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Responding to the Retrofit Challenge

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Key Points

- What's the problem
- Some obvious questions
- 6 point plan
- Making it happen

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Why existing stock?

- 1/3 of carbon emissions
- 2/3 of total stock by 2050
- Energy demand in UK housing sector grew 17.5% between 1990 to 2003
- In 2005/6, 23.5% households (543,000) were found to be fuel poor; an increase of 5.3% on the 2004/5 figure.
- Now, 1 in 3 fuel poor?

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The Living Planet Report

Fig. 1: **LIVING PLANET INDEX,** 1970–2000

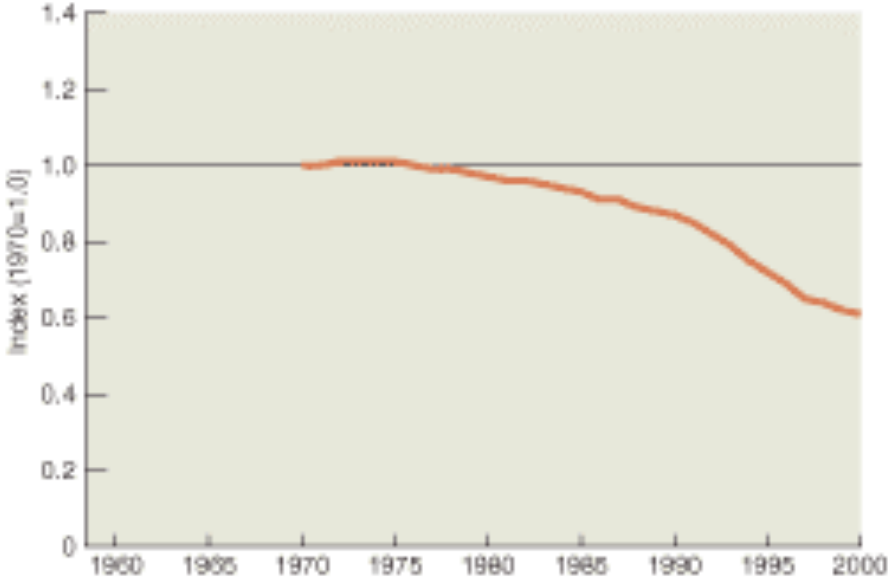
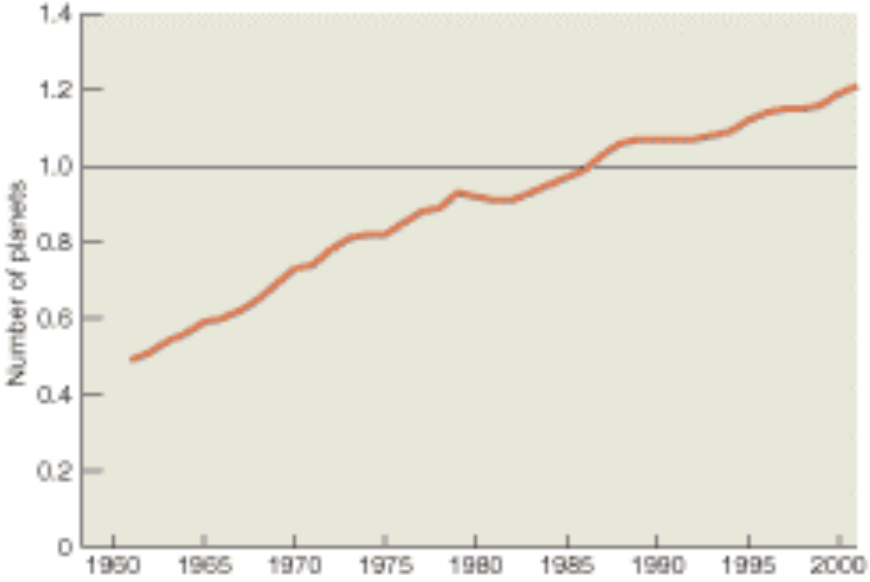


