable Transport Fuels Obligation

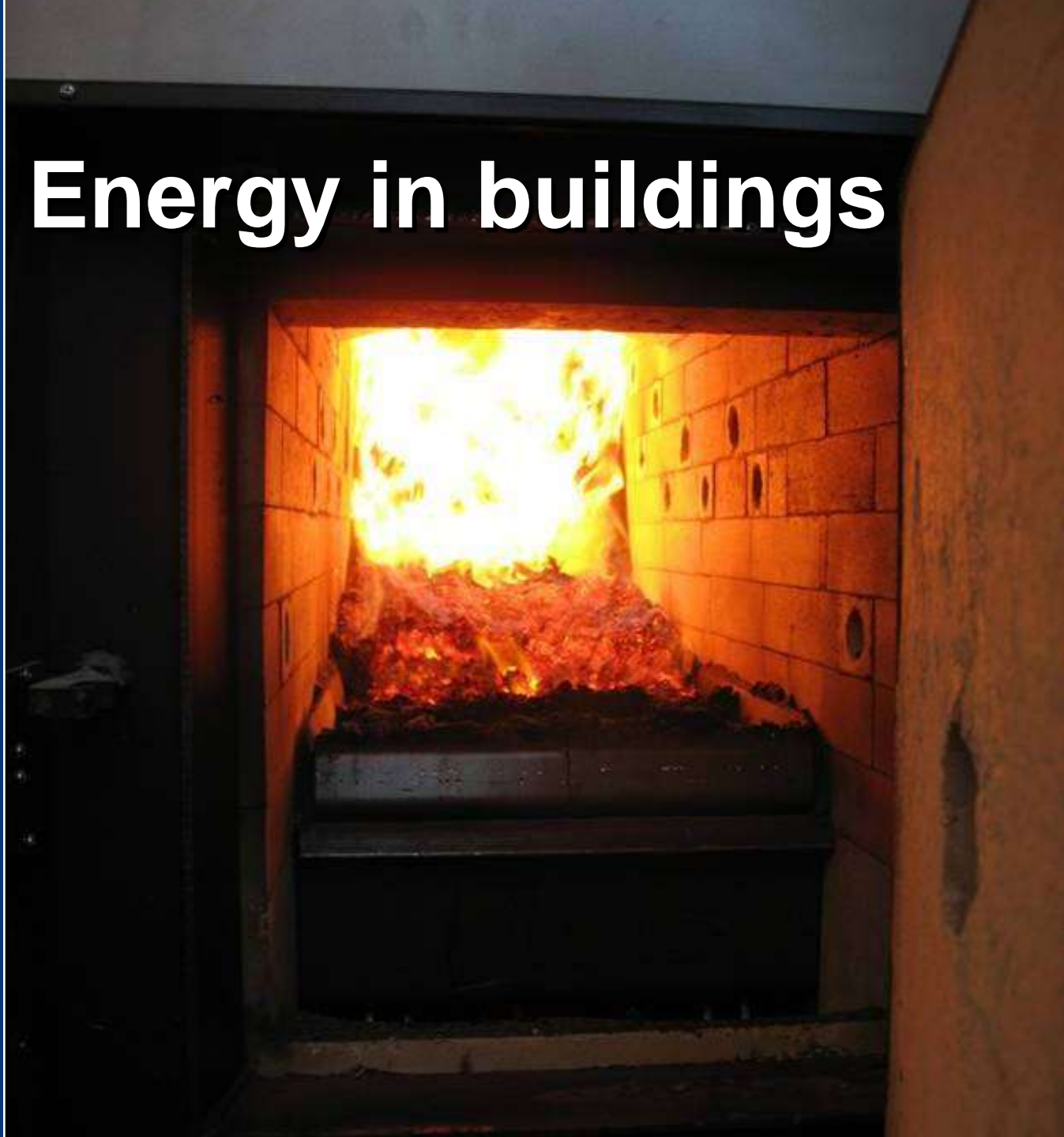
7 Combined heat and power

Routemap to 2020

New on-site measures needed



Energy in buildings



New residential energy options

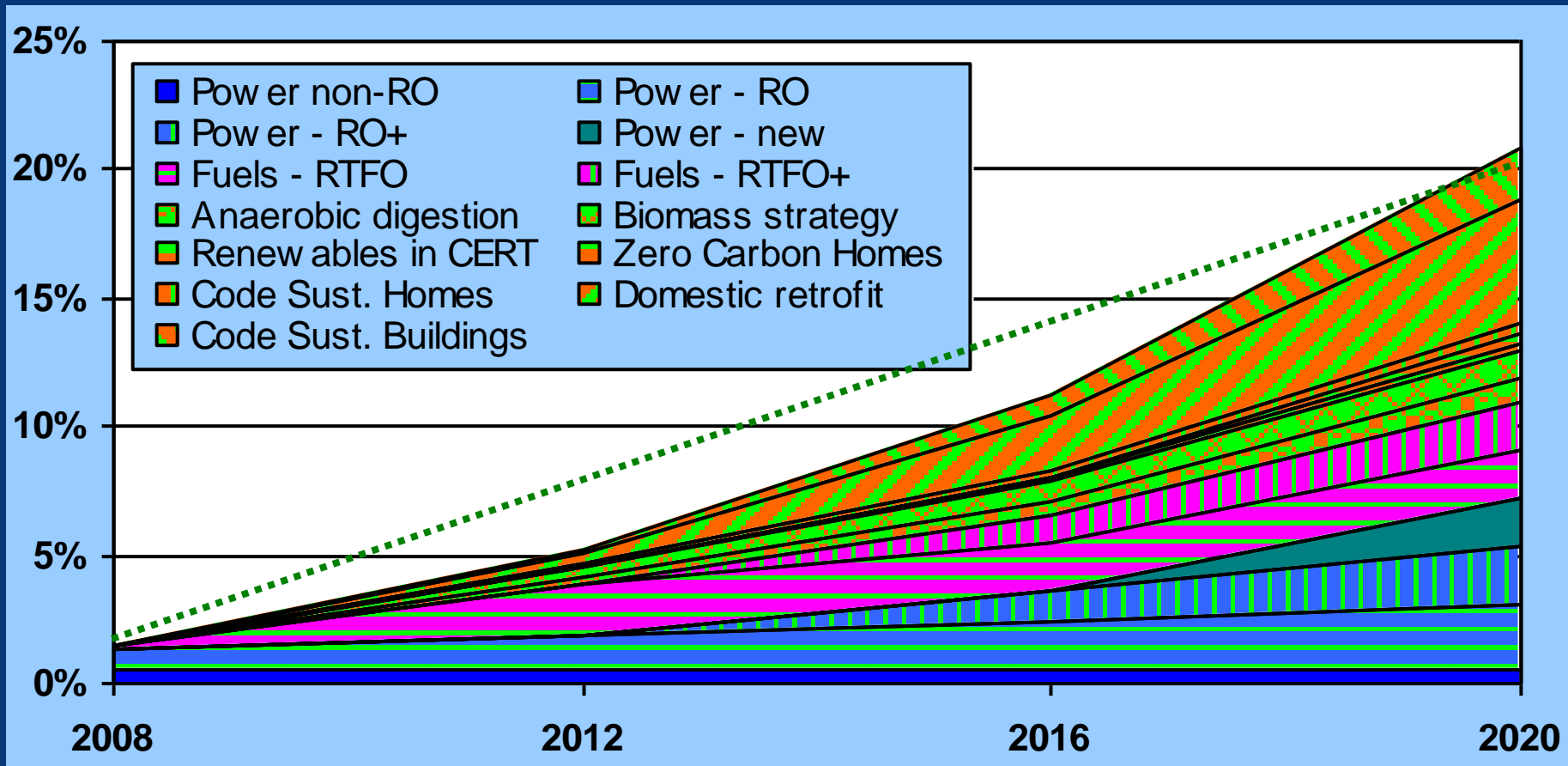
- ▲ Smart metering roll-out programme
- ▲ Retrofit programme for existing houses
 - > Owner occupiers and private landlords:
 - > Feed-in tariffs for electricity; similar for heat
 - > Stamp duty breaks, council tax concessions
 - > Financing measures, mortgages and loans
 - > Social rented and fuel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

