



Llywodraeth Cymru
Welsh Government

Uned Tystiolaeth Strategaeth

Strategic Evidence Unit

Ann Humble– *Pennaeth Dadansoddi Strategol* / Head of Strategic Analysis



Air quality

Greenhouse gasses

Landscape

Amenity

Bioenergy

Pests and diseases

Biodiversity

Adaptation to
climate change

Food production

Balancing competing goals

Profit

Flood
alleviation

Water quality

Timber

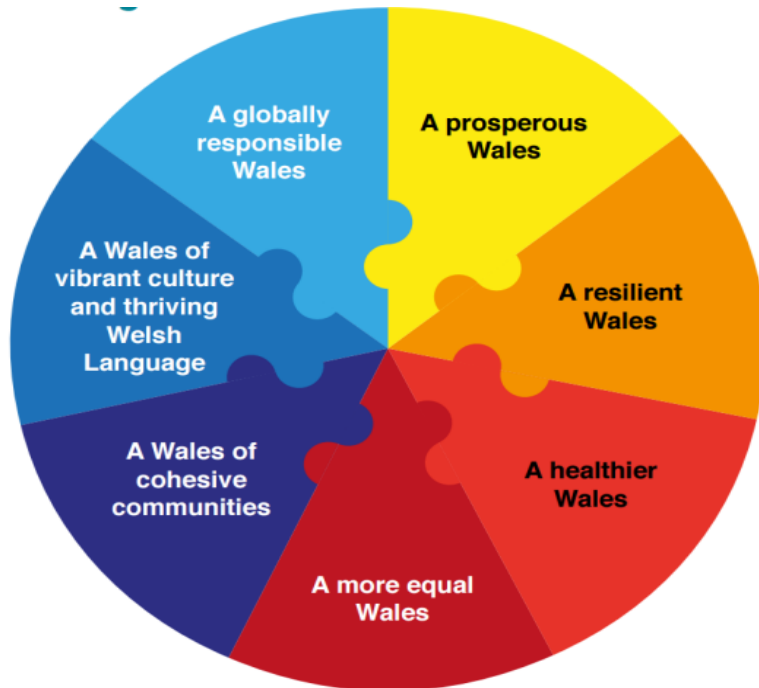
Water resources

Healthy soils

Rural jobs

House building

The Framework of Goals





Natural Resources Wales / SoNaRR2020: Introduction

Principles of Sustainable
Management of Natural resources

OFFICIAL SENSITIVE

FABLE-Wales

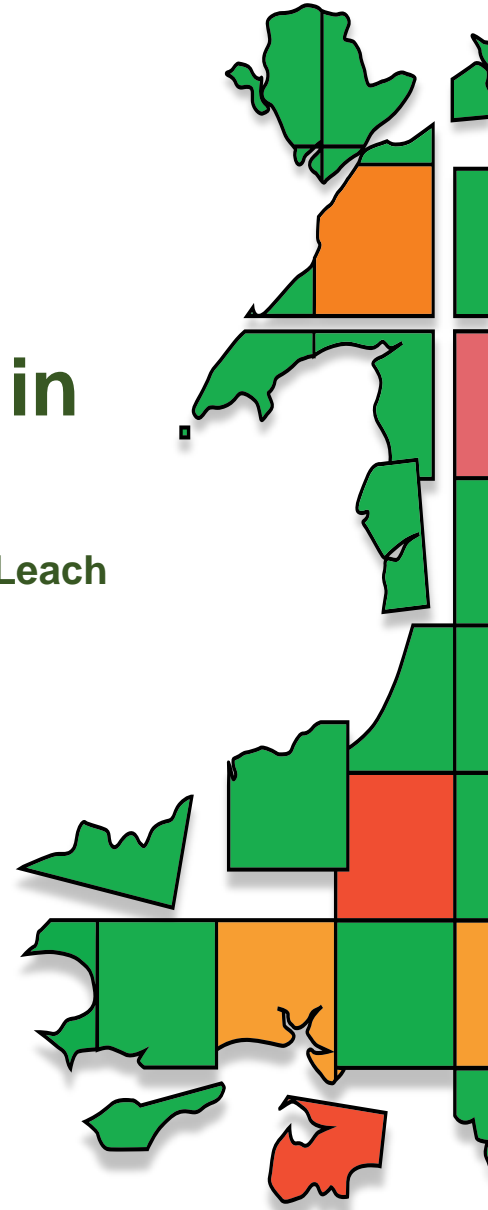
Strategic Modelling of Land Use in Wales

