



# Climate change – opportunities for farmers



## This presentation

- Our possible future climate
- Agriculture's GHG emissions
- What might this mean for agriculture
  - Overview of benefits and challenges
  - Opportunities: resource use efficiency
  - Opportunities: renewable energy



# Our future climate?



# Future climate

All areas of the UK will get warmer, more so in summer than in winter

summer

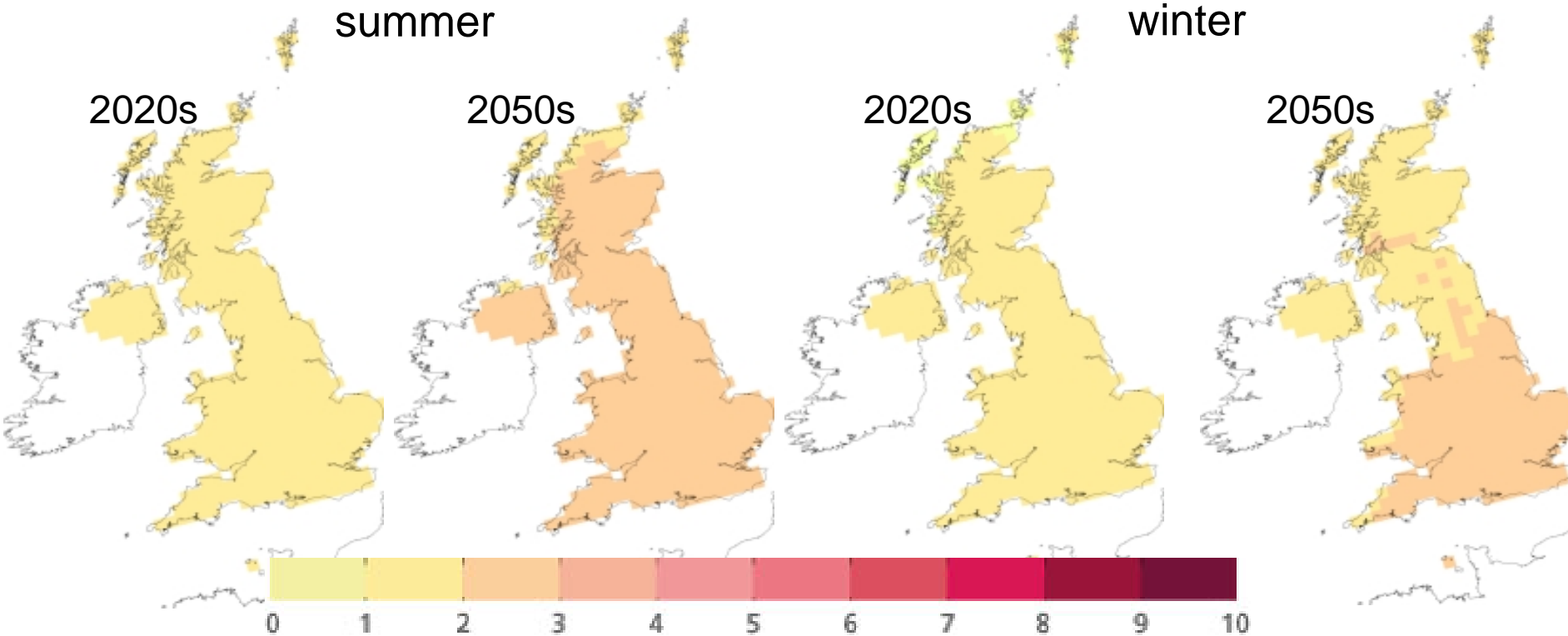
winter

2020s

2050s

2020s

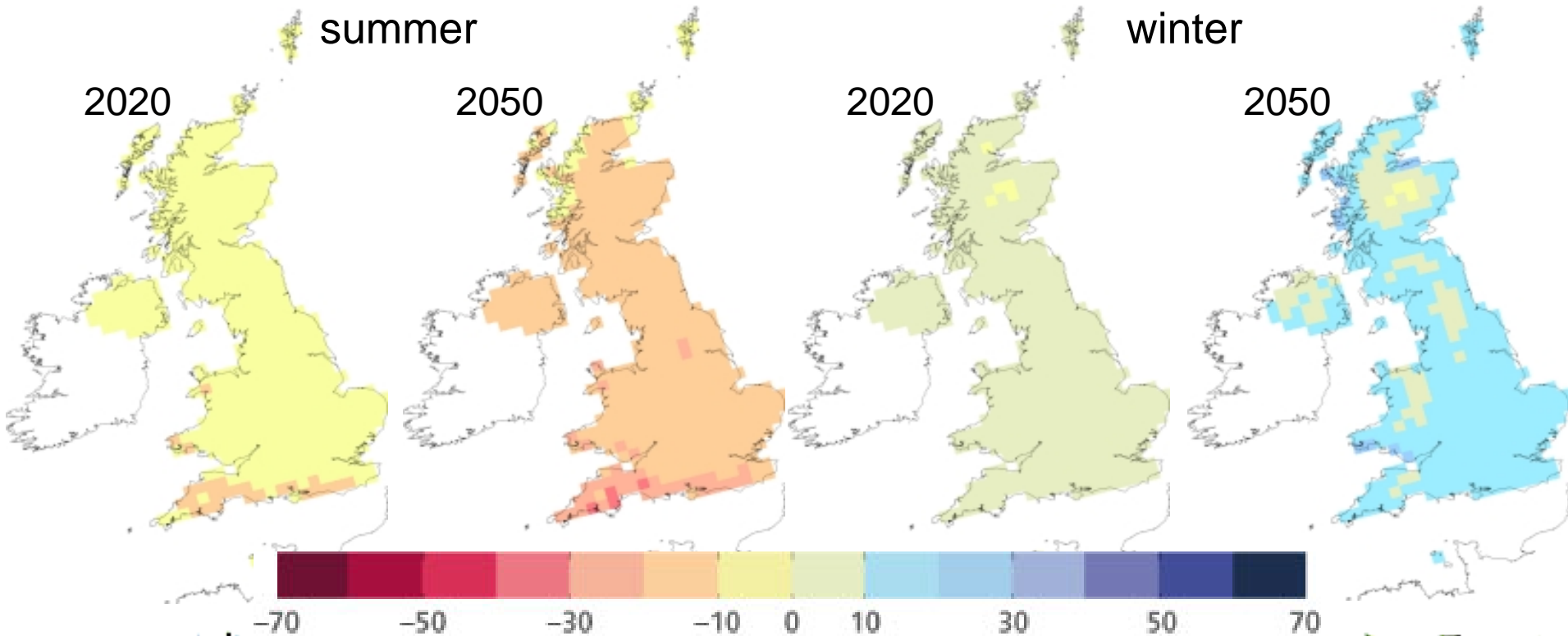
2050s





# Future climate

Summer precipitation tends to decrease and winter precipitation tends to increase





## Future climate

- Sea level rise 18 – 36cm (2040 – 2080)
- Projections of future changes to wind speed and soil moisture not possible
- The impacts of climate change are likely to vary across the region