Non-residential energy options

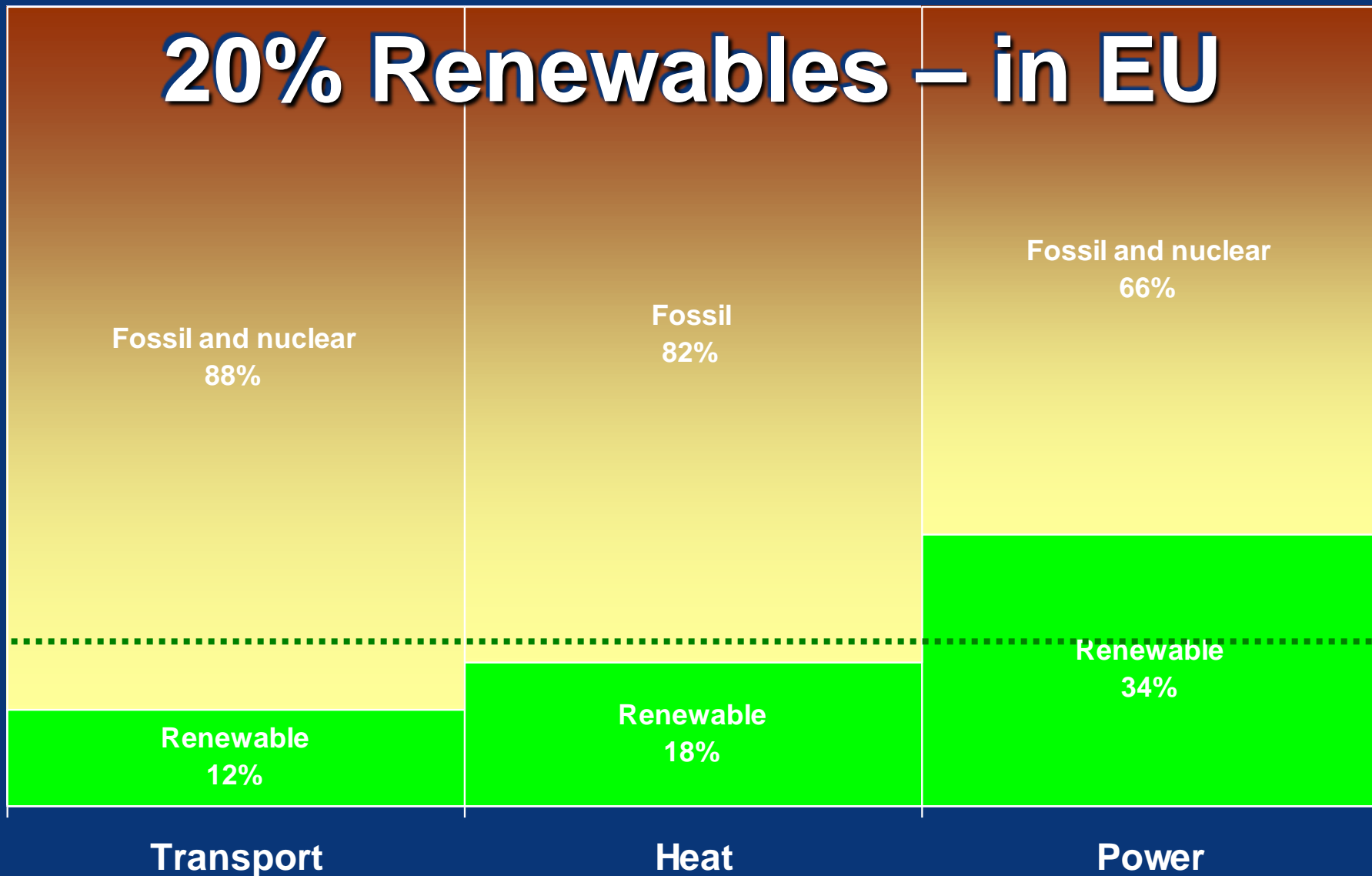
- ▲ Efficiency / renewables in new development
- ▲ Retrofit programme for existing buildings
 - > Feed-in tariffs for electricity; similar for heat
 - > Enhanced capital allowances
- ▲ Novel approaches
 - > E.g: Anaerobic digestion
- ▲ Infrastructure
 - > Smart load management
 - > Heat networks
 - >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