Taking farm-scale IFBB forward

Opportunities for deploying IFBB in different modes in Wales

Colin Keyse,

Cwm Harry Land Trust

Cwm Harry
For enterprising communities

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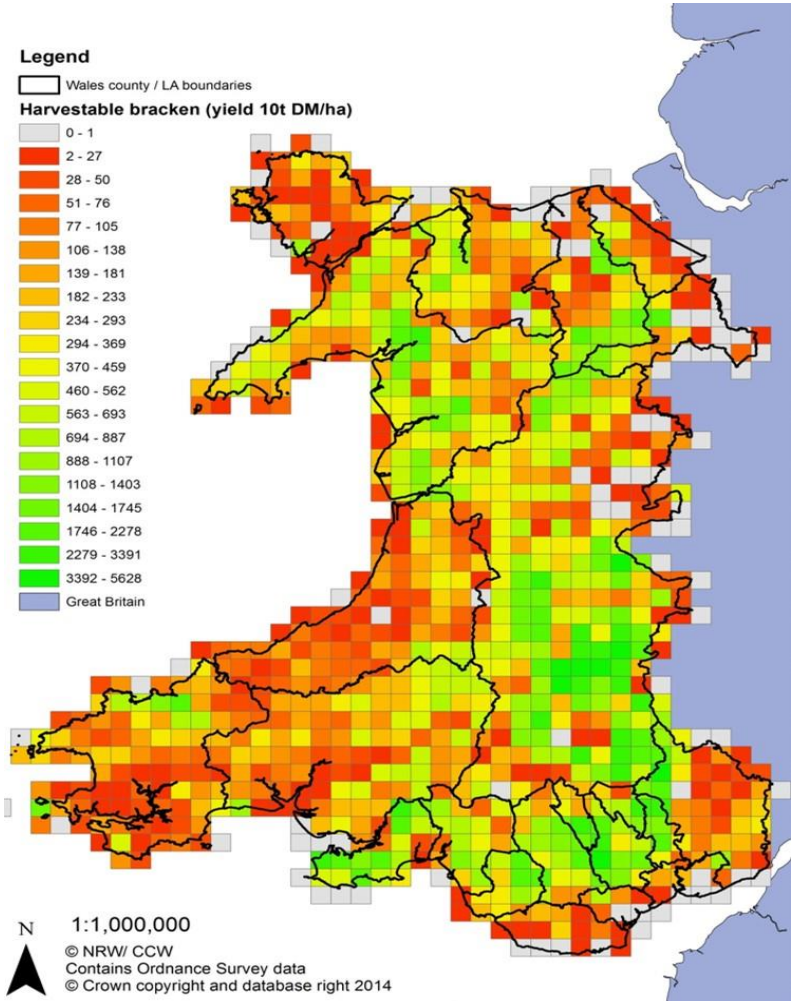
We know it's out there……

- All-Wales vegetation data survey has shown that there is a significant amount of material in the form of underutilised plant species available
- No need to utilise material classed as waste in first instance. Keeps regulatory issues to a minimum until appropriate protocols for IFBB have been developed in UK.
- Add value to end products by blending materials e.g. Woodchip
- Estimates indicate that there is sufficient soft rush, bracken, and late-cut grass and sedge from wetland reserves to support <20 x 1000T per annum farm-scale plants.



