

Net zero agric/horticulture by 2040:

Opportunities for on-site renewables production



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Climate change, energy, net zero: NFU policy

The National Farmers' Union of England and Wales (NFU) represents the interests of ~55,000 farmer and grower businesses

Given the long-term **impact of climate change on our sector**, NFU members have acknowledged our role in tackling it over the past 15 years.

Agriculture is uniquely **both a source and a sink** for greenhouse gas emissions, making good use of the 75% of UK land area under farming.

In 2019, the NFU set out its vision for agriculture to achieve a **net zero contribution to climate change** across the whole of agricultural production by 2040, focussed on three key themes or 'pillars'. **Many sectors may now need to reach net zero before 2050.**

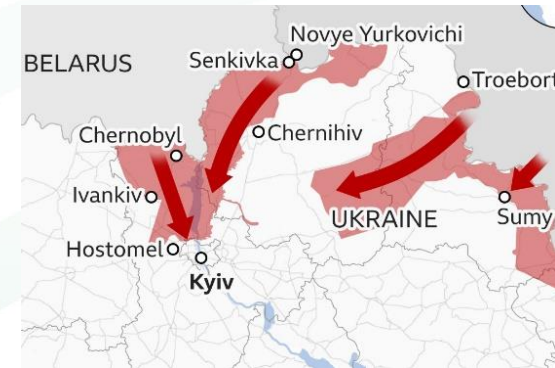
Farmers and growers own or host >50% UK solar power and AD capacity, as well as the majority of onshore wind power, while playing a significant role in the supply or fuelling of renewable heat and thermal power generation.

Action on the twin crises of **climate change** and **biodiversity loss** requires farmers and policy decision-makers alike to move on from regarding land as having one single purpose (food, non-food, conservation)

Since 2022...three BIG policy drivers

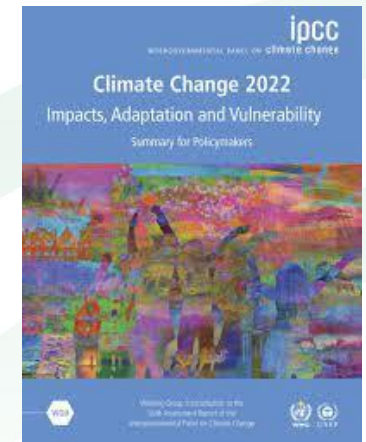
- **Energy security (Putin's war)**

Oil was \$130/bbl, now \$80, but highest since Jul 2008
Solar electricity or green ammonia must replace oil



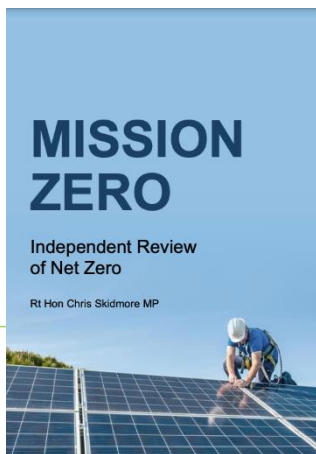
- **Climate Change (IPCC AR6 synthesis report)**

“choking humanity...fossil fuels a dead end...living through climate collapse in real time”: UN Secretary General Antonio Guterres



