

PERENNIAL ENERGY CROPS DECISION SUPPORT SYSTEM (PEC-DSS): ENVIROCROPS (AFBI-303-1)

Final Report – Redacted Version



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1. Introduction

The Agri Food and Biosciences Institute (AFBI) was awarded funding through the Biomass Feedstocks Innovation Competition run by BEIS to investigate the feasibility of developing a Perennial Energy Crops Decision Support System (PEC-DSS). The online tool, which will be branded EnviroCrops, is envisaged as a central source of impartial advice and information in an easy to access, free or low-cost, user-friendly format, that will enable farmers and land managers to make an informed decision about planting perennial energy crops (PECs).

The PEC-DSS project is a partnership between AFBI, Crops for Energy Ltd (C4E) and Calvium Ltd. Other contractors acting as sub-contractors to C4E are NFU Energy (NFUE), University of Aberdeen, Rothamsted Research, Eucalyptus Renewables, Miscanthus Nursery, Murray Carter, Poplar Tree Company and Willow Energy.

2. Background

The UK Government is considering a large expansion in the area of PECs to meet net zero commitments. A Biomass Strategy will be published in 2022 which will build on previous work by the Committee on Climate Change (CCC) that proposed an area of between 0.2-1.4 million hectares (ha) by 2050¹. The Net Zero Strategy suggests annual planting areas of PECs and short rotation forestry (SRF) of 7,440 ha by 2025, 21,275 ha by 2030 and 26,350 ha by 2035².

For this to be achieved the PECs industry needs to take off quickly. To facilitate this it is essential that growers, end users, consultants and land management / agricultural students are rapidly upskilled and able to make decisions based on good, dependable, independent and up to date information.

Unfortunately, the information that is currently available is widespread, much of it is out of date and some of it comes with a sales pitch and can be biased or tainted. As a result, if interested parties start from a position of zero or little knowledge it will be quite difficult for them to navigate their way to a position where they have all the answers required to make an informed and sensible decision on whether to proceed with biomass crops or not.

This needs to be addressed as planting PECs is a long-term decision; a 20-year decision that will be very expensive if they get it wrong. In contrast, farmers don't have this problem with any of the other crops they have historically produced for predominantly food and feed purposes. They have enough knowledge of what grows well on their land to make a quick and educated decision. They also can rely on trusted consultants, agronomists, contractors, land agents, seed merchants and even academics, to help them out. Similarly, biomass boiler owners and power stations don't have this problem with most other feedstocks.

¹ [Land use: Policies for a Net Zero UK \(Jan 2020\)](#)

² [Net Zero Strategy: Build Back Greener \(Oct 2021\)](#)

They will have a very good understanding of the price and the specification and the local sources and suppliers of biomass fuel sources.

The EnviroCrops web app aims to fill this knowledge gap and revolutionise the PECs industry by providing the confidence that farmers and project developers need to de-risk this as an investment choice.

The aim is for interested potential growers to enter some basic information (e.g. their location or postcode) and be able to find out the following information:

- what crops are suitable for their land
- what yields are possible
- the best PEC crop type or variety
- the production timescales and costs
- the locality of contractors and markets, and crucially
- the economic potential.

End users, be they a self-supplier, a local authority or a biomass end user such as a manufacturer, heat producer or power station will be able to simply calculate

- how much land is required to meet all or a proportion of their needs
- the production timescales, and
- the delivered costs.

Therefore, EnviroCrops will deliver to users a free or very affordable mini-feasibility study so they can work out if a particular perennial energy crop such as willow, miscanthus, poplar or eucalyptus is the right crop for

- their land
- their end use
- their facilities, and
- their pocket.

2.1 Technical description of the innovation

The concept of the EnviroCrops app is to bring together information from best practice guidance publications from organisations like AFBI together with information typical of a consultant's feasibility study on the suitability of growing PECs. Kevin Lindegaard of C4E is one of the few experienced consultants providing affordable feasibility studies and the proof-of-concept app is based on some of the tools and templates that he has created over the past 18 years. During this time, he has performed ~150 feasibility studies for farmers, power stations, local authorities, waste management companies, water companies and airports.

Usually, feasibility studies are tailored towards the client's specific requirements but they generally fall into perhaps five distinct categories such as:

- I have a boiler that needs xx tonnes of fuel. How much PECs do I need to plant, what will it cost and if I plant next year when will it be available?