Fig. 2: **HUMANITY'S ECOLOGICAL FOOTPRINT,** 1961–2001



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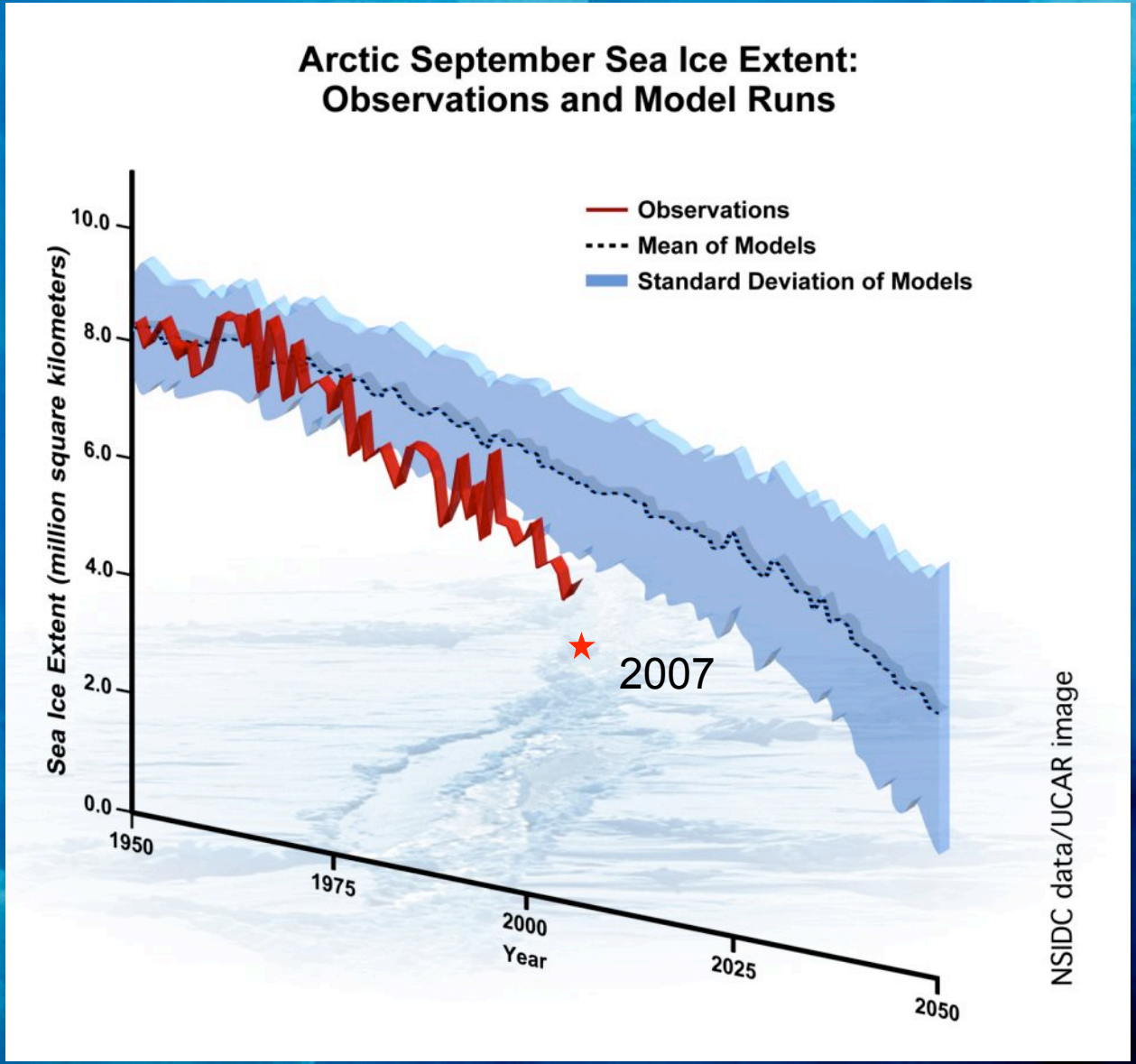
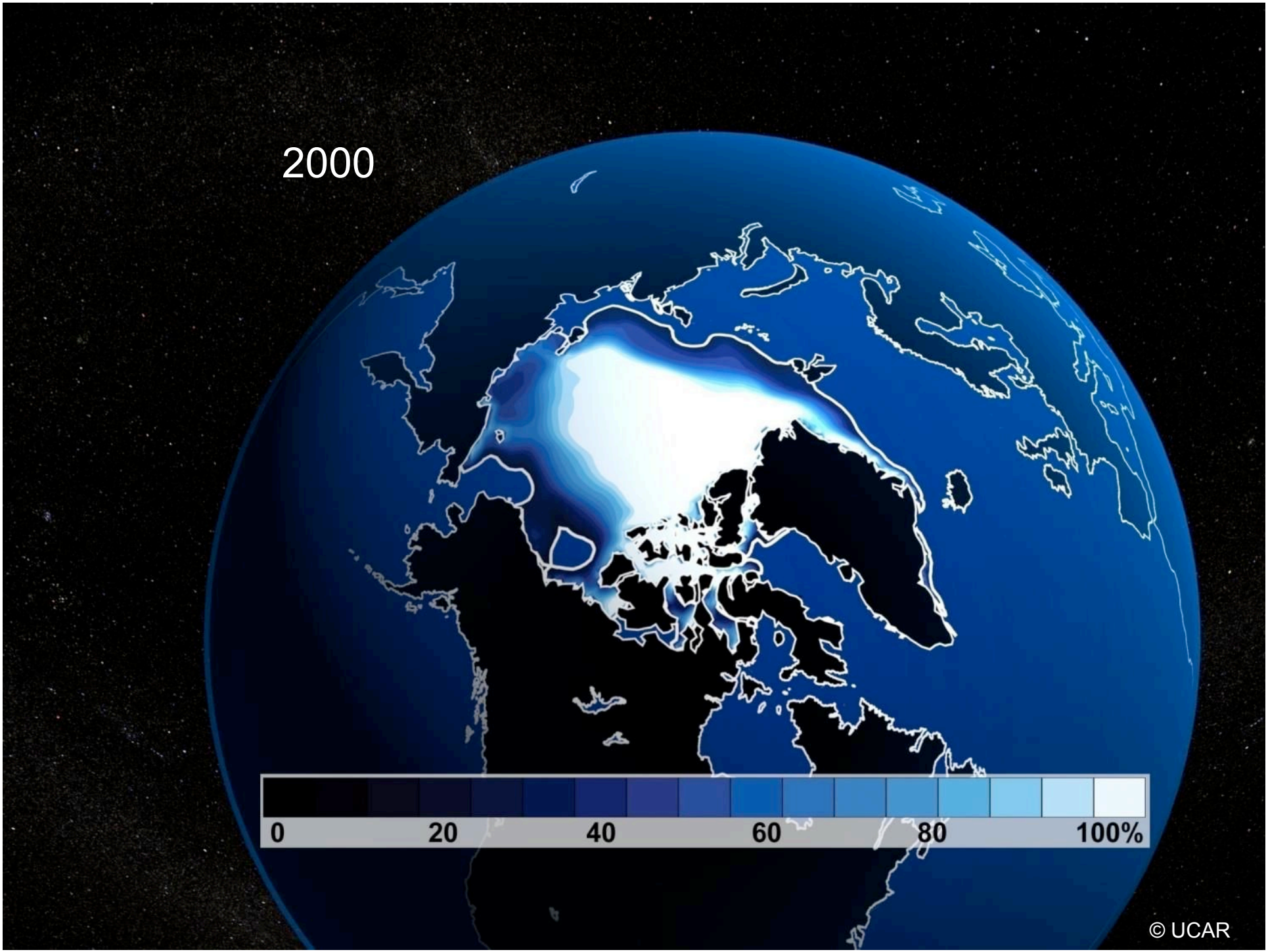
Climate Change - the scientific debate is over…..

- IPCC finds “unequivocal” warming of 0.75°C over last century, “very likely” due to human activity
- We are on course for further warming of 1.8-4°C this century – and potentially 6.4°C
- Even at 1.5-2.5°C warming, 20-30% of species face extinction
- The poor will be hardest hit – risk of mass migration, increased global insecurity

The ice is melting!




