AgNav - a tool for putting climate action planning in farmers' hands

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Abstract

Agriculture accounts for 37% of Irelands carbon emissions. The Irish government, in its Climate Action Plan, has set a target of a 25% reduction in emissions from agriculture by 2030.

One of the key challenges facing farmers, advisors and processors is having an accurate picture of on-farm emissions as well as understanding the potential carbon mitigation effects of individual farm management practices.

ICBF, Bord Bia and Teagasc are three agencies with key involvement in the research, implementation and promotion of best practice in the Irish agriculture and food industry. They have collaborated to develop an online toolkit, AgNav, that provides individual farmers with an individual assessment of the total carbon emissions of their farm and the carbon footprint of their produce. AgNav adopts the approach of "assess, analyse, act" to provide a holistic decision support tool for farmers.

1. Assess: AgNav is powered by access to the most accurate farm level data available drawing from a range of data sources. It uses certified methodology of the Lifetime Cycle Analysis model to calculate carbon emissions.
2. Analyse: The tool provides on-demand forecasting capability that allows the farmer and their advisor to estimate the impact on farm emissions of different carbon mitigation actions, such as reducing fertilizer, optimizing grazing days or reducing finishing age.
3. Act: Once the farmer, in conjunction with their advisor, has evaluated the most appropriate mitigation practices for their farm, AgNav provides the functionality to develop a farm specific action plan.

Overall the aims of AgNav are to:

1. Encourage and support farmers to implement climate action and sustainability improvement on Irish farms
2. Leverage the most robust inter-agency data, research and resources to drive the most appropriate actions tailored to individual farms
3. Enable the most precise capture and analysis of data allowing accurate calculation of action impact
4. Provide a mechanism to support the quantification of progress towards Climate Action Plan targets for the agri-sector

Support clear communications on positive progress achieved at farm level – giving control to farmers

Introduction

A particular challenge of climate change mitigation in the context of agriculture is the variety of figures and data that need to be understood and acted upon e.g. total carbon emissions, carbon footprints, emissions targets.

There are challenges in getting a consistent, accurate assessment of on-farm emissions, translating sectoral targets down to individual farm level and building a farm specific roadmap on how to arrive at optimal best practice in carbon mitigation practices.

These challenges need to be addressed at different levels : country, sectoral, corporate and farm.

For agriculture the questions to be answered include:

- What are the current greenhouse gas emissions for the sector ?
- Where are the sources of these emissions?
- What are the targets for the sector ?
- What is the pathway to achieving these targets ?
- What does it mean for an individual farmer ?

In Ireland, the national and sectoral targets are set by the Irish Government and set out in the Climate Action Plan.

The Climate Action Plan sets out a target of a 25% reduction in GHG emissions in Agriculture by 2023. A number of state agencies are involved in assessing how this target can be achieved in this timeframe.

One of these agencies is Teagasc, the national body providing integrated research, advisory and training services to the agriculture.

Teagasc has developed a Marginal Abatement Cost Curve Curve (MACC) to display the abatement potential and relative cost of different mitigation measures (Figure 1).

In the MACC, the wider the bar on the x-axis, the more carbon abatement potential for that action. On the y-axis if an action is below 0 it also cost-negative, if it is above 0 then there is a cost to this measure.

The MACC outlines the activities that will have an impact at the macro level. It is then necessary to translate this into actions that can be undertaken at individual farm level.

This involves three steps:

1. Understanding where each farm is at currently in its ghg emissions.
2. Examining the menu of mitigation actions and see what does it mean for that farm.
3. Agreeing on mitigation actions and making a farm specific plan.

The components needed to underpin these three steps include:

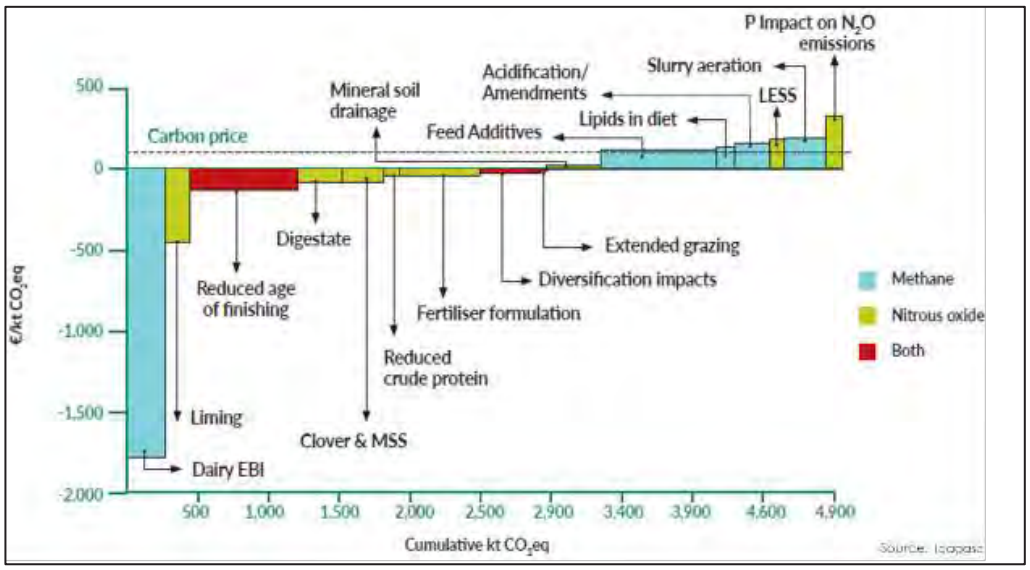

Figure 1. Marginal Abatement Cost Curve – Teagasc 2023..