- I have xx hectares of marginal land that I rent out for grazing. How much biomass fuel could I produce from this, how much will it cost, how much money can I make from it and how long will it take to grow?
- I run a biomass power station that needs xx thousand tonnes of biomass per year. I am interested in procuring some locally grown miscanthus or willow. If I wanted to source 10% of the annual requirement, how much land would be required, what will be the price, will local farmers be interested in growing at that price, what support will they need?
- I manage a landfill / brownfield site and am interested in planting PECs to reduce managements costs and provide and income. Is it economic?
- My company produces xx cubic metres of wastewater per year. We currently pay £xx thousand per year to dispose of this through conventional means. We have some land and are interested in a biofiltration option. Is it logistically and economically feasible?

These studies range from one day overviews to extensive reports looking at all aspects of the process. All types will have economic and logistical questions that need answering e.g.

- Land required
- Local yield potential
- Production capabilities and timelines
- Production costs
- Return on investment
- Land preparation and management options
- Information on local contractors
- Market options
- Storage space required
- Number of transport journeys
- Transport costs
- Processing requirements
- Ash production

Depending on the client commissioning the work they may also be interested in

- Biodiversity benefits
- Environmental benefits (air / soil / water)
- Carbon emission savings / sequestration / offsetting
- Bioremediation potential

With the anticipated upscaling of the PECs industry there will need to be many more knowledgeable people and organisations providing advice, direction, contacts and consultancy support. In addition, many farmers will want to be able to make a quick and easy decision on whether to plant based on their own investigations. The EnviroCrops app will increase knowledge and understanding of PECs and provide users with immediate results on whether PECs are suitable and viable on a particular site.

3. PEC-DSS EnviroCrops app – Feasibility Study

The project was supposed to start in August 2021. However, this was delayed by lengthy contract negotiations and it kicked off in October 2021.

As a result of the delays, one major change was made to the work programme. It was decided that the outreach questionnaire (which was designed to be conducted at an early stage) would instead coincide with the app testing exercise. This was because it was no longer possible to schedule this prior to carrying out the other tasks. Furthermore, it was considered that a streamlined work plan would reduce burden on the volunteers helping test the proof-of-concept demonstrator.

3.1 Information gathering

Trial yield information was assembled by C4E, Rothamsted Research and AFBI. Commercial yield information was assembled by Willow Energy, Miscanthus Nursery and Poplar Tree Company.

Yield information was submitted to the University of Aberdeen and models for miscanthus and SRC willow were updated. Calvium used the updated model to provide a UK map which can be clicked on to access yield information. This will be used as an essential part of the Decision Support System revealing modelled yield figures when users input their location information.

AFBI provided MS Word versions of the Best Practice Guidelines for miscanthus and SRC willow. Miscanthus Nursery, Murray Carter, Willow Energy and Rothamsted Research provided feedback on what needs updating and substantial editing where necessary. Eucalyptus Renewables and Poplar Tree Company produced draft mini versions of Best Practice Guidelines for poplar and eucalyptus.

AFBI and C4E liaised with project sub-contractors and took part in a series of site visits on 3-5 November 2021.

3.2 Outreach

In total we engaged with 54 stakeholders during the project. The majority of these responded favourably to the idea of helping test the EnviroCrops app. A 14-question questionnaire was produced online and the link circulated. A total of 16 stakeholders completed the questionnaire. 9 respondents were existing PEC growers and the others were potential growers, advisors, civil servants and a consultant.

The questionnaire produced the following headline results

- 15/16 respondents said they were interested or maybe interested in using the EnviroCrops app
- In terms of content most respondents were interested in economics, land suitability, productivity, markets and carbon trading potential

- Most respondents indicated that they would prefer a free app although some were prepared to consider paying a fee for premium information
- Most preferred the idea of the app being supported by a virtual marketplace (biomass and carbon trading) or advertising.

3.3 Spreadsheet calculators and decision trees

C4E produced draft calculators on energy use both for boiler owners and power stations), land requirements for growing SRC willow and miscanthus, production timelines to achieve peak yields and production costs and shared these with NFUE. The latter were able to integrate these together so there was logic enabling one choice to lead to populating another field. Testing was carried out and revisions made.

In order to translate the Spreadsheet Calculators into a form of logic which would enable Calvium to programme the app, NFUE developed flow diagrams that described the processes in the different pathways based on the previous choices.

3.4 Development of the proof-of-concept demonstrator

Calvium were kept abreast of developments as WP 2, 3 and 4 proceeded. Initial work involved using the modelled yields to produce a UK map that can be clicked on to provide the yield potential for that pinpoint. Following the handover training on 28th October 2021 they received the spreadsheet calculators and decision trees and set to work developing the wireframe user interface and design of the public facing web application.

Some of the elements of the EnviroCrops app were complete (70% finished) and demonstrated by Calvium to the project Monitoring Officer (MO) by the end of November 2021. The proof-of-concept demonstrator app was completed in mid-December 2021. At this stage the app wireframe included three main pathways. The project MO suggested a fourth pathway be included to help with the user friendliness of the tool. This was added to the working model for the third lot of testing. The four pathways in the final version of the proof-of-concept demonstrator are shown in Figure 1.