2000
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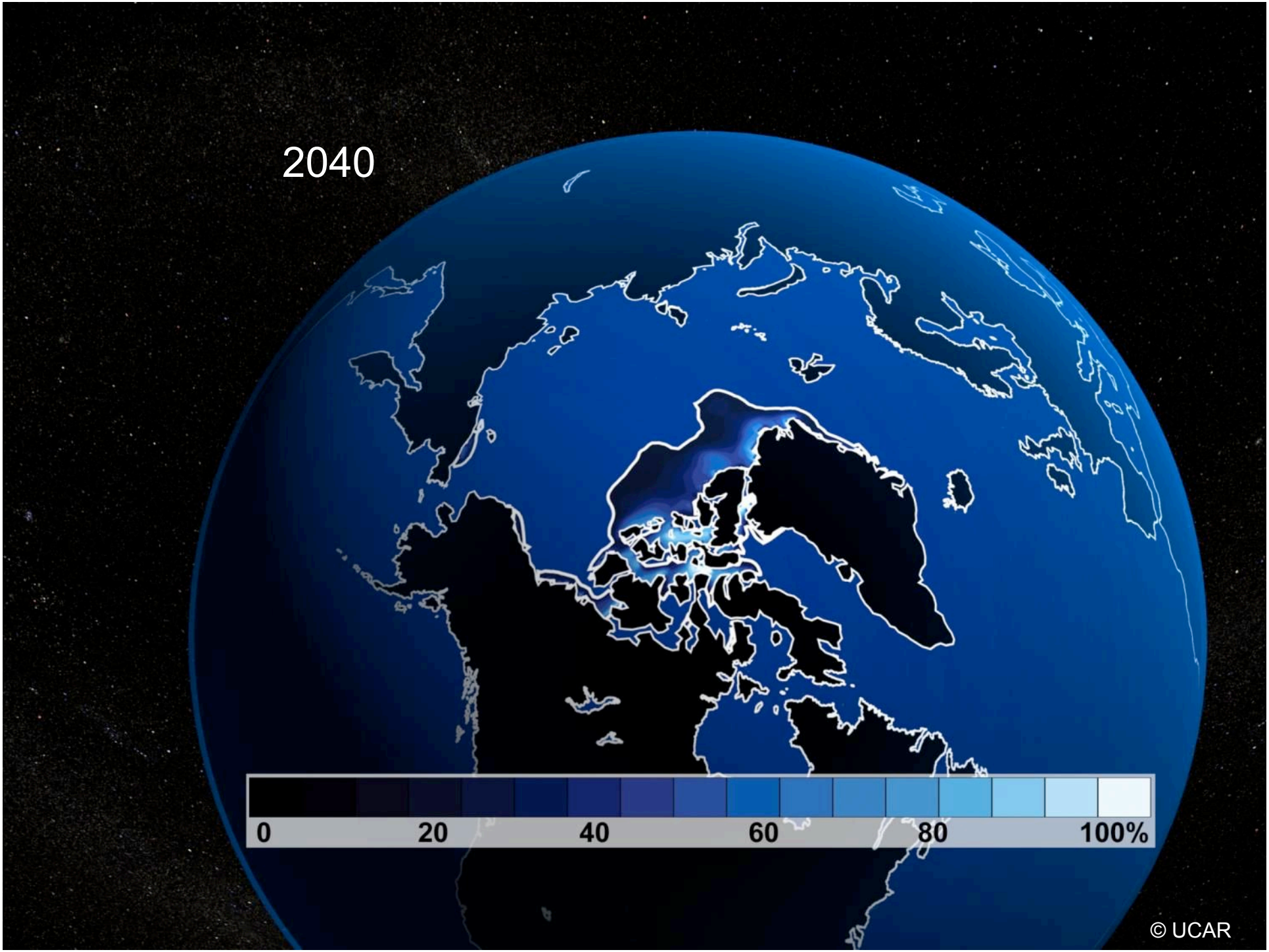
20
40
60
80
100%
© UCAR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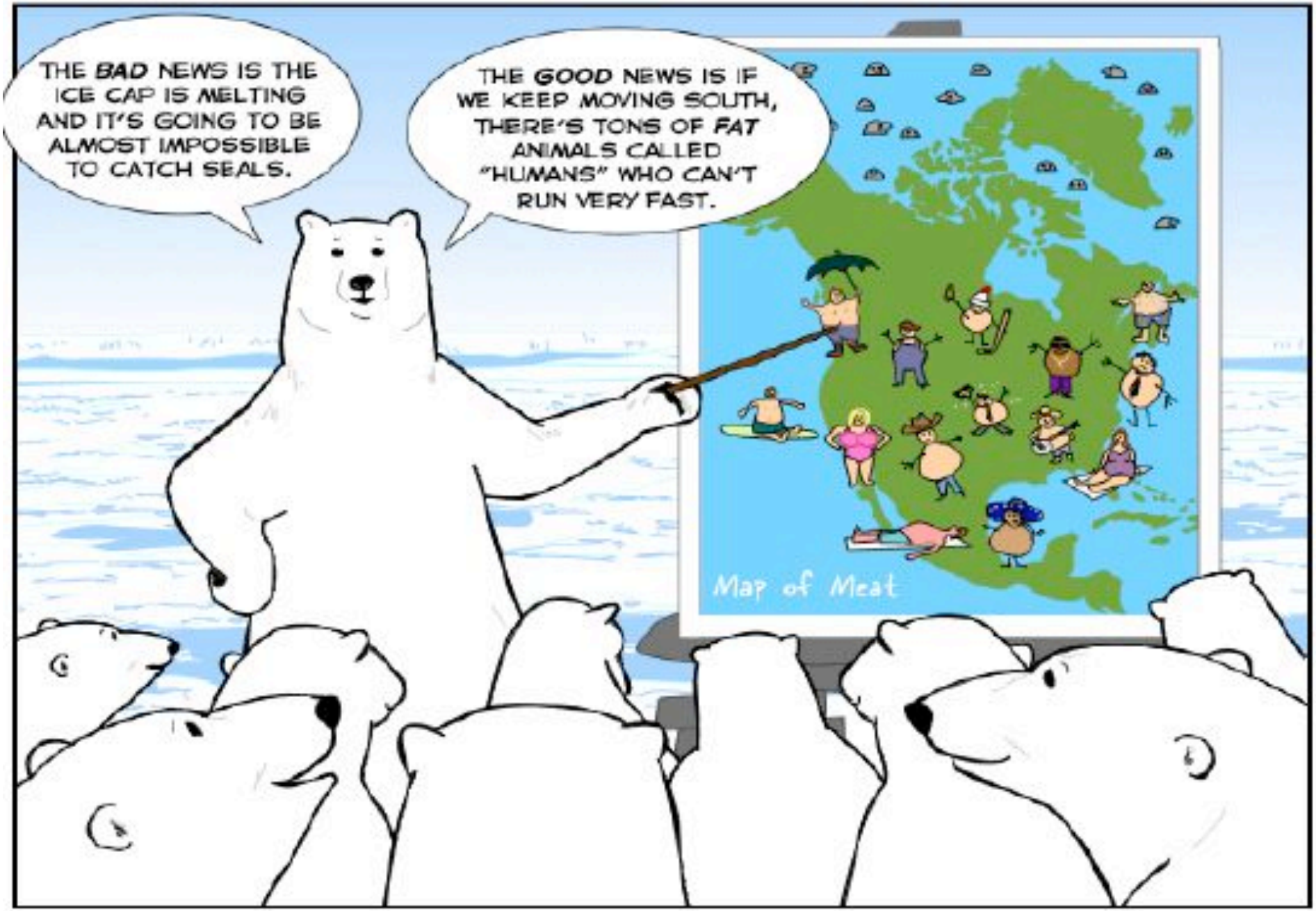
by Nitrozac & Snaggy