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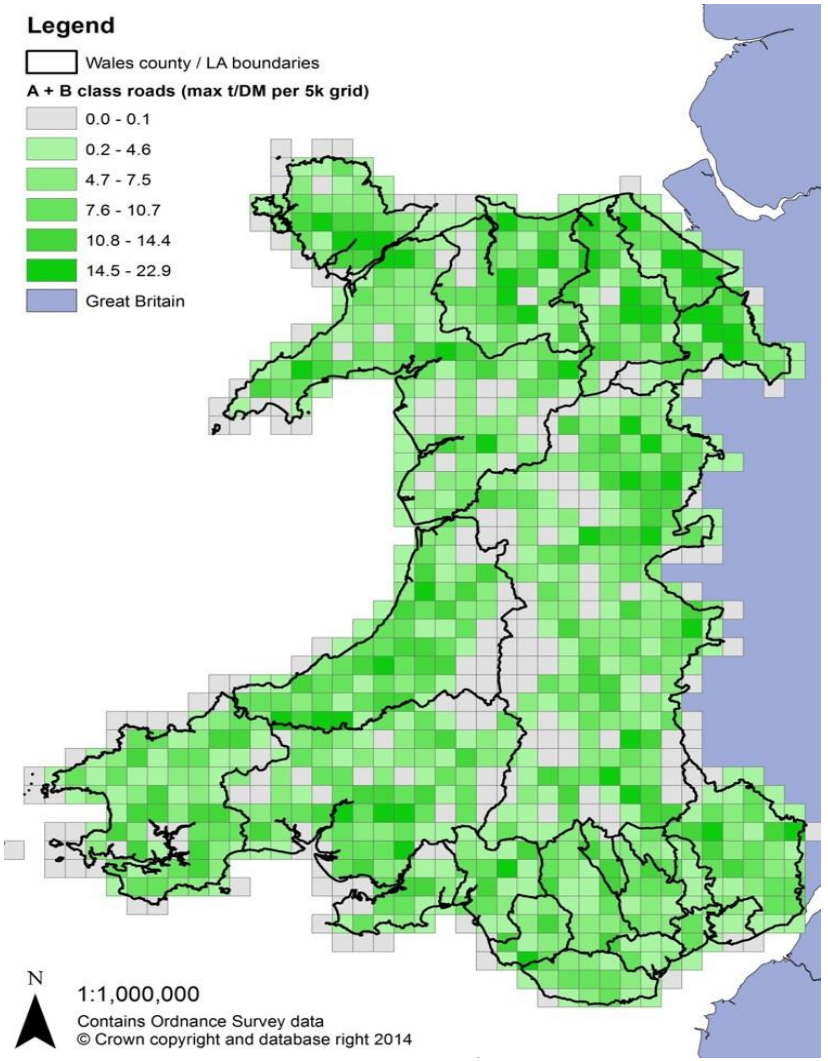
If roadside verges are added

- If questions raised by regulators over potential contamination of roadside verge grass can be overcome, this opens up a considerable resource
- Wales satellite mapping indicates an estimated 13,975T p.a. available from roadside verges based on an average 1m cut on each side.
- Information from Aberystwyth University and Welsh Government indicates large quantities of wood chip from tree and woodland maintenance (as opposed to commercial forestry) available on farm with little or no value.

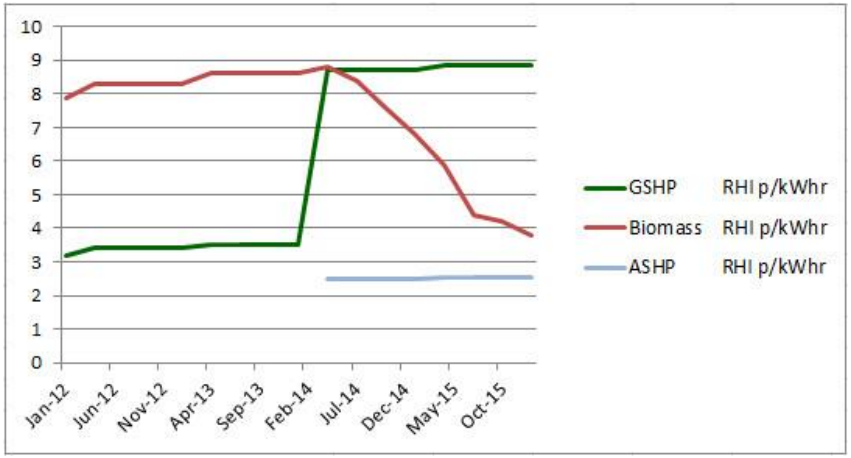


Cwm Harry Objectives:

- To create a stand alone or add-on IFBB model that is viable with 1000T silage feedstock per year.
- To work within sustainable feedstock footprint of 20km radius.
- To keep capital cost at or below £250,000 (€350,000)
- To create an operation that will fit in with other farm activities and processes.
- To reduce dependence on renewable energy subsidies and tariffs.
- To create a package that could be leased through a social economy bank or via- a crowd-funding mechanism.

Drivers for development:

- Dramatic rate of reductions in government subsidies for renewable energy.
- Reductions in subsidies for farm-support payments, and falling farm incomes.
- Limitations on volume of water used/disposed of in process.
- Costs of planning, environmental permitting and licensing.
- Need to develop products suited to direct sales into local markets



Minimising costs – monetising outputs

- Farms often have opportunities to sell directly to the public and take an increased proportion of revenue sales.
- A small-scale operation can utilise existing farm machinery and structures and be fitted in around other farm work – keeping operating costs to a minimum.