Following testing of the working model some minor changes were made and the completed Phase 1 version of the App was presented to BEIS.

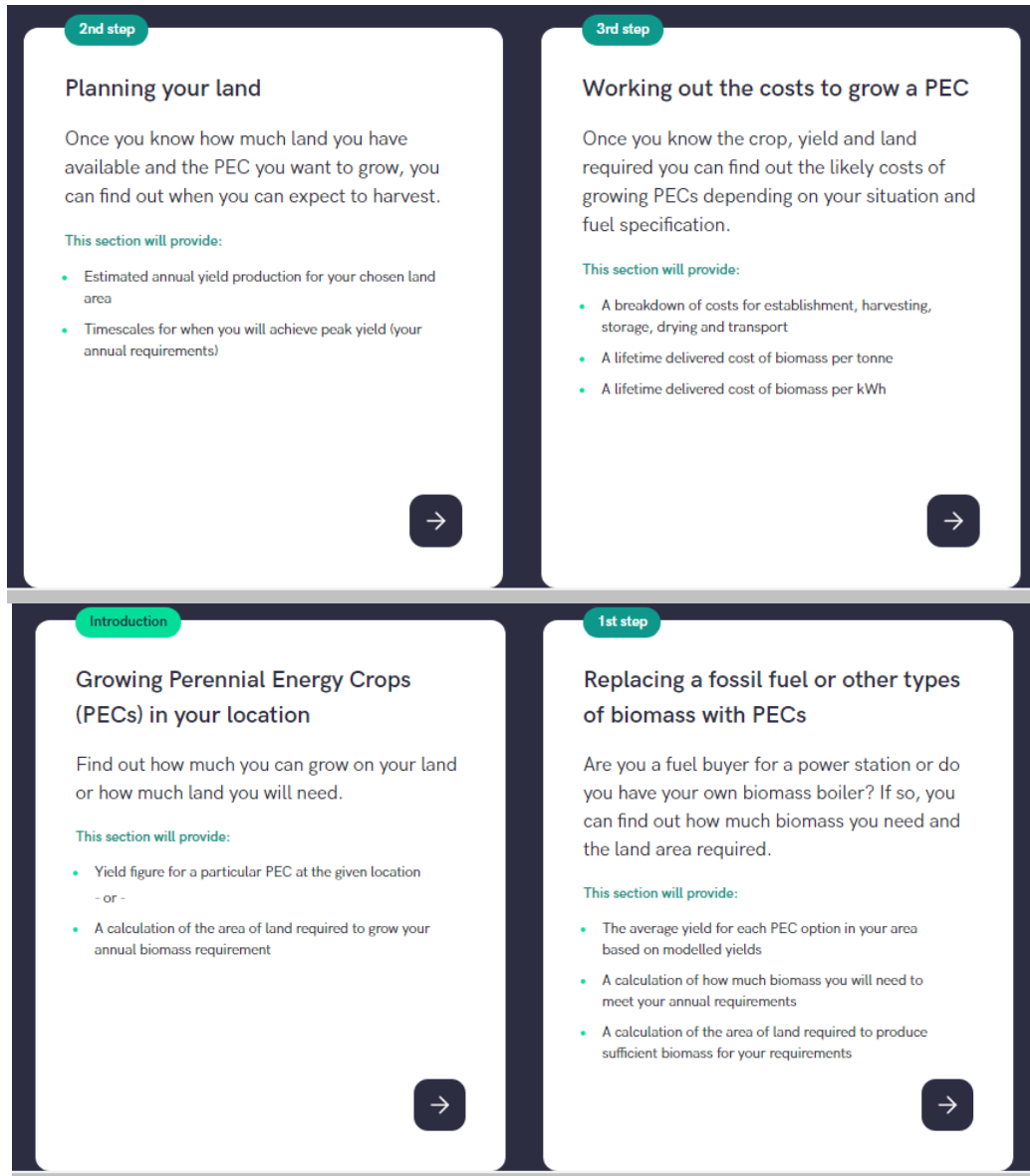


Figure 1: The pathways in the final proof of concept app.

3.5 Testing of the proof-of-concept demonstrator

In total over 20 stakeholders assisted in testing the proof-of-concept demonstrator. This included 7 members of the project team and 13 external stakeholders.

Testing sessions were organised by NFUE and run by Jamie Brown of Calvium with technical input from Kevin Lindegaard of C4E. In total, four sessions took place from the 14-17 December 2021. The testing sessions were conducted using Microsoft Teams and, with the participants permission each of the sessions were recorded and transcripts produced. Each session lasted 60-70 minutes.