- **Food security (agricultural policy transition)**

“completely contradictory policies”: Minette Batters



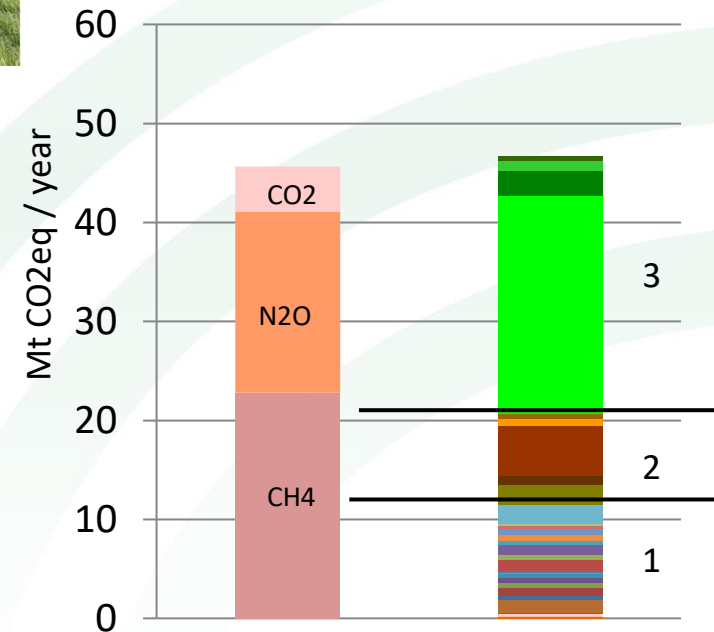
2023 - Chris Skidmore report: “go further and faster”