Modellers: Alison Smith, Paula Harrison, Sarah Jones, Nicholas Leach

Presented by Ann Humble – Environment & Rural Affairs
Welsh Government



Codi hyder yn sail tystiolaeth ni
Building confidence in our evidence base



PRODUCTIVITY crop productivity or the key crops in the country			
Status Quo	Improving the Current System	Land Sparing	Land Sharing
<p>As for the UK, in 2050, crop productivity remains the same:</p> <ul style="list-style-type: none"> • 7.7 tons per ha for wheat (7.1 with climate change impacts). • 5.7 tons per ha for barley. • 43.9 tons per ha for potatoes. <p>Based on FAOSTAT historic yields for 2010.</p>	<p>Same as for Status Quo</p>	<p>As for the UK, by 2050, crop productivity reaches:</p> <ul style="list-style-type: none"> • 12.7 tons per ha for wheat (12.0 with climate change impacts). • 9.4 tons per ha for barley. • 72.4 tons per ha for potato. <p>Based on assumption that yields for all crops increase by 65% (from stakeholder discussions).</p>	<p>As for the UK, by 2050, crop productivity reaches:</p> <ul style="list-style-type: none"> • 10.7 tons per ha for wheat (10.1 with climate change impacts). • 7.9 tons per ha for barley. • 61 tons per ha for potatoes. <p>Based on assumption that yields for all crops increase by 39% from the 2010 value, in line with the revised CCC medium projection.</p>
PRODUCTIVITY Livestock productivity for the key livestock products in the country			
<p>Dairy Yield, Beef, Chicken to remain the same</p>	<p>Between 2015 and 2050, yields:</p> <ul style="list-style-type: none"> • Dairy: a 37% increase in milk yield (from 7784 to 10,654 l/cow). • Beef: Remain at 123.6 kg/head of population for cattle meat. • Poultry: Remain at 1.37 kg/head of population for chicken meat. • Lambing increases by 17%. 	<p>Between 2015 and 2050, yields:</p> <ul style="list-style-type: none"> • Dairy: a 50% increase in milk yield (from 7784 to 11,676 l/cow). • Remain at 123.6 kg/head of population for cattle meat • Increase by 10% for chicken meat, from 1.37 to 1.51 kg/head of population . • Lambing percentage increases 52% as sheep systems increases efficiency. 	<p>Same as Improved current system except that</p> <ul style="list-style-type: none"> • Lambing increases by 41%
PRODUCTION Pasture stocking rate			
<p>No changes to stocking density</p>	<p>Change in livestock density compared to baseline: 132%</p>	<p>Change in livestock density compared to baseline: 202%</p>	<p>Change in livestock density compared to baseline: 136%</p>
PRODUCTION Post Harvest Losses			
<p>No changes to post harvest losses</p>	<p>No changes to post harvest losses</p>	<p>By 2050, the share of production and imports lost during storage and transportation reduces by 50% to reach 0.5%. This parallels the SDG 12.3 target to halve consumer and retail waste by 2030.</p>	<p>By 2050, the share of production and imports lost during storage and transportation reduces by 50% to reach 0.5%. This parallels the SDG 12.3 target to halve consumer and retail waste by 2030.</p>



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Rheoli Tir Cynaliadwy / Sustainable Land Management

Canlyniadau Rheoli Tir yn Gynaliadwy / Sustainable Land Management Outcomes

- Aer glân
- Dŵr glân
- Lleihau risg llifogydd a sychder
- Gwella mynediad ac ymgysylltu
- Safonau iechyd a lles anifeiliaid uchel
- Storio carbon
- Lleihau allyriadau nwyon tŷ gwyr
- Defnyddio adnoddau'n efeithlon
- Ecosystemau cydnerth
- Tirweddau naturiol a'r amgylchedd hanesyddol gwarchoddedig
- Clean air
- Clean water
- Mitigate flood and drought risk
- Enhanced access and engagement
- High animal health and welfare
- Maximise carbon storage
- Reduce greenhouse gas emissions
- Resource efficient
- Resilient ecosystems
- Protect natural landscapes and historic environment



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Priddoedd *Soils*

Soils in Wales

Future soil threats

Climate change

From showyourstripes.info



Average annual temperatures in Wales 1884–2020 by colour.



Wetter winters, drier warmer summers and more extreme weather events, like droughts and floods are predicted.



This will have an impact on soil functions and services, and the capability of agricultural land.



Land use change

Future pressures and drivers – climatic, socio-economic and political – are likely to drive **changes in current land uses.**

Unsustainable intensification and irreversible development of agricultural land will negatively impact the soil resource and its services.