The stakeholders included 5 SRC willow growers, 3 advisors / policy makers, 1 miscanthus grower, 1 reed canary grass grower, 1 potential grower and 1 consultant. Several others signed up but couldn't make it on the day. Others potential attendees said they would like to participate but could not make the times / dates put forward. These stakeholders have agreed to participate in any testing required for Phase 2.

The transcripts of the training were edited and 89 comments and queries regarding the EnviroCrops app were recorded on a spreadsheet. The minor changes suggested were made prior to the completion of the draft report. Major changes are beyond the scope of Phase 1 of the project and will be incorporated into the Phase 2 plan. User feedback from the testing sessions will also be incorporated into future design planning.

3.6 Long term feasibility & sustainability of the EnviroCrops (PEC-DSS) app

If the EnviroCrops app is to function as a long-term source of information for farmers and project developers, it will have to be able to be financially self-sufficient beyond any Phase 2 funding. WP8 looked at possible options for EnviroCrops to derive revenue in order to pay for any updates and modifications.

The potential options considered viable were as follows:

- Free app with charges for premium elements
- Levy funding from sales of planting stock or biomass sales
- Consultant and contractor training and accreditation with continuing professional development (CPD) elements
- License fee for use by agricultural colleges
- Creation of virtual marketplace so that producers and users / traders / breeders could liaise and enable farmers to market their crop or trade carbon to the highest bidder
- Advertising by industry participants
- Corporate sponsorship.

It is unlikely that there is one single long term revenue creation option that will make EnviroCrops financially sustainable post Phase 2 funding. Instead, a combination of options is much more likely to bring in the necessary income and reduce risks. Initial support funding is crucial in the early stages to manage cashflow before the subscription or volume trading models kick in. Project team members C4E and NFUE have experience of setting up and running the Sustainable Fuel Register (SFR). Based on this initiative we have first-hand knowledge of the difficulty of gaining critical mass so a commercial version supported by an academic / consultant version may provide essential promotion benefit.

Any solution that requires regulatory input may be difficult to achieve not only with Government backing but also support from the industry at large. By contrast,

a voluntary levy would be easier to get started but would be better done through private sponsorship or a licensing option.

Long term viability is probably best addressed through volume of users (free and premium app) and volume of biomass (virtual marketplace). In the questionnaire carried out as part of WP 3 Outreach, respondents collectively viewed the virtual marketplace as the best options for long term financial viability (ranked 1 out of 9 for biomass trading and 2 out of 9 for carbon trading). The implication is that through this option EnviroCrops would be facilitating wealth creation of growers rather than simply adding to the production costs (Levy and subscription offers).

3.7 Elements to be added to the app in Phase 2

The proof-of-concept demonstrator was well received by stakeholders based on the content, appearance, logic and overall useability. If phase 2 funding is awarded the intention is to improve the user experience whilst providing additional features including:

- Crop types, yields and management
 - Additional crop options e.g. poplar, Eucalyptus, other energy grasses, Sida and hemp
 - Improve modelled yield information for all species
 - Adding content on best practice - cultivation, management and harvesting
 - Adding details of varieties and species suitable for a particular location
 - Adding alternative management options and pathways for planting PECs in a way that promotes biodiversity
 - Providing optional email alerts providing users with information on what activity is required at different times of the year.
- Logistical and economic feasibility
 - Adding logistical information so that users can understand storage requirements, number of transports, ash content etc
 - Adding a function allowing large scale users to work out what % area of the farmland within a certain radius would be required to meet their requirements (important for planning considerations)
 - Adding an in-depth costing tool so consultants can update predicted figures with real figures once an activity is completed
 - Adding cash flow functionality so that users can see payback, long term profit / loss and / or production costs
 - Enabling more than one PEC option to be selected so comparisons can be made
 - Adding an in-depth carbon sequestration assessment tool providing the basis for carbon trading functionality
- Markets and support
 - Find a Contractor function showing a map and distance from user
 - Find a Market function showing a map and distance from user

- Developing pathways for producers and different types of end users (self-supplier, trader, heat user, power station)
- Planning elements / Regulatory information
 - Enabling exact fields to be pinpointed and polygons to be drawn for land management and funding purposes
 - Explore opportunities to gain access to Magic.gov.uk datasets so users can pinpoint designations and constraints
 - Rules for prospective growers on what to do before they plant
 - Rules on reporting sustainability, land criteria, quality and adhering to emissions thresholds.