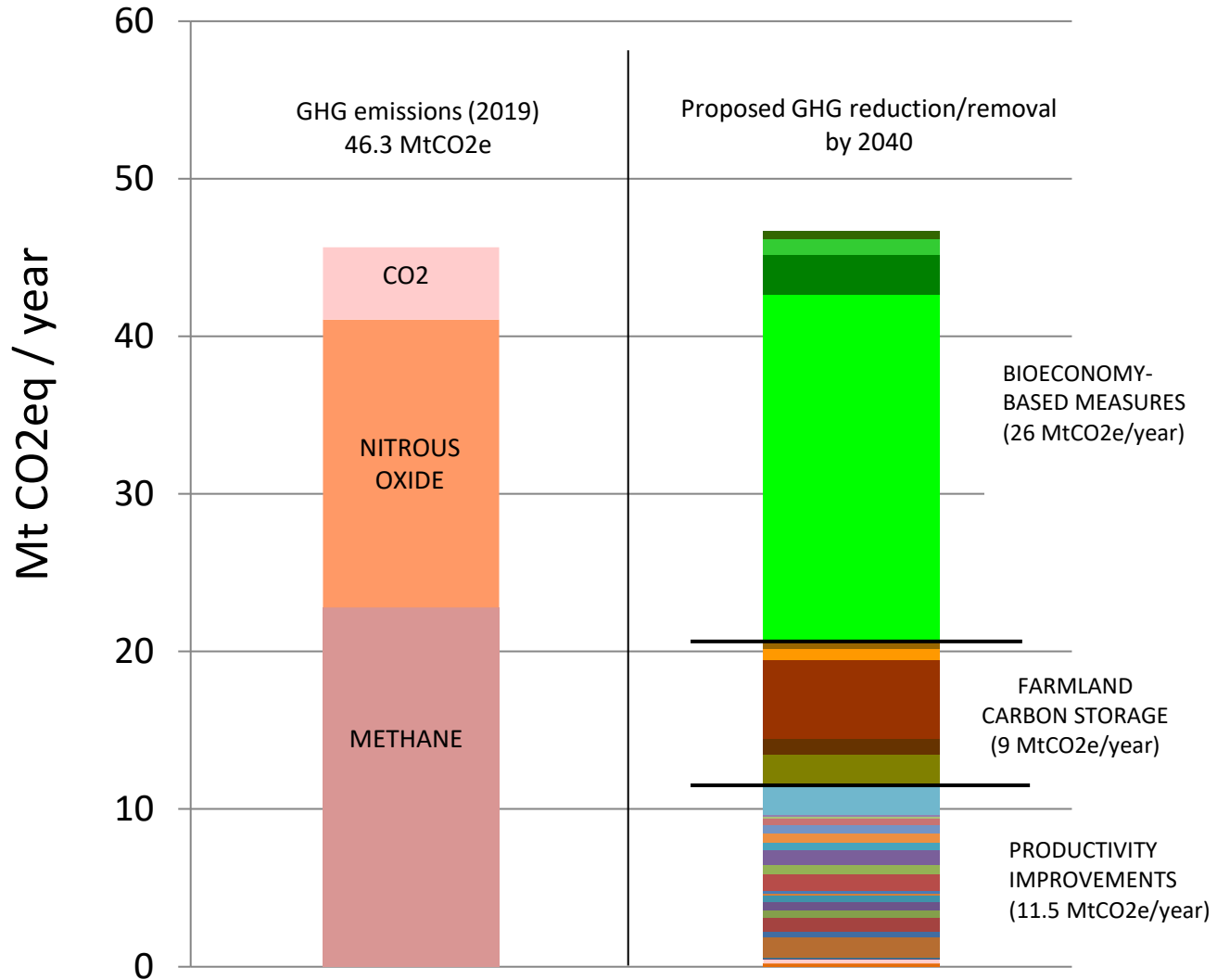




NFU net zero strategy: Sep 2019 – but has stood the test of time

- reduce emissions from production activities as far as possible
- counterbalance the residual emissions with carbon removals
- many other sectors have followed suit, 2019-23
- **NFU at COP26 / 27 / 28 climate summits**





2019 agricultural emissions balanced against potential GHG reduction through productivity measures and GHG removals by various methods

Pillar 1

Boosting productivity and reducing emissions

Estimated GHG savings: **11.5 MtCO₂e/year**

Wide variety of measures, from controlled release fertilisers and inhibitors to feed additives, advanced breeding, energy efficiency, on-farm AD

Pillar 2

Farmland carbon storage

Estimated GHG savings: **9 MtCO₂e/year**

“Nature-based solutions”: enhanced hedgerows, increased tree planting, measures to boost soil organic matter

Pillar 3

Coupling bioenergy to carbon capture, utilisation and storage

Estimated GHG savings: **Up to 26 MtCO₂e/year**

BECCS and other “engineered” greenhouse gas removals, ideally at farm scale, plus bio-based materials, other renewables that avoid fossil fuel emissions, and novel soil amendments (biochar, rock weathering)

Ukraine 2022/23: a shift of focus...

Farmers and growers have faced unprecedented costs for fertiliser and energy inputs --> emphasis now on 'Pillar 1' **resource use efficiency**:

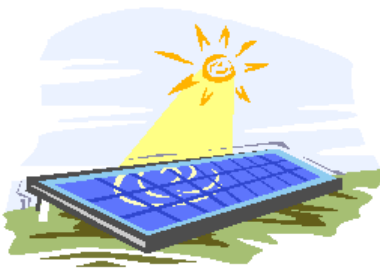
- Boost energy efficiency and on-site renewables like solar and onshore wind power
- Call for better regulation that enables efficient return of agricultural nutrients to land.

Support more **landspreading** (planning and environmental permitting):

- manures and slurries
- compost and AD digestate
- straw-fired power station ash

Enable **anaerobic digestion** to produce more biomethane (new-build, convert CHP plants, bring forward increased food waste collection alongside crop feedstocks) and capture more food-grade carbon dioxide