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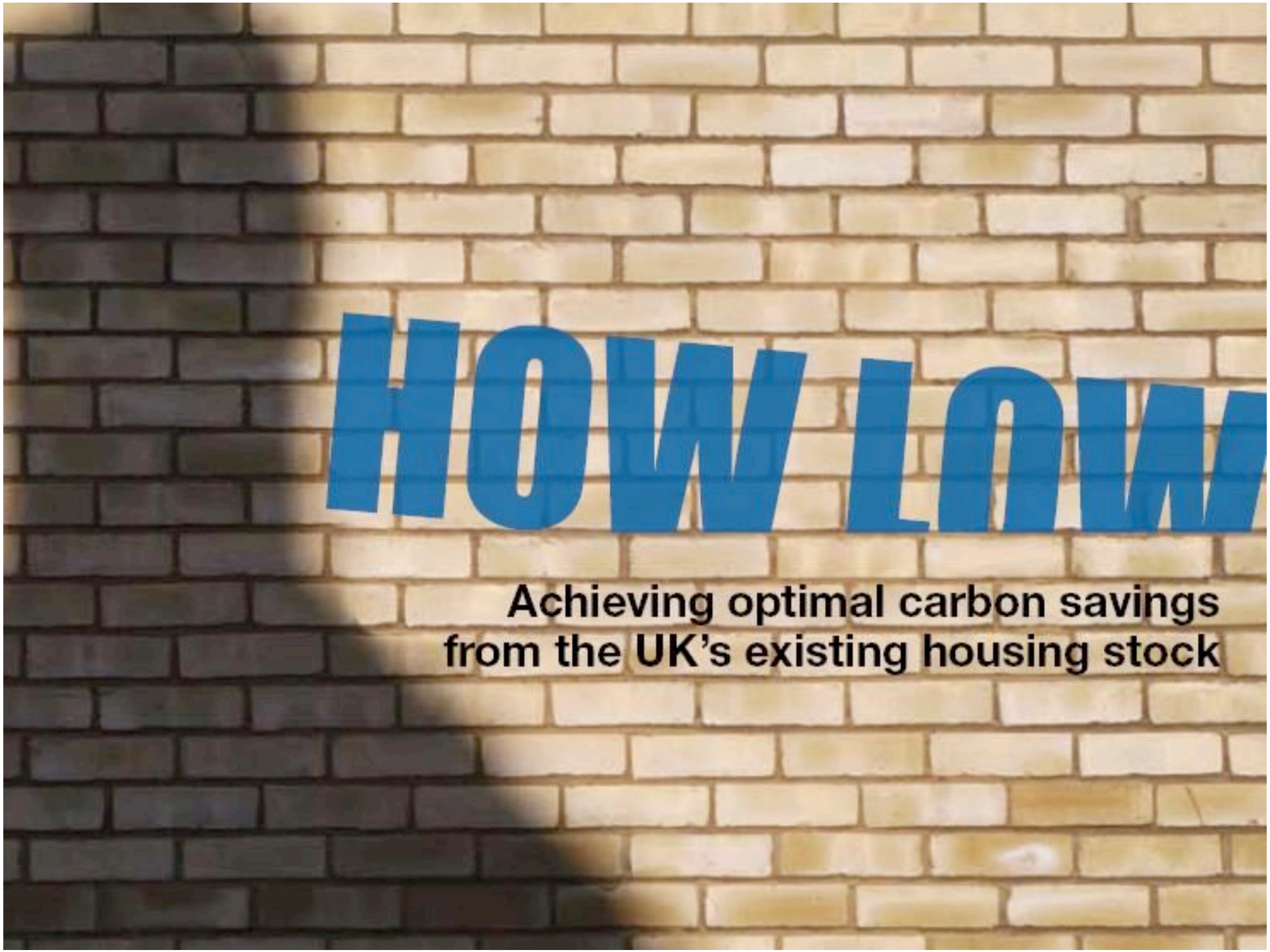
Creating a Retrofit Programme for Scotland

- What is it possible to do and by when?
- Do we have the capacity to do it?
- What policies, regulations and incentives are needed?
- Who pays?


HOW LOW
Achieving optimal carbon savings
from the UK's existing housing stock

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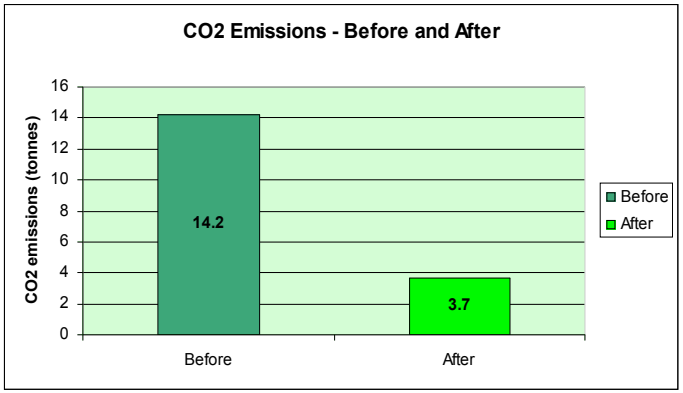
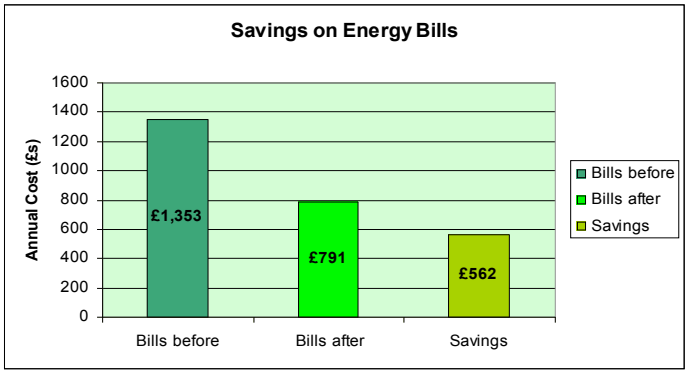
Detached House, solid-walled with an old oil boiler