4. Implications of the EnviroCrops project

4.1 Contribution to increasing sustainable biomass supply

It is envisaged that the EnviroCrops app could boost sustainable biomass supply in a number of ways:

- Help de-mystify the range of PEC options and allow precision deployment
- Provide up to date information on species and variety suitability and performance across the UK
- Enable a better understanding of land preparation, crop establishment and management techniques and timelines
- Provide greater appreciation of the economic costs and returns
- Increase the confidence of farmers, supply chain protagonists (i.e. plant breeders, producers of planting material and machinery developers and contractors) and project developers and de-risk the investment choice leading to more rapid uptake of PECs
- Enable increased awareness of environmental benefits and how to maximise these through sensitive planting regimes
- Facilitate linkage and contacts within the sector.

One of the advantages of the EnviroCrops app would be that it will be a useful tool for biomass power plant project developer so they can easily find out the land area they would need to be planted in order to meet their needs. The app would be able to tell them what % of farmland would be required within a 5, 10, 20, 30 or 50 mile radius. As a result, the app will also be very valuable to local authority planners, planning consultants, energy consultants and environmental groups.

At the other end of the scale, self-suppliers will be able to use the annual fuel usage of their biomass boiler to work out how much land they need to assign to produce the same amount of fuel. Similarly, a farmer may want to begin supplying a local end user with fuel and based on their biomass fuel use could work out the land required and the economics of this venture.

Hence, the EnviroCrops app could potentially work from both sides providing a much needed push to farmers augmented by an increased pull from markets.

A major impact of the widespread distribution of the app is that all farmers will have access to exactly the same guidance. This will mean the standard of PEC management and the efficiency of production will be improved leading to:

- Increased yields and improved land resource efficiency (less land to produce more product)
- Increased quality of the biomass product to end users
- Greater willingness of end users to use PECs, leading to
- Increased demand and increased profits for farmers.

This will ensure that planting PECs is a more attractive choice for farmers. As numbers of growers increase and variety choice, growing techniques and machinery technology improves there will be further economies of scale which will drive efficiency and reduce costs. All this will swell the number of farmers planting PECs and essentially create a snowball effect.

Other fringe benefits of an increase in the quality of feedstock is that it will enable improved combustion efficiency which will reduce user costs, lengthen the operating life of biomass plants and reduce the emissions of nitrogen oxides and particulates. This will maintain or improve local air quality.

4.2 Integration with lot 2 demonstrator platform

The EnviroCrops project is very well placed to provide an important link with the Lot 2 Demonstrator project in Phase 2. We have been working with the BioFIND project led by the Centre of Ecology and Hydrology and therefore, the suggestions below relates specifically to that Lot 2 bid (although they could easily be part of the other bidders' Lot 2 projects as well).

Based on questionnaires conducted by both the BioFIND and EnviroCrops feasibility studies it is clear that stakeholders are most interested in the economic benefits of PECs. The Lot 2 Demonstrator should therefore be aiming to communicate marginal gains and how these translate into monetary value for the grower and showcase how different elements of best practice lead to higher yields which enables more income from less land.

EnviroCrops could integrate very well with visitors and open day events to demo sites and help provide a truly interactive experience allowing them to evaluate yield capacity and income potential for different crops using the app.

If the Lot 2 demonstrator analyses the increase in soil carbon for example (as well as above ground biomass), then this information could be translated into the

carbon trading potential for different crops. Almost certainly this is something of great value and interest to farmers and as such, the BioFIND hub sites could serve as an independent source of baseline information for growers to evaluate their crops. This would be very advantageous to anyone setting up carbon trading platforms such as that foreseen as an option for EnviroCrops.

In addition, demonstration blocks could provide benchmark figures for establishing and harvesting different crops to best practice conditions with existing machinery. Other potential links include the species / variety trials at hub sites and the harvesting of trials at spoke sites. In both cases the information produced would augment PEC yield models which could be utilised in the app.

As the BioFIND proposal incorporates a number of well-respected universities and research institutes hosting the hub and spoke sites, data and input from the likes of AFBI, Rothamsted, IBERS and SRUC will be credible, unbiased and ultimately peer reviewed.

4.3 Wider environmental benefits or trade-offs

The EnviroCrops app will provide information on lifecycle GHG savings comparing the production and use of PECs to various fossil fuel and biomass counterfactuals and estimate carbon sequestered by PECs in the soil. This is important as at some point soon, growers of PECs will be well positioned to sell the carbon stored and sequestered by the crop on the open market.

Part of the appeal of the EnviroCrops app is that it will be developed at the same time that the Sustainable Farming Incentive (SFI) is being rolled out. The app will enable growers to look at options that promote productivity and profit against those that make a greater emphasis on biodiversity benefits (e.g., by increasing edge effect, the proportion of open ground between plots and the greater inclusion of species / varieties that have elevated levels of pollen and nectar).