- Robust, peer reviewed climate emission models.
- Validated sources of input data.
- Maximised use of existing data sources to avoid duplication of effort by farmers.
- Technical capability to run the models at scale.
- Advisory channels to aid in the dissemination of best practice and to provide farmer advice and education.
- Consistent approach to developing farm specific action plans that can be recorded, monitored and followed up.
- Easy to use interfaces for farmers and advisors navigating from the assessment of figures to the development of action plans.

The effort in drawing these components together can be aided by multi-agency collaboration. AgNav is such a collaboration involving three agencies in Ireland. Teagasc as described above, Bord Bia which is the agency that promotes Irish agricultural produce and manages the Quality Assurance Schemes to which the majority of beef and dairy farmers belong, and ICBF, which is the central database for genetic evaluations and for wider data services in the Agrifood sector in Ireland.

The three agencies have developed the AgNav data platform. The contribution from each agency can be summarised as follows:

Teagasc: latest of the scientific research and models for calculating emissions across agriculture. In addition to this there is the link with the Signpost Climate Advisory programme, that is being rolled out across the entire industry.

ICBF: Software engineering and database capabilities in managing data, combining the data from different sources, programming and running the scientific models, testing at scale and updating in line with the latest research. In addition to this it has to technical capability required for development of tools and dashboards for farmers and advisors.

Bord Bia: interface with the existing Quality Assurance Schemes in which farms are audited periodically across a variety of sustainability measures, providing a key source of validating data. In addition to this, as part of the of the Quality Assurance Schemes, farmers develop actions plans for their own farms across a variety of areas covering sustainability and animal welfare. Bord Bia is also the agency for the promotion of Irish agricultural produce both nationally and internationally.

The AgNav tool endeavours to assist the farmer in the three stages of : Assess – Analyse – Act.

Assess: AgNav is powered by access to the most accurate farm level data available **drawing** from a range of data sources. It uses certified methodology of the Lifetime Cycle Analysis model to calculate carbon emissions.

Analyse: The tool provides on-demand forecasting capability that allows the farmer and their advisor to estimate the impact on farm emissions of different carbon mitigation actions, such as reducing fertilizer, optimizing grazing days or reducing finishing age. Act: Once the farmer, in conjunction with their advisor, has evaluated the most appropriate mitigation practices for their farm, AgNav provides the functionality to develop a farm specific action plan.

AgNav is available to farmers at the website https://www.agnav.ie

The user is presented with the latest carbon emissions for their farm: total emissions, emissions per hectare and carbon footprint. These have been calculated using existing data sources to which the farmer has granted permission (Figure 2).

Figure 2: AgNav – Assess: Showing the current on-farm emissions breakdown.