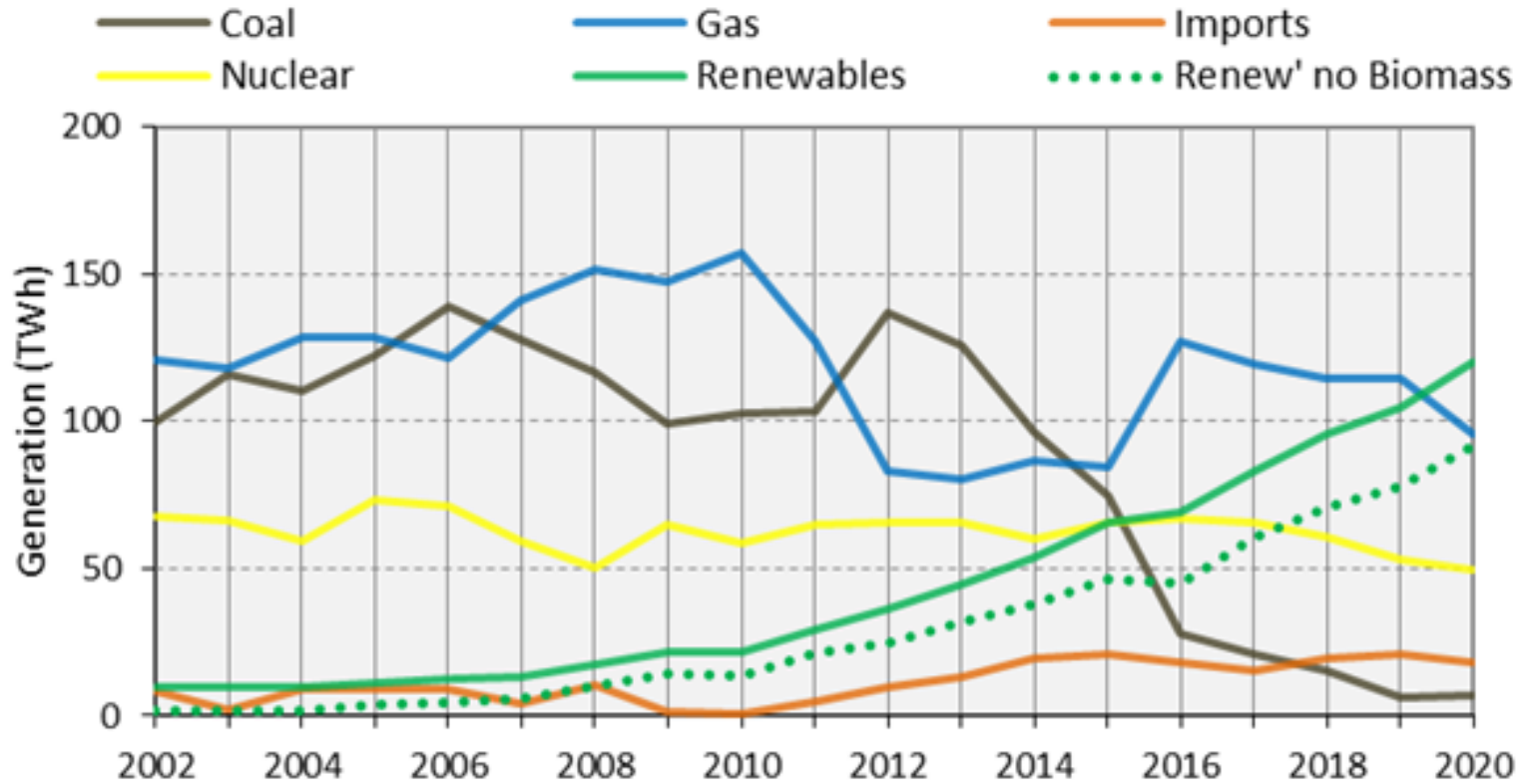
...and more emphasis on sectors



UK renewable power 2020-23 \approx 43%
53,500 MW of renewable generation capacity in 2022



GB Generation by Fuel



Solar roofs a 'no-brainer' – especially for farmers, but grid connection a constraint – and now solar canopies



50-300 kW PV systems for intensive livestock sheds, grain stores, dairy barns: examples across Britain (all sizes now Permitted Development, including canopies)

Multi-purpose land: good impressions count

Solar Energy UK
ambition = 40
gigawatts (GW) of
solar by 2030,
including 25GW
solar farms, up
from 9GW today

Larger solar farms
more challenging,
but total land use
still modest cf.
other renewables

Govt goal = 70 GW
by 2035 (45 GW
solar farms?)



multi-functional land use (food, energy, environment)

Striking a balance between food security and net zero



Tom Bradshaw, NFU Deputy President: “Renewable energy production is a core part of the NFU’s net zero plan and solar projects often offer a good diversification option for farmers. It’s important that large scale solar farm development is located on lower quality agricultural land, avoiding the most productive and versatile soils. Utilising roofs and farm buildings for solar should also be incentivised as it delivers a sustainable method of energy production while avoiding any land use conflict.” (City AM business newspaper, 21 Aug 2022)