Similarly, by integrating the app with layers from Defra's Magic dataset (Magic.gov.uk) the app could provide information to enable farmers to plant PECs where they will benefit water quality and flood mitigation benefits.

We do not foresee there being any substantive environmental risks from the development and commercialisation of the EnviroCrops app.

5. Commercialisation plan

During Phase 1 the team realised that the name PEC-DSS was cumbersome and limited the options for the app to energy. As PEC feedstocks may be used for many different end uses (such as biopolymers, pharmaceuticals and bio packaging) and many non-energy applications (biofiltration, flood mitigation etc) we decided that a name change would enable many more opportunities to be explored. PEC-DSS was therefore renamed EnviroCrops. We have secured the domain names envirocrops.com, envirocrops.info and envirocrops.org.

We envisage several target user groups. UK Agriculture supports approximately 475,000 jobs (Source: NFU). This includes farmers, contractors, consultants, land agents and land managers. In addition, there are around 46,000 jobs in the biomass industry (Source: Wood Heat Forum) and 12,200 Renewable Heat Incentive accredited non-domestic solid biomass boilers (Source: Ofgem). There are also 20,000 agricultural students in the UK (Source SI-UK). Other potential interest groups include: policy makers, local authority planners, academics, Environmental non-governmental organisations (NGOs) and carbon traders. This means that the EnviroCrops tool is potentially relevant to over 550,000 people in the UK.

During Phase 2 of the project we will be intending to engage with 5% of this target audience or 27,500 people. This will be achieved through:

- Outreach and testing
- Visits to the EnviroCrops website and unique uses of the app
- Networking through consultants and contractors
- Circulations to NFU members (55,000 farmer members and 34,000 countryside members)
- Engagement with the Country Land and Business Association (33,000 members)
- Articles in the trade press and online (e.g. Farmers Weekly and fwi.co.uk) and NFU publications (British Farmer and Grower)
- Stakeholders signing up to newsletters
- Social media follows
- Views of online videos
- Attendance at Lot 2 biomass platform open days
- Attendance of online training and webinars
- Taster sessions for agricultural colleges
- TV / radio programmes (e.g. Countryfile and Farming Today)

Throughout the project we will need stakeholders to test the updated and new features of the app. In addition, we will be involved in demonstration activities in conjunction with the Lot 2 biomass platform. As part of these interactive engagements, we will endeavour to create a user forum for testing the app and providing feedback on the post Phase 2 commercial elements. This will enable sense checking and assist in refining our future commercial approach. As a result, the testing and commercialisation tasks will be integrated into WP 5 App Development.

In Phase 1 we have not been able to share the app with the wider PEC industry. This was because of the risk of losing a competitive edge to rivals for Phase 2 funding. However, we realise that wider industry engagement and acceptance is necessary for EnviroCrops app to be a success. We will look to open these avenues for discussion at an early stage of Phase 2 with a view to creating a PECs Advisory Group (PECAG).

Following Phase 2 funding the intention is to create a long-term not for profit app that supports itself. Any income derived will be invested in keeping the system up to date and relevant as new innovations, varieties and contractors emerge. We envisage a number of ways to derive revenue beyond the Phase 2 funding.

6. Phase 2 project plan

6.1 Work plan, timelines for deliverables, including key milestones

The Phase 2 work packages will be broadly the same as those included in the Phase 1 feasibility study and proof-of-concept development. They are as follows:

- WP 1: Project management and reporting
- WP 2: Information gathering
- WP 3: Outreach and dissemination
- WP 4: Spreadsheet calculators and creation of decision trees
- WP 5: App development

The one major difference is that the Testing and Commercialisation Plan are integrated into WP 5.

6.1.1 WP 1: Project management and reporting

Lead: AFBI (A project manager will be recruited by AFBI to fulfil this role. In the early stages of the project (until the candidate is in post) this role will be provided by Kevin Lindegaard of C4E. After the PM is recruited Kevin Lindegaard will provide a mentoring and support role).

Duration: Months 1-36

Contributors: C4E, NFUE

Tasks:

- Kick off meeting
- Ongoing project management
- Quarterly and annual reporting
- Draft report completed
- Final report and meeting

Key Milestones and Deliverables:

- Kick off meeting and project management plan (Q1) D
- Quarterly reports (Q1-12) M
- Annual reports (Q4 & 8) M
- Draft report and final report (Q12) D

6.1.2 WP 2: Information gathering

Lead: C4E (Kevin Lindegaard will be task leader)

Duration: Months 1-9

Contributors: C4E sub-contractors, AFBI, Teagasc

Tasks:

- Update best practice guidelines (BPG) for miscanthus and SRC
- Further develop best practice guidelines for eucalyptus and poplar based on templates developed in Phase 1
- Produce summary species and variety information for willow, miscanthus, eucalyptus and poplar
- Gather yield information and any growers guides on hemp, sida, reed canary grass, paulownia etc. Identify knowledge gaps and write up into similar style as other BPG
- Augmenting yield model, scrutinising data, looking for geographical gaps and aiming to fill these based on consultation with industry advisory group
- Site visits – especially to see plots of SRF, hemp, sida, reed canary grass, paulownia etc.