Rural, off the gas network



Improvements undertaken:

- Loft Insulation
- External insulating render
- Draught-proofing
- Compact fluorescent lights
- Ground source heat pump



Installed cost:

£12,550

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Terraced house, solid-walled with an old gas boiler

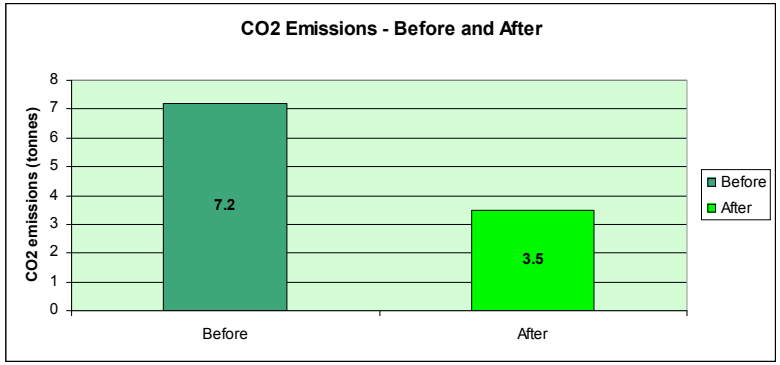
Urban, on the gas network

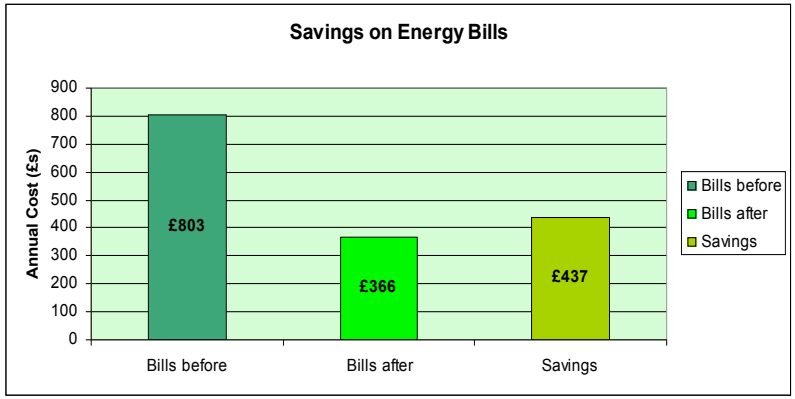
Improvements undertaken:

- Loft insulation
- External insulating render
- Draught-proofing
- Compact fluorescent lights
- Condensing combi-boiler

Installed cost:

- £5,440





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Do we have the capacity?

- Stop – go programmes, grant dependent
- Gap in central heating and renewable energy engineers
- Gap in building control and planning officer expertise
- Skills shortage in LZC technologies

Scale of change (England)

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Measure	Current per year	Scenario 1a (2020) Required rate	Difference	Scenario 1c (2020) Required ra	Difference
Cavity Wall Insulation	378,052	174,640	203,412	272,090	105,96
Loft insulation	490,188	830,732	-340,545	350,083	140,10
Draught proofing	245,080	571,351	-326,271	388,820	-143,74
Solid wall insulation	20,163			114,145	-93,98
Gas central heating & replacement	1,310,579	693,602	616,977	374,425	936,15
Oil central heating & replacement	62,589	35,639	26,949	941	61,64

- Scenario 1a assumes all lofts improved to building regulations
- Scenario 1b & 1c large deficit for solid wall insulation

LZC technologies (England)

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Measure	Current pe year	Scenario 1c (2020) Required rate	Difference	Scenario 2 (2050) Required rate	Difference
Micro CHP	50	675,154	675,104	193,766	193,71
Ground Source Heat Pumps	105	374,780	374,675	95,113	95,008
ASHP	50	2,284	2,234	61,857	61,80
Biomass boilers	44	808	764	1,147	1,103
Solar PV	340	164,918	164,578	169,619	169,28
Solar water heating	1,320	125,107	123,787	35,270	33,95
Wind turbine	243	-		60,461	60,21

- Deficit for all LZC technologies
- Huge step change
- CERT not enough for HTT and LZC technologies

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What polices can deliver?

Targets, targets, targets

- Kyoto
- Scottish Climate Change Bill – 80%
- National Energy Efficiency Action Plan (Scotland?)
- Renewable electricity target
- Fuel poverty target
- Scottish Housing Quality Standard

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Real policies to deliver

6 Key Steps – ‘Opt in’ and ‘Opt out’

- Area-based ‘Low-Carbon Zones’
- Expand use of Energy Performance Certificates
- ‘Balance trading’ for new developments
- CHP/community heating promotion
- Energy Savings Trust – one stop shop
- Monitor progress – EST database

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1. Low Carbon Zones

- ‘something for everybody’
- Community involvement
- Economies of scale
- Hadyard Hill Community Energy Project