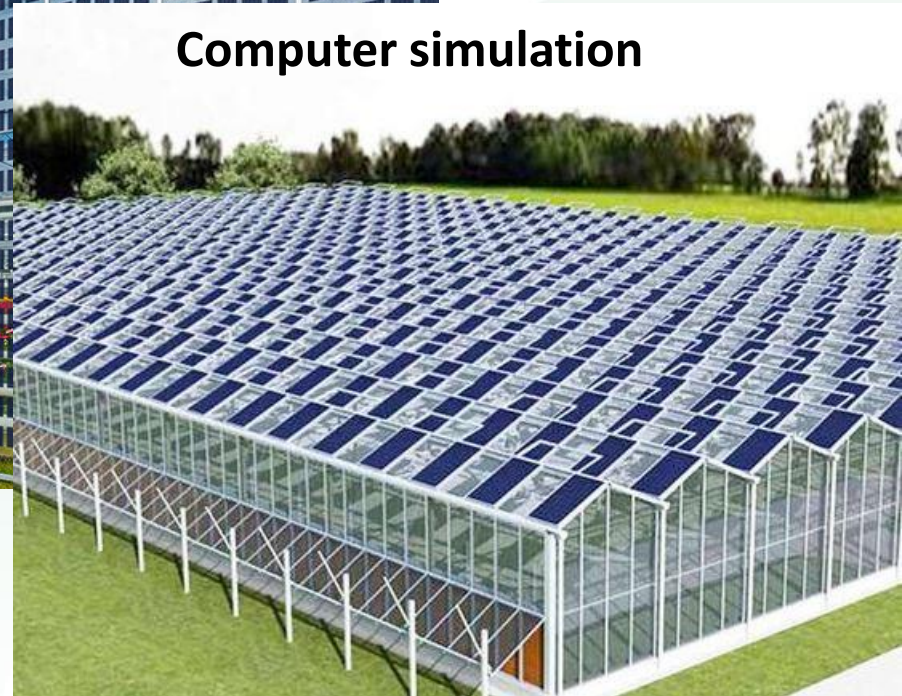
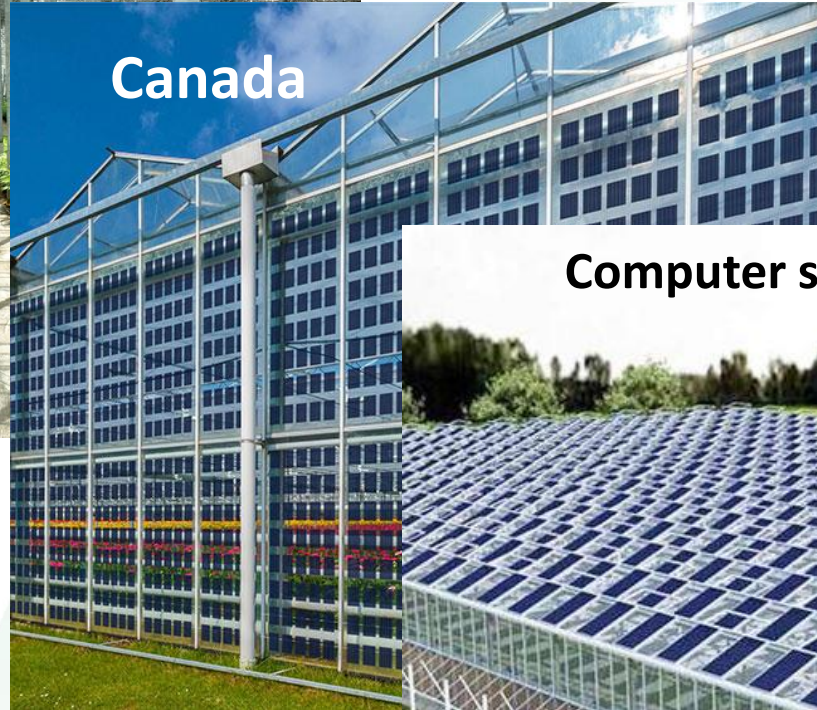
Agrivoltaics – protection for ‘top fruit’



NFU supported by



Potential applications for protected ornamentals



Wind power complements solar – returning soon?