Key Milestones and Deliverables:

- Internal report on Information gathering (Q3) D
- Site visits (Q2-3) M

6.1.3 WP 3: Outreach and dissemination

Lead: NFUE (Roger Franks will be task leader)

Duration: Months 1-36

Contributors: C4E and sub-contractors, AFBI, Teagasc

Tasks:

- Recruit an industry advisory group comprising key industry players e.g. Terravesta, Willow Energy ECCL, MNL, Drax. Iggesund, Brigg, WBEF
- Recruit people to be part of a user forum to test the app
- Request more yield information from more farmers, contractors and small holders to augment models
- Explore opportunities to gain access to Magic.gov.uk datasets so users can pinpoint designations and constraints
- Develop links through Lot 2 website, demonstration days, dissemination and training events
- Marketing - articles, press releases, blogs, social media, YouTube tutorials
- Participation in hosting trade mission to demonstrate export potential

Key Milestones and Deliverables:

- Internal report on advisory group and stakeholders (Q2) D
- Kick off advisory group meeting (Q2) M
- Involvement at Platform Open Days / Demonstration events (TBD) M
- Involvement in hosting trade mission (Q8-Q9) M

6.1.4 WP 4: Spreadsheet calculators and creation of decision trees

Lead: C4E (Kevin Lindegaard will be task leader)

Duration: Months 1-18

Contributors: NFUE, C4E sub-contractors, AFBI, Teagasc, Calvium

Tasks:

- Updating calculators with exact calorific values and moisture contents
- Simplify some pathways for casual users (free app) and develop more in-depth pathways for consultants and specialists (premium app)
- Adapting existing calculators to include poplar, Eucalyptus, reed canary grass, Sida and hemp
- Adding detailed costing tool for all crop types
 - Functionality to allow user to update predicted figures with real figures once an activity is completed
 - Cash flow functionality so that users can see payback, long term profit / loss and / or production costs
- Adding logistical information calculator so that users can understand storage requirements, number of transports, ash content etc
- Adding carbon sequestration assessment calculator providing the basis for carbon trading functionality
- Flow diagrams for different crops showing the regulatory steps prospective growers need to follow before they plant
- Flow diagrams for different crops showing the regulatory steps prospective users need to fulfil to report sustainability and land criteria and adhere to emissions thresholds
- Flow diagram, of different PEC land preparation and management activities

Key Milestones and Deliverables:

- Internal report on spreadsheet calculators and decision trees (Q7) D
- Calculators for different crops (Q2) M
- Calculators for logistics and detailed costs (Q3) M
- Calculator for carbon reduction and trading functions (Q6) M

6.1.5 WP 5: App development

Lead: Calvium (Jamie Brown will be task leader)

Duration: Months 1-36

Contributors: AFBI, C4E, NFUE, Teagasc

Tasks:

This work package is divided into 5 sections and a total of 13 sub-work packages.

- Soft launch; first production release & basic content management system (CMS)
 - Discovery (User Experience [UX]) for production build and user interface design for soft launch
 - Development for soft launch
 - User interface design for production

- Development for production
- Development of basic content management system (CMS)
- First iteration of production system; preparation for a free vs. paid subscription model
 - Discovery for first iteration of production system
 - Design for production iteration
 - Development for production iteration
- Feature refinement and support
 - Advanced commercialisation discovery
 - Advanced commercial UI design
 - Advanced commercialisation development
- Feature refinement and support

Key Milestones and Deliverables:

- Updated version of the app for general release (Q3) D
- Premium version of the app ready for testing (Q4) D
- Versions of free and premium app with commercial elements ready for testing (Q7) D

6.2 Project management, including project delivery team

The project team is remaining largely the same as Phase 1. The team will be bolstered by the addition of a new AFBI employee who will provide additional project management, administrative and knowledge exchange skills. In Phase 2 NFUE will be a full partner rather than a sub-contractor to C4E.

The overall project leader is Chris Johnston of AFBI. Each of the four partners will have a dedicated team leader who is in charge of the project delivery in their organisation. These are as follows:

- AFBI New employee
- C4E Kevin Lindegaard
- Calvium Jamie Brown
- NFUE Roger Franks

Overall day to day project management, invoicing and liaison with the project MO will be shared by Kevin Lindegaard and the new AFBI employee.