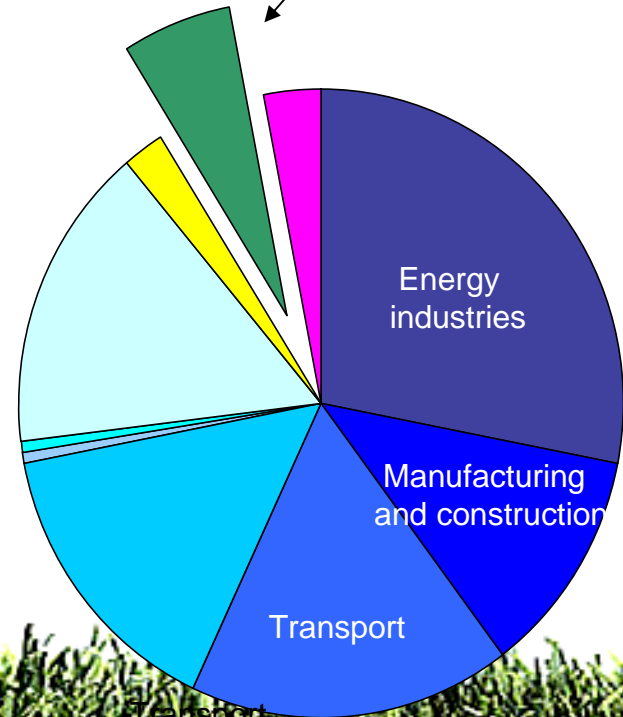
# Agriculture and GHG emissions



## UK ag emissions

- Agricultural production contributes 7% of the UK's greenhouse gas emissions:

- < 1% of carbon dioxide ( $\text{CO}_2$ )
- ~ 1/3rd of methane ( $\text{CH}_4$ )
- ~ 2/3rds of nitrous oxide ( $\text{N}_2\text{O}$ )





# Overview of potential benefits and challenges



## Benefits for agriculture

- longer growing season
- increasing yields
- opportunities for new crops, varieties and breeds
- renewable energy



## Challenges for agriculture

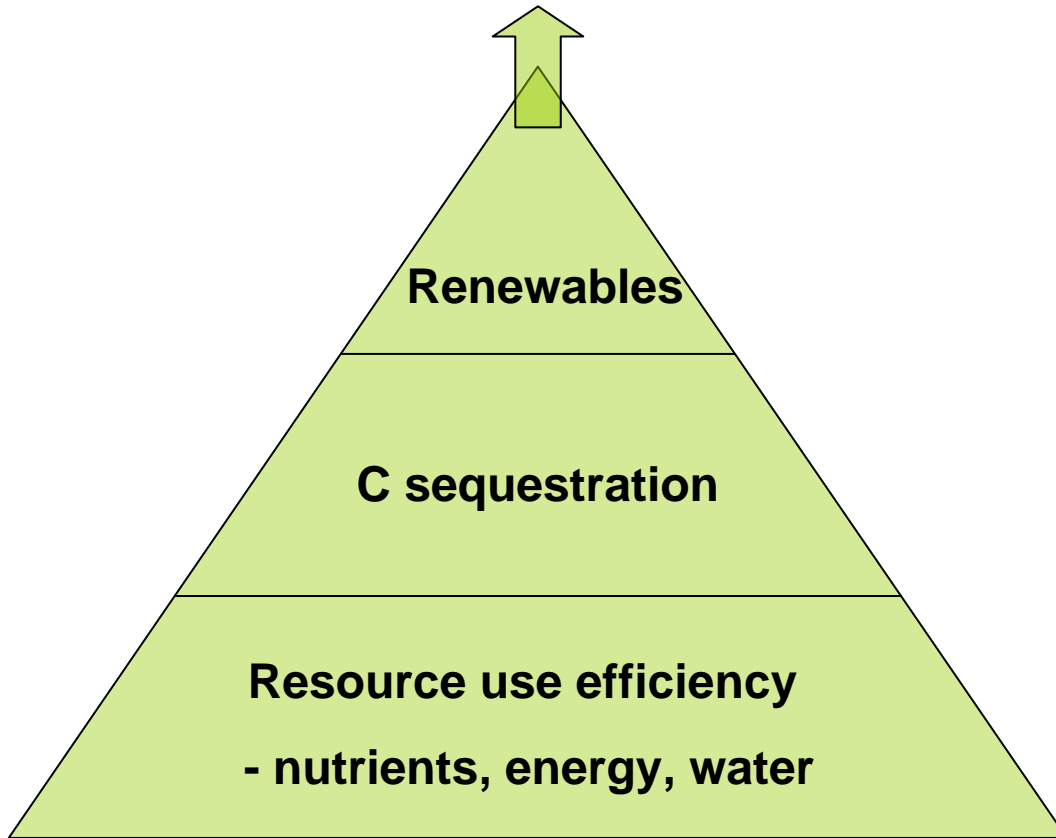
- Higher temperatures - heat stress, changing growth rate
- Drier summers - increased probability of drought stress
- Wetter winters – establishment of winter-sown crops, field ops, silage, grazing
- Changing pests and diseases – over-wintering, earlier attacks