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Cost objectives and assumptions:

- End product = ‘fuel log’ 10kg sack sells @ £2.85 (€3.99) - 1T pallet sells for £249/€349
- Log is blended 70% presscake 30% woodchip
- To make 2T ‘logs’ per day (@20% MBV) or 480T per year, takes 3.73T wet silage per day or 896T per year.
- Forced heat drying takes 924kWh/day (£41.58/ €58.21) 222mWh/yr = 9.71% of retail price. Alternative forms of drying could be more cost effective.
- Water costs can be reduced by rainwater harvesting/ storage and mash liquor settling/ separation. It takes 4.67m^3 to produce 700kg’s dried presscake @ 2.5:1 mash ratio. 2240m^3 per year at £1.13 per m^3 = £2,900 / €4060.

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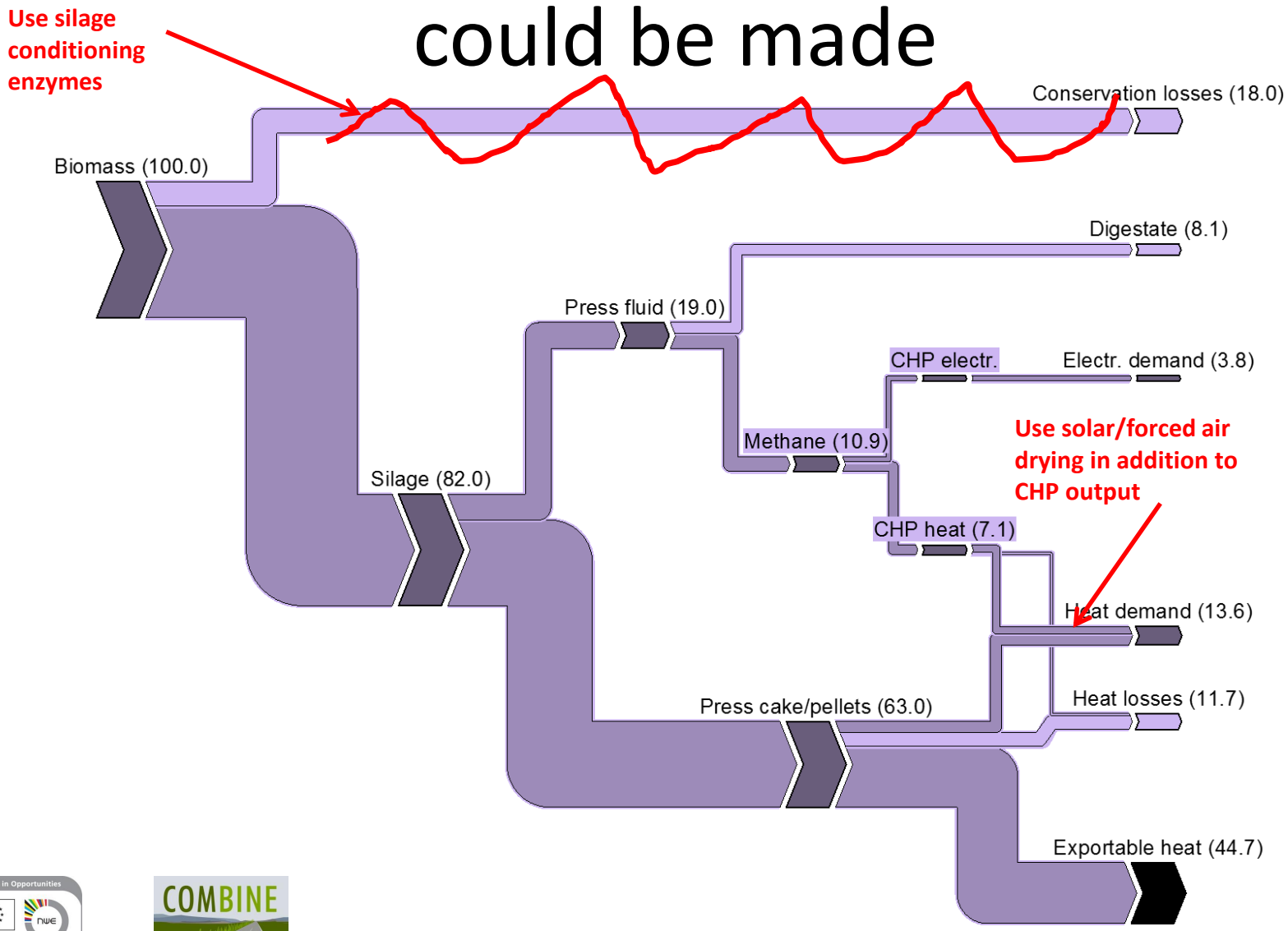
Energy Balance shows where gains could be made