The team will have one new participant. Barry Catlin of Teagasc was involved in writing the 2015 best practice guidelines on SRC and miscanthus. He has extensive involvement with PEC development in Ireland and will provide input on developing the app for a non-UK audience and markets. Teagasc and AFBI have a strong relationship based on many years of collaboration. Teagasc also commissioned C4E to write the SRC Variety guide in 2012.

6.3 Risks and risk management

An extensive assessment of the risks associated with Phase 2 was produced. 23 risks were identified and mitigating actions suggested to limit these.

6.4 Quality assurance, project controls and governance

The project partners will complete a Consortium Agreement containing: the governance structure, roles and responsibilities; distribution of project resources; arrangements for adding or removing parties to the consortium; a GDPR compliant data management process; agreements on handling intellectual properties; terms for termination of the consortium; and dispute resolution process.

Individual WP leaders will produce a Task plan to be agreed by the PM (Kevin Lindegaard / new AFBI employee) and participating team members. Each WP will reviewed weekly by the Task leader / PM to keep abreast of deliverables, any risk issues threatening the delivery of the project, allocated time, changes in work programme, redeployment of team members etc.

Our software developer Calvium will follow the Government Digital Services (GDS) framework for agile experience design projects. Phase 1 of the project which resulted in the creation of the proof-of-concept tool involved Discovery and Alpha stages.

In Phase 2, the app development task (WP 5) will be split across three years. Within those three years, the major pieces of work will be split into three further phases of work - Discovery, Design and Development. To ensure user's needs remain the main driver of this process, we will arrange User Experience workshops with real users during every discovery phase to wireframe and test acceptability of new features before committing time and resources to designing and building them. Equally, once built, these features will again be tested with users before deploying to the production system. This process of Discovery, Design and then Development will be repeated across all technical work packages within WP 5.

WP 5.1.2, in the early stages of Year 1, will deliver a soft launch of the platform: releasing an updated experience with a subset of production features to a small group of known users, for the purpose of gathering further user feedback and informing subsequent production releases.

In Years 2 and 3, our approach will shift from large sprints with predetermined requirements, to a more iterative approach of feature development. Feature developments will be informed based on usage of the production platform; feedback from users via the user forum; and bottlenecks identified via analytics data. A ticketing system will be established using Monday.com so that requested platform can be tracked with consistency, reviewed and bi-weekly meetings, before being implemented, tested and published to production. This structured approach will enable seamless communication and oversight by the project lead.

Finally, the final year of the project will focus on enabling the platform to generate a sustainable source of revenue. Again, proposals for this will be grounded in the needs of users and led by user-centred design.

Calvium has both ISO 9001 Quality and ISO 27001 Information Security certifications.

We will use collaborative tools including MS Teams, Webex and GoogleMeet and file sharing tools such as Dropbox/Google Docs). The whole project team will meet online every month to monitor progress. Minutes will be taken and any sticking points highlighted and activities set in motion to address these. An iterative approach that involves interim review/analysis will enable flexibility based on feedback from the monitoring process.

All work will be logged on timesheets relating to the specific task. All project outputs will be checked for completeness and accuracy, proof read and authorised prior to release. A record will be maintained. All electronic and hard copy reports will be subject to clear guidelines for storage and archiving upon completion.

6.5 Reporting plans

The project will communicate and report according to the following schedule:

- Monthly core project team meetings – last Friday of each month
- Monthly meetings with BEIS MO and PM
- Internal reports to present the work done at the completion of each WP
- Quarterly reports – 4 per calendar year providing updates (Q1-11)
- 2 x Annual reports collating information from quarterly reports (Q4 & 8)
- Draft report (Q12)
- Final report (Q12)

7. Conclusions

During the feasibility study the project team was able to assemble a great deal of information and create a very high-quality proof of concept web app. This was rigorously tested by a cohort of the intended target audience and the results will help inform the refinement of the app in Phase 2.

The EnviroCrops (PEC-DSS) app was well received by the testers and the concept welcomed by all the stakeholders we engaged with. There was unanimous agreement that the app would plug a huge gap in knowledge and understanding and help farmers and other supply chain participants in meeting the biomass upscale challenge.

The feedback received gives a strong endorsement that this project should receive Phase 2 funding from the Biomass Feedstock Innovation Competition.

A particular advantage of the project is that within 6 months a simple, free version of the app would be ready for release to the target audience and therefore able to start making a difference almost immediately.

The project team has investigated ways that could be used to create a long-term, not for profit, independent and financially sustainable app. Some of these revenue creating options will be incorporated into the design and will enable the app to continue long beyond when phase 2 funding concludes.