11 kW Gaia turbine (above); 50 kW Endurance turbine (right)
Height = about 20m



Height = about 30-35m

NFU supports enlargement of the current Permitted Development right for on-site generation by farmers, SMEs, community groups, giving access to year-round electricity independence and new applications like EV charging

NFU supported by



Mid-sized solar PV for poultry, pigs, veg stores, packhouses

- Ukraine + falling cost = grid parity; economics now work subsidy-free for most users
- those with summer peak electricity needs most economic
- e.g. £375k for 500 kW, generating 450-500 MWh/year
- 50% on-site use = £63-70k @ 28p/unit + £27-30k @ 12p/ kWh export PPA/SEG (low O&M costs)
- 75% on-site use = £95-105k (own use) + £15k export
- Effective ROI from 24% to 32%





Warwickshire 0.8 MW



Cumbria 10 MW

Battery electricity storage

Wide range of sizes and appearances: now growing fast



Lincolnshire 10 MW

Anaerobic digestion: multiple products including bio-CO₂

gas / electric / CO₂ / digestate



JV ENERGEN

RENEWABLE ENERGY



Wight Farm Energy / Foresight



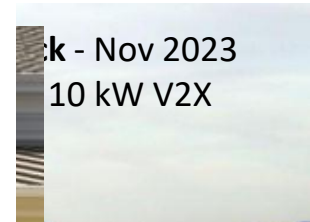
Electric vehicles – driving change for farmers



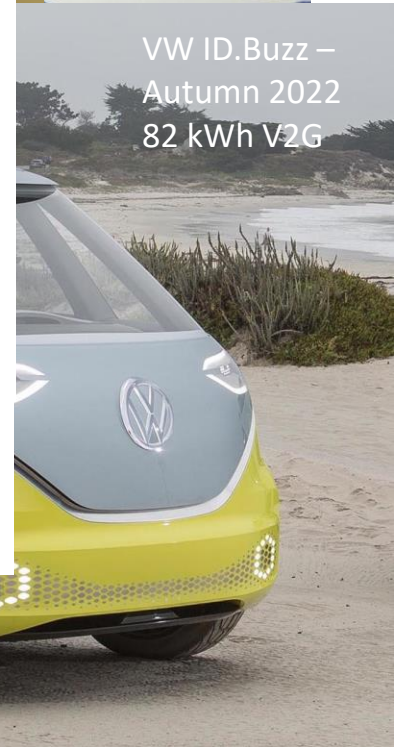
Ford F-150 Lightning
April 2022 / 113 kW
9.6 kW power / V2X



Fendt e100 Vario electric tractor (50kW / 75hp)
100 kWh battery – V2G (vehicle-to-grid) ready
Field trials 2019/20 in Germany – now expected 2025



Nov 2023
10 kW V2X



VW ID.Buzz –
Autumn 2022
82 kWh V2G

Media reports of progress by manufacturers around the world



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Renewable Energy Solutions



Defra grant schemes for rooftop solar

1. Animal Health and Welfare grants - Calf Housing scheme (£10m) and upcoming Poultry chicks/pullets scheme include solar PV on new/upgraded buildings (25% above a total spend of £37,500) with batteries, mounting systems and grid connection/upgrade costs.
2. Improving Farm Productivity 'rooftop solar' scheme (**all farm types, including hort**) to overcome grid connection limitations: £15m budget; 25% funding, minimum £15,000 grant, so small-medium roofs included (40-100 kW). **Details on NFUonline – application checker due Jan '24.**



NFU policy asks – linked to Net Zero

1. Support for investment in new technology, and improved infrastructure, to drive increased productivity
2. Farmers need access to a robust carbon price to enable on-farm carbon storage in vegetation and soils – climate change must be an ELMS priority
3. A strong domestic bioenergy supply chain is essential to realise GHG removals through the bioeconomy, avoiding venting bio-CO₂ – plus continued non-tariff support for renewables, batteries, EV charging, etc.

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