# Business opportunities



# “Part of the solution”





# Business opportunities – improved efficiency



## Tackling emissions by improving efficiency = saving money

### Energy (CO<sub>2</sub>)

- Energy records, machinery, lightbulbs, insulation, new equipment
- Interest-free loans for energy efficiency from CT
  - Thermal screens, used in greenhouse horticulture, typically cost up to £20,000, and can save over £10,000 / 100 tonnes of CO<sub>2</sub> annually.
  - Milk cooling accounts for one third of the energy consumption of dairy farms. New systems cost £3,000, and save up to £1,000 / 6 tonnes of CO<sub>2</sub> a year.
  - Insulation used in field horticulture crop stores, typically costs around £17,000, and saves up to £10,000 / 50 tonnes of CO<sub>2</sub> a year.



## Tackling emissions by improving efficiency = saving money

- Water
- Nutrients ( $N_2O$ )
  - fertiliser use efficiency, optimal animal nutrition
- Livestock ( $CH_4$ )
  - increasing feed efficiency
  - improved manure management or AD



# Business opportunities – generating renewable energy



## Our aspiration: every farmer could be an clean energy exporter

Farmers Weekly (2009):

"If there are two things that were made for each other, it's farmers and renewable energy. Whether it's biofuels or anaerobic digestion, wind turbines or biomass boilers, farmers have the land, the buildings, the entrepreneurial skills and often the raw materials to set up a renewable energy project."



## The shift towards a low-carbon economy

- ‘Green New Deal’ – from culture of embedded fossil carbon (goods, materials and energy), to a sustainable resource-based economy
- NFU policy encourages farmers to diversify into harnessing and exporting low-carbon renewable energy services of all kinds
- bioenergy (various kinds) and wind power probably the largest of the land-based renewable energy resources
- agricultural buildings also present ideal platforms for deployment of small wind and solar energy capture
- on-site power needs only, or also export of renewable electricity?



## Bioenergy – biofuels

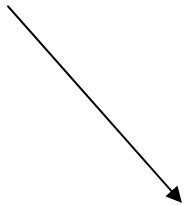
- UK: RTFO started on 15<sup>th</sup> April 2008
  - 99% UK feedstocks meet environmental sustainability criteria
  - 2 new bioethanol plants in NE



## Bioenergy - biomass

Renewable organic material  
used for energy:

- wood / forestry residues
- crops / straw / other residues
- perennial energy crops



- Heat
- Electricity



# Bioenergy - Anaerobic Digestion: NFU policy

- Not just diverting waste from landfill; also a rural economic/diversification opportunity
- Utilising on-farm residues is low risk enterprise
- Benefits: reducing GHG, managing manures and slurries, heat and/or power, digestate
- NFU vision for 1000 on-farm AD plants by 2020.



# Bioenergy - Anaerobic Digestion

- 2 models: on-farm and larger waste-linked unit
- Capital costs and fixed operating costs are sensitive to scale
- Recently announced Feed-in tariffs do not encourage smaller-scale AD



## Other renewables

- bioenergy (various kinds) and wind power probably the largest of the land-based renewable energy resources
- agricultural buildings also present ideal platforms for deployment of small wind and solar energy capture
- ground source heating, micro-hydro



## Illustrative costs: on-site renewable electricity

- Small wind power = £3000-4000/kW cf. £1000-1500/kW for large wind. Small scale needs financial instruments to spread capital cost.
- Solar photovoltaic = £5000-8000/kW.  
Likely size modest (1-5 kW).



## NFU work

- Climate Change Task Force – recommended renewable energy and efficiency savings
- [www.FarmingFutures.org.uk](http://www.FarmingFutures.org.uk) - events at RE sites, proposed elite ‘master classes’ for early adopters
- Trying to resolve issues of environmental permitting, planning and grid access
- NFU Energy Service
- CT loans



# Agriculture and climate change mitigation

- NFU believes that agriculture has a significant role to play in tackling climate change
- We believe every farmer should have the opportunity to be a net exporter of renewable energy



Thank you