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Natur
Nature

Nature Recovery Action Plan Wales – Biodiversity Strategy for Wales



- First published 2015 - Part I (Our Strategy for Nature) and Part II (Our Action Plan). All-Wales plan for everybody. Part II 2020-21 following input from a range of stakeholders.

- Engage and support participation and understanding to embed biodiversity throughout decision making at all levels;
- Safeguard species and habitats of principal importance and improve their management. Including the requirement on Welsh Ministers to prepare and publish a list of the living organisms and types of habitat which are of principal importance for the purpose of maintaining and enhancing biodiversity in Wales;
- Increase the resilience of our natural environment by restoring degraded habitats and habitat creation;
- Tackle key pressures on species and habitats;
- Improve our evidence, understanding and monitoring; and
- Put in place a framework of governance and support for delivery

- Ymgysylltu a chynorthwyo cyfranogi a dealltwriaeth er mwyn gwreiddio bioamrywiaeth ledled y penderfyniadau a wneir ar bob lefel
- Diogelu'r rhywogaethau a'r cynefinoedd pwysicaf, a gwella'r modd y'u rheolir, gan gynnwys y gofyniad i Weinidogion Cymru baratoi a chyhoeddi rhestr o'r organebau byw pwysicaf a'r mathau pwysicaf o gynefinoedd o safbwynt cynnal a gwella bioamrywiaeth yng Nghymru
- Cynyddu cydnerthedd ein hamgylchedd naturiol trwy adfer cynefinoedd a ddiraddiwyd, a chreu cynefinoedd
- Mynd i'r afael â'r pwysau allweddol sydd ar rywogaethau a chynefinoedd
- Gwella ein tystiolaeth, ein dealltwriaeth a'r systemau monitro
- Sefydlu fframwaith llywodraethu a chymorth ar gyfer cyflenw

This will be updated to reflect the new Kunming-Montreal Global Biodiversity Framework and drive action towards legally binding nature targets



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Pobl
People

Gwerthoedd | Values

Freedom to stay in rural communities



1



Basic services and infrastructure for all



2



Keeping product value within rural wales



3



A strong farming sector



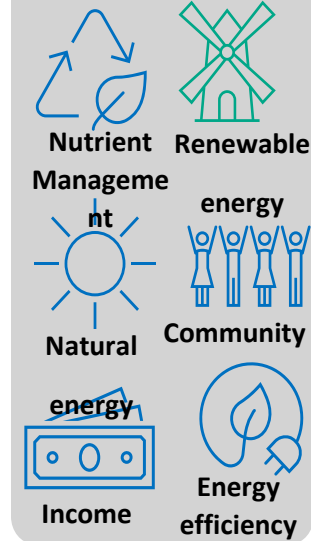
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Locally owned renewable energy



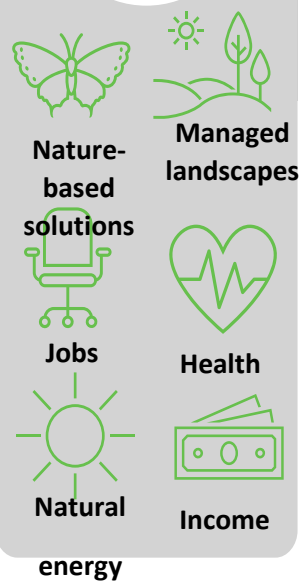
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Landscapes that deliver nature-based solutions



6

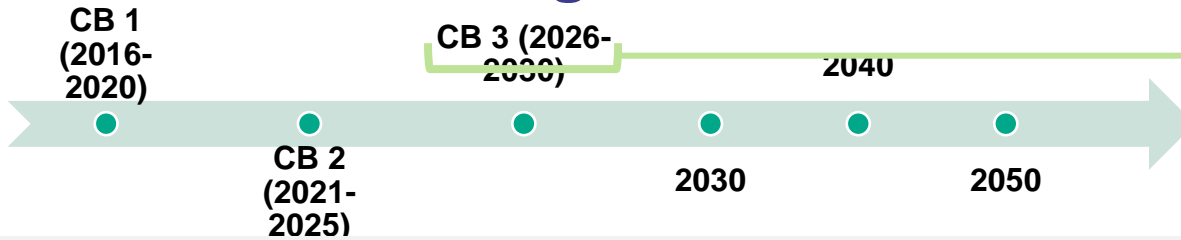




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Datgarboneiddio Amaethyddiaeth ***Decarbonising Agriculture***

Net Zero Wales Agriculture: Our Plan



For our next **Carbon Budget** we are looking for further measures to reduce our agricultural emissions.