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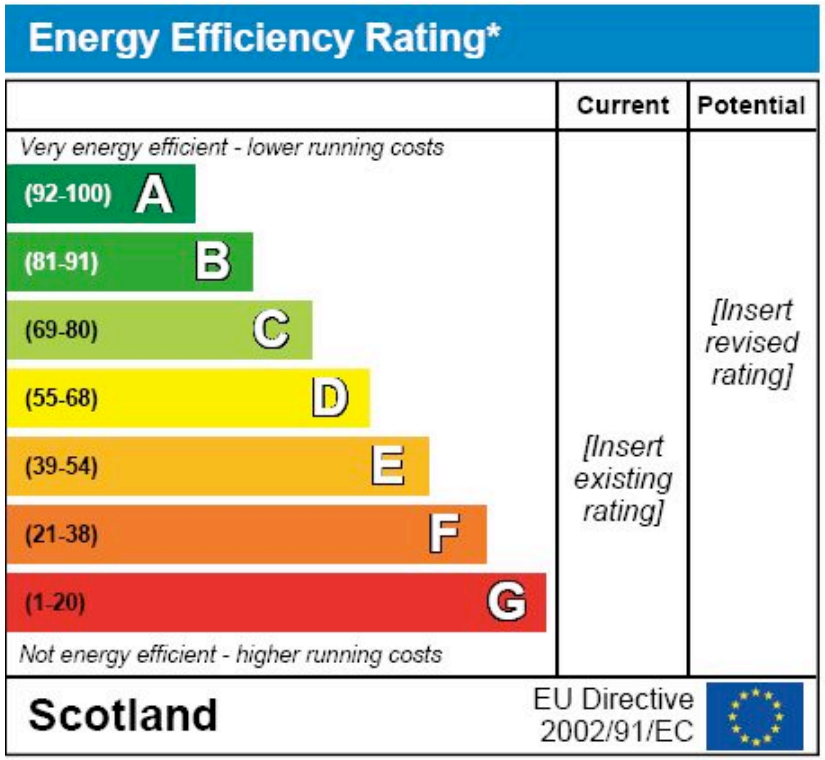
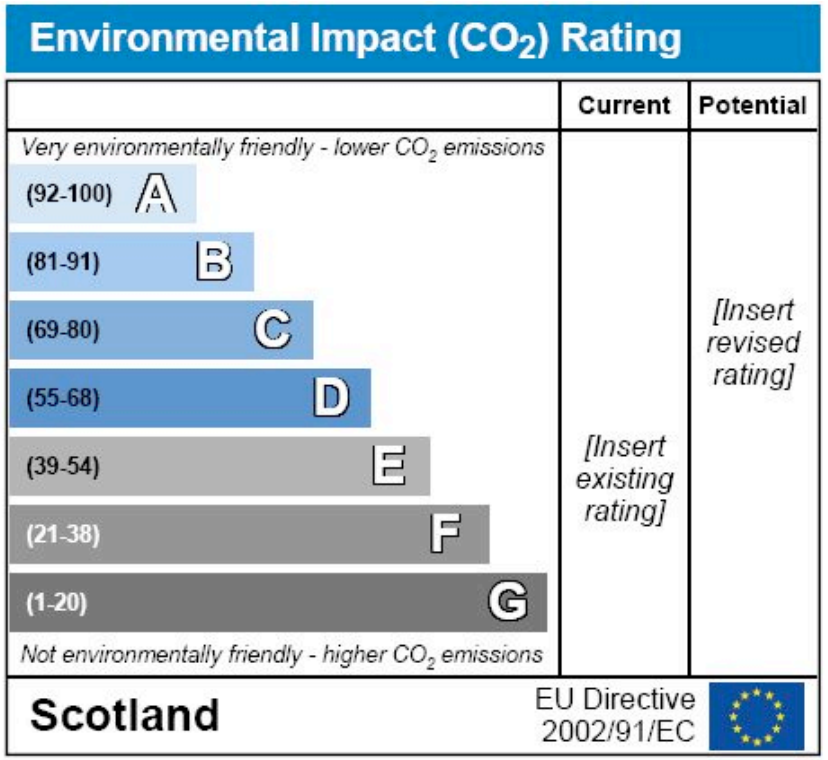
2. Energy Performance Certificates





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3. Balanced Trading

- Offset emissions from new developments with savings from existing homes in area
- Must ensure additionality
- Income stream for Low Carbon Areas

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4. CHP and Energy Service Companies

- Scotland-wide CHP Development ‘agency’
- Offer services to public sector
- Help establish local ESCOs
- Aberdeen City

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5. Single gateway – Energy Savings Trust

- One high profile gateway for information, advice *and* financial support
- Energy efficiency, all low and zero carbon technologies
- Hand-holding
- ‘Opt in’ approaches

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6. Monitoring

- How do we know how we're doing?
- Home Energy Efficiency Database – HEED
- More triggers for EPCs to build database – remortgage, planning permission
- Use to prioritise investment

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How much and who pays?

WWF *How Low?* report

- 80% cut in emissions *is* possible with negligble effect on economy
- £2.6-£3.5 billion pa for the UK (cf Stern 1% GDP £19 b)
- Scotland – proxy cost £260 million pa