Add-on IFBB to existing Biogas plant

- Capital costs already committed for site, digester, CHP, grid tie etc.
- Main feedstocks (slurries, energy crops -e.g. Maize) already sourced
- IFBB press fluid can replace make-up water if needed
- Digestate disposal already accommodated.
- Press cake fibre can be used for more than just a solid fuel
- If business model is gate-fee dependent, can a differential be applied to feedstock for IFBB add-on?
- Will contamination in Municipal green waste compromise output quality?
- Will volume of water in IFBB process add to digestate storage costs?
- Can the process be viable without RHI/subsidy?

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FSSA-IFBB Headline numbers

- 1000T wet silage input/yr from within 20km radius of IFBB plant.
- Blending with 30% free or low cost woodchip increases fuel heat content and bulks product to 480T fuel logs per year.
- If sold in smaller loads at retail prices, this could achieve £102k per year sales.
- Operating costs including cost of drying, briquetting, packaging, & consumables = £29,580
- Labour costs at 16 hrs/wk - £10/hr = £8,320
- Other site costs (assuming no rent to pay) £7,876
- Cost of woodchip £2,880.
- Gross profit: £53,344 / €74,682 (52.3%)

FSSA Capital cost assumptions

- Plant based on farm – no rental costs or land charges.
- Water/solid mash ratio is critical to sizing of mash vessels and Biogas digestor, and digestate disposal.
- Digestor dwell time is critical to digestor sizing – capacity limit assumed at 2 x 20m^3 based on 21 day dwell time.
- Most process steps can be containerised or utilise standard containers and fittings
- Assumed capital cost ceiling £250,000/€350,000.
- Capital grant assistance possible @ 40% = £100k/€140k
- Lease package over 10 years @ cost + 7.5% pa flat rate =
  - £21,366/€29,912 per annum with grant support = £31,978/€44,769 NP
  - £35,600 / €49,840 per annum without grant = £17,744/€24,842 NP

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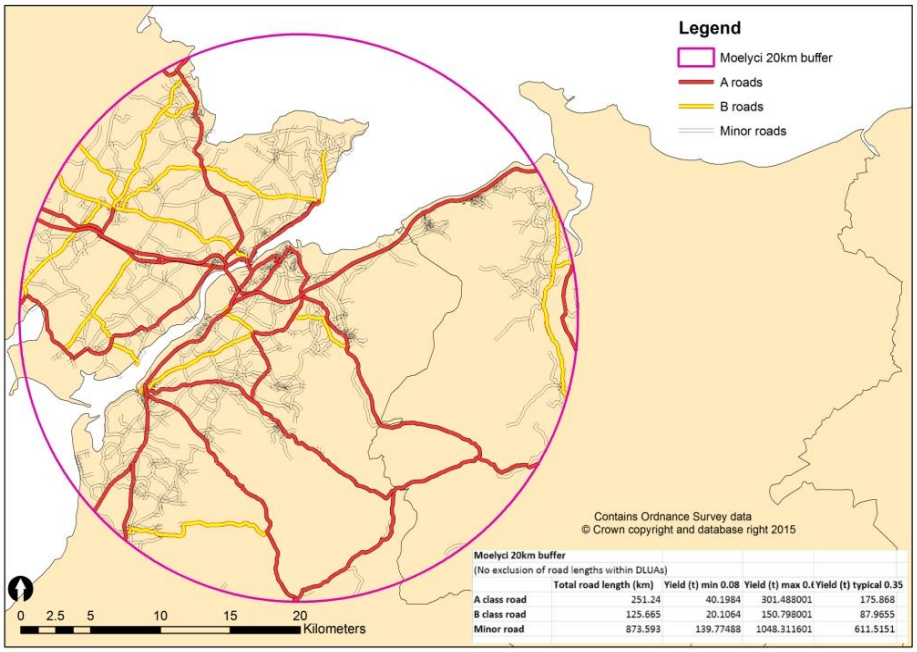