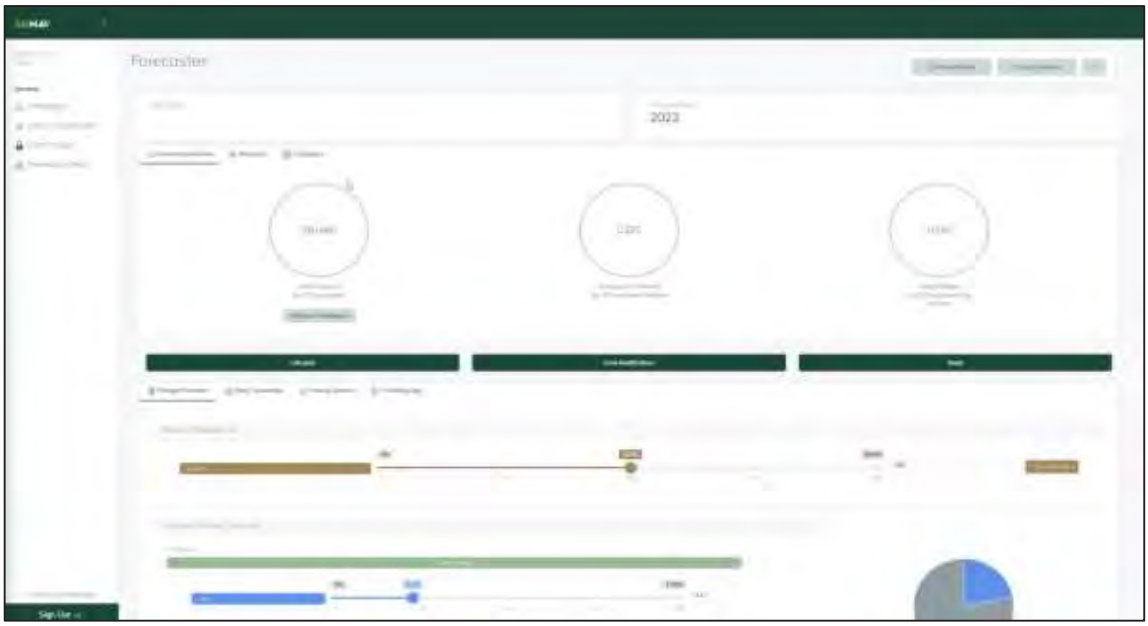

Figure 3. AgNav – Act: Building a specific Action Plan of suitable mitigation measures.

The user can then investigate various mitigation scenarios. Current functionality includes scenario planning across the following areas:

- Reduction in total fertiliser use.
- Modification in the type of fertiliser used.
- Modification to slurry spreading method and time of year of application.
- Modification to the begin/end of the grazing/housing seasons.
- Modifications to the finishing age (age at slaughter) of beef animals.

Following analysis of the effectiveness of different mitigations practices, the farmer can navigate to the Action Planner, and in consultation with their advisor, choose from a menu of options.

In the example in Figure 4 the user has opted to use protected urea. They are then instructed to select specific actions to help them achieve this and to set a target date for completion.

The Action Plans are saved on the AgNav system to allow for monitoring and further follow up with their advisor.

Future development and rollout

In addition to the functionality outlined thus far, the AgNav platform development plan includes scenario planning in the areas of:

- The effects of increased genetic gain on methane emissions
- The effects of certain feed additives

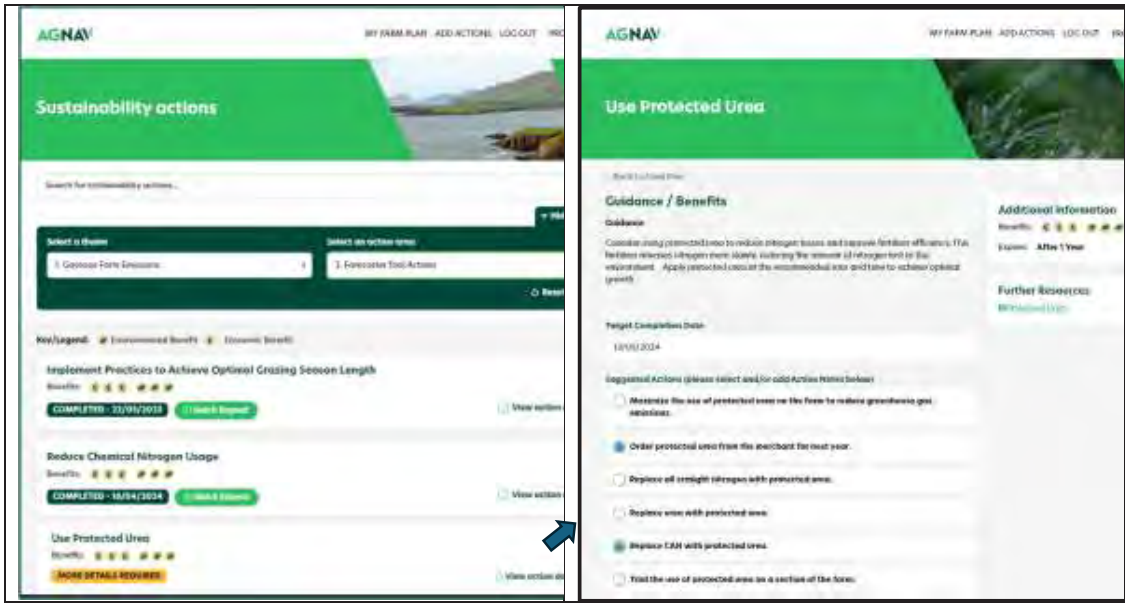

Figure 4. AgNav – Act: Building a specific Action Plan of suitable mitigation measures.

- The effects of different feed concentrate levels

Further development will look at integrating soil type to assess carbon sequestration at farm level.

The development of the AgNav platform began in 2022 building on existing integrations and co-operation between the three agencies. It involved co-design workshops with pilot groups that included farmers and advisors.

It is now included in the training of climate advisors as part of the wider Teagasc Signpost Advisory programme. The Signpost Advisory Programme is a national advisory programme that aims to engage with 10,000 farmers each year from 2024 in the area of climate action and sustainability with a target of 50,000 farm plans by 2030.

AgNav remained in closed pilot phase through 2023 and early 2024 to allow for training of advisors and the gradual onboarding of farmers involved in the Signpost Advisory Programme. It will open to all farmers in the latter half of 2024.

Future developments will see AgNav functionality extend into the sheep, pig, poultry and tillage sectors.