Cost effective scenarios

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1a. Market potential

- Measures with a 5 year payback

  Standard insulation, A-rated boilers, controls, dp, HWT

1b. Economic potential

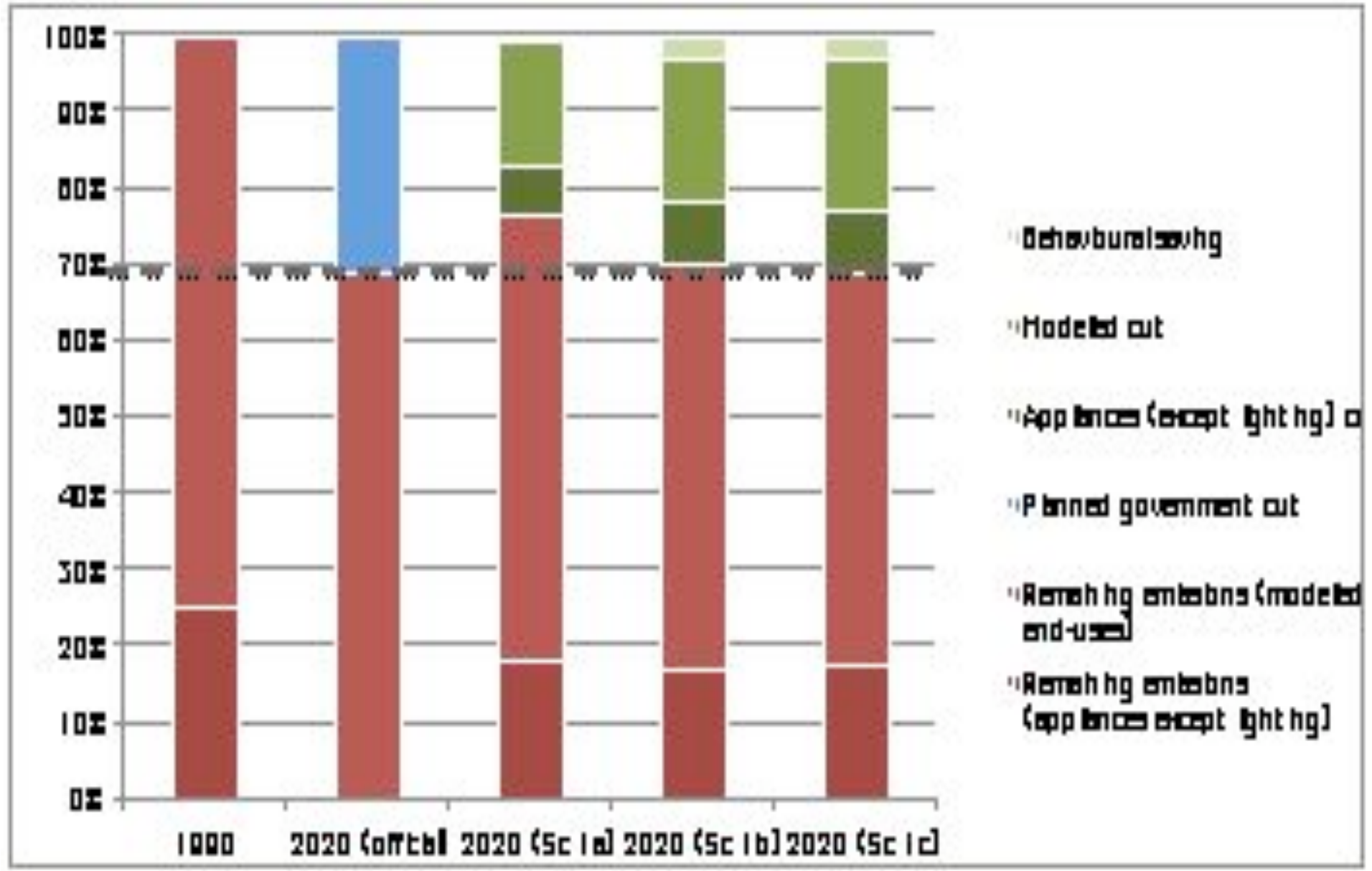
- +NPV inc. 3.5% dr

  As above, some solid wall insulation, heat pumps, solar water heating

1c. Real economic potential

- +NPV inc. 3.5% dr & shadow price C

  As above, more solid wall insulation, some biomass and PV


1000
900
800
700
600
500
400
300
200
100
0
1990
2020 (ref)
2020 (Sc 1a)
2020 (Sc 1b)
2020 (Sc 1c)
Other burning
Modelled out
Appliances (except lighting) o
Planned government out
Remaining emissions (modelled end-use)
Remaining emissions (appliances except lighting)

The kitchen sink…

2a. Technical potential

- All possible measures

  Some decarbonisation of electricity, 10% behavioural, improved appliance efficiency

2b. Theoretical potential

- All possible measures+

  As above, further decarbonisation of electricity, further behavioural savings, some green gas

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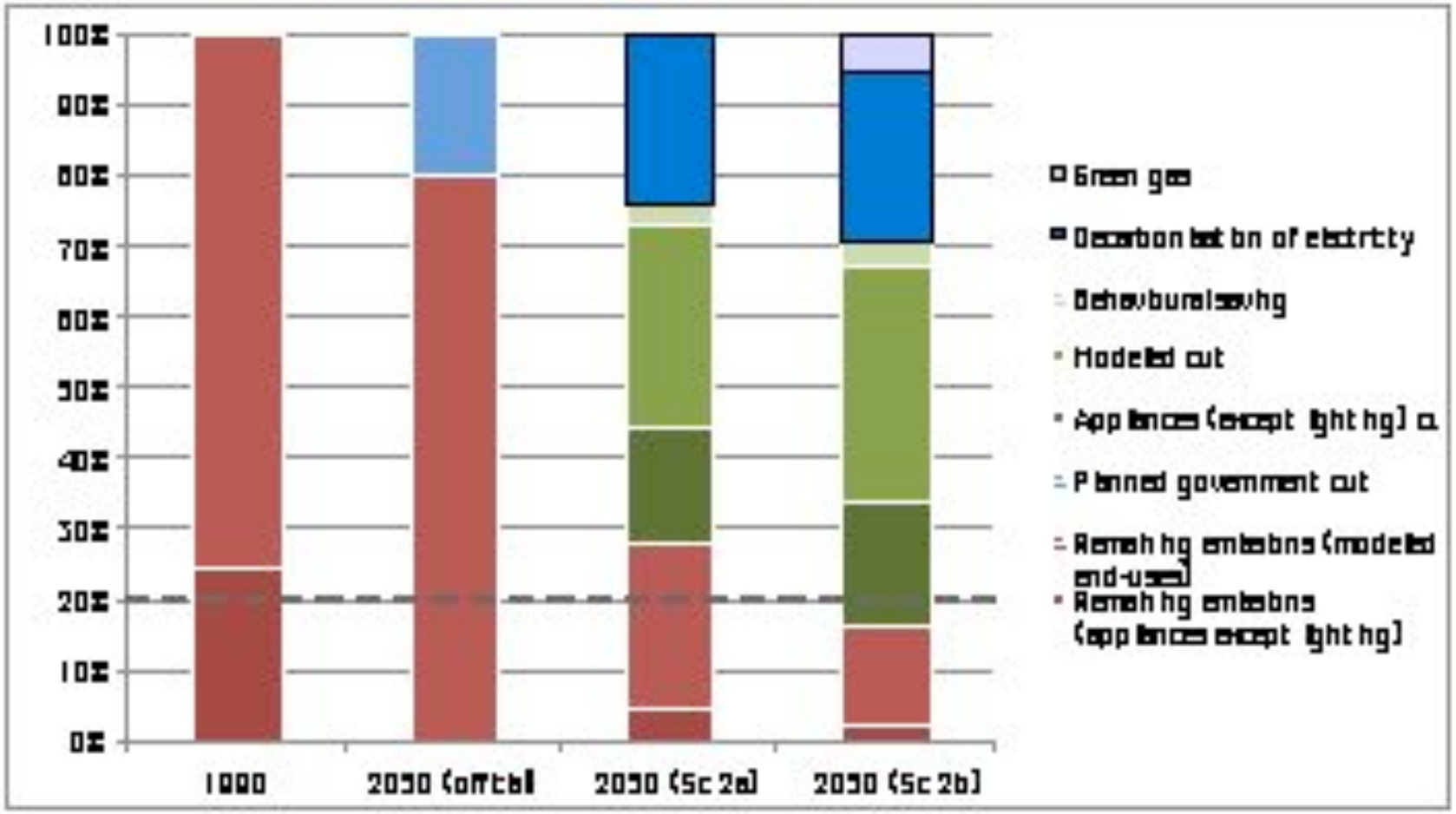