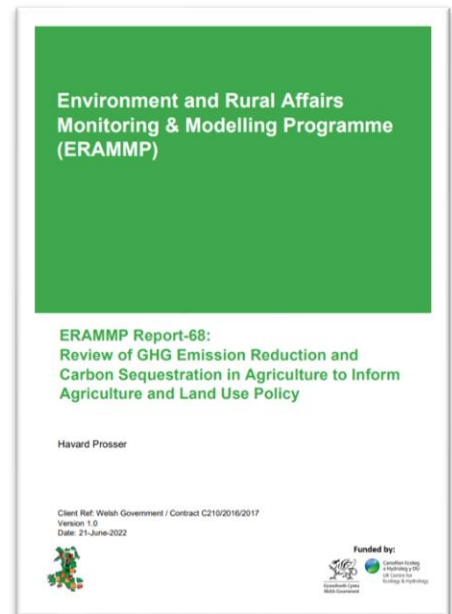
Our [ERAMMP Report-68](#) by Havard Prosser (published June 2022) outlined priority actions for mitigating GHGs and sequestering carbon in agriculture.

Some of these will be taken forward by our Sustainable Farming Scheme which has been designed to tackle the nature and climate emergencies, alongside the sustainable production of food.

All of these measures have been analysed internally by our Strategic Evidence Unit, which provides us with initial evidence for our future priorities, though **more research & development is greatly welcomed!**

This is where you come in! >>> See Our Priorities >>>

Our Future Farming Policy team is working with policy leads internally across Welsh Government and externally to develop our plan for the next Carbon Budget



Net Zero Wales Agriculture: Our Priorities

Priority Areas	Wales Level Abatement kt CO ₂ e	Abatement Score 1-5 scale	Uptake Score 1-5 scale	Total Priority Score
Animal management, genetic improvement and diet options	912	4	3	12
Agricultural machinery	233	4	3	12
Slurry acidification	205	4	3	12
Biomass crops	56	5	2	10
Anaerobic digestion	205	4	2	8
Afforestation	532	5	1	5
Add Nitrate Inhibitors to inorganic fertilisers	190	3	1	3
Other fossil fuel use, motors, cooling, drying	?			

Our Strategic Evidence Unit evaluated GHG mitigation options based on:

- **Efficacy** – level of abatement as reported in Havard Prosser’s report (scored 1-5 - min-max)
- **Likely uptake** – based on rapid literature review (scored 1-5 - min-max)

Efficacy **Likely Uptake**
Final Score
 These are among their top scoring list of priorities.

Could you contribute further R&D which might develop the practical feasibility of some of these potential solutions?



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Strategic Evidence gaps

Types of questions Governments might ask 'the Hub'

How would your project contribute to the evidence to answer this type of question

Adapting to and mitigating for Climate Change

Future farm Systems?

- New climate
- Delivering net zero
- Restoring nature
- Circular Agriculture (food systems)
- Viable business models?



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Strategic Evidence gaps

Types of questions Governments might ask 'the Hub'

How would your project contribute to the evidence to answer this type of question

Reducing the Externalities of food production:

Measurement and Tools

- Air quality – ammonia and other gases
- Water quality – phosphorus, nitrogen, sedimentation
- Animal Nutrition
- Human Nutrition



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Strategic Evidence gaps

Types of questions Governments might ask 'the Hub'

How would your project contribute to the evidence to answer this type of question

Engaging People :

- Farmers and land Managers
- Consumers
- Rural Communities
- Business



Useful Documents:

- [Net Zero Wales Carbon Budget 2 \(2021 to 2025\) | GOV.WALES](#)
- [Natural Resources Wales / State of Natural Resources Report \(SoNaRR\) for Wales 2020](#)
- [Well-being of Future Generations \(Wales\) Act 2015: the essentials \[HTML\] | GOV.WALES](#)
- [Environment \(Wales\) Act 2016: overview | GOV.WALES](#)
- [Sustainable Farming Scheme | Sub-topic | GOV.WALES](#)
- [Beyond recycling | GOV.WALES](#)
- [Nature recovery action plan | GOV.WALES](#)

- [Sustainable Farm Scheme Evidence Review \(SFS\) | ERAMMP](#)
- [FABLE Calculator | ERAMMP](#)
- [Review of Welsh soil evidence | GOV.WALES](#)
- [Understanding farmer motivations: very small and small farms | GOV.WALES](#)
- [68a_ERAMMPReport_Decarb_response.pdf](#)
- [69 ERAMMP Feasibility of increasing cultivated crops on farms in Wales as a GHG mitigation measure and for delivery of public goods.pdf](#)



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