Scotland Economic benefits

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Scenario	Scenario 1a (2020)	Scenario 1b (2020)	Scenario 1c (2020)	Scenario 2
Modelled Savings (MtC)	0.81	0.89	0.93	1.26
Total costs (£ 1000s)	£1,638,114	£6,560,117	£7,043,635	£11,066,2
GVA (£ 1000s)	£451,316	£1,949,642	£2,118,877	£3,328,9
Lifetime fuel savings (£ 1000s)	£9,521,472	£6,812,538	£7,153,816	£9,675,8
Value of Carbon Shadow (£ 1000s)	£405,710	£444,464	£466,730	£631,28
Total Benefit (£ 1000s)	£10,378,498	£9,206,644	£9,739,423	£13,636,1
Net Benefit (1000s)	*£8,740,384*	*£2,646,527*	*£2,695,738*	*£2,569,9*

- For scenario 1a every £1 spent = £5.34 benefit
- Total cost of scenario 2 falls to £9.5 bn based on RAB projections for micro-gen costs
- £262 million pa

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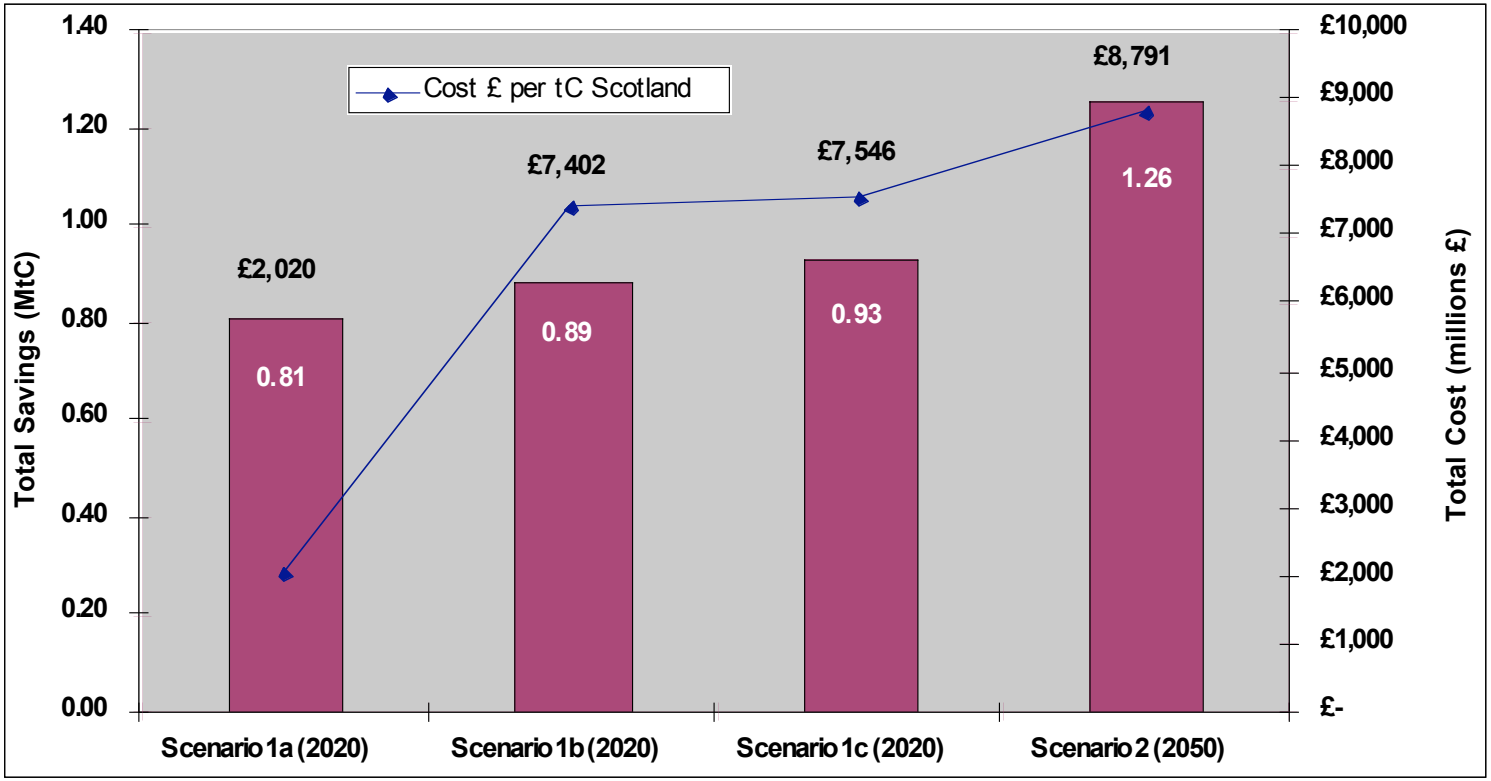
Cost per tC



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Filling the funding gap

Gap of £200 -300 million per annum

- Investment by householders
- Investment by private landlords
- More investment by energy suppliers and lenders
- More investment by central and local government
- New business model

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Opportunity Knocks?

- Scottish Climate Change Bill
- A Low Carbon Building Standards Strategy for Scotland
- Fuel Poverty commitment
- Rising fuel bills
- Kyoto, EU Directives

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A Retrofit Strategy

- Link to fuel poverty, community involvement, improve overall house standards
- Staged targets towards 80%
- Low Carbon zones, EPCs, Balance trading, CHP promotion, EST, monitoring
- Shared investment, carrot and stick
- New business models for whole house retrofit

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Conclusion

- 2^0 imperative = Retrofit imperative
- Energy efficient house – a better house
- **Can** achieve 80% reduction by 2050 with negligible economic impact
- Invite input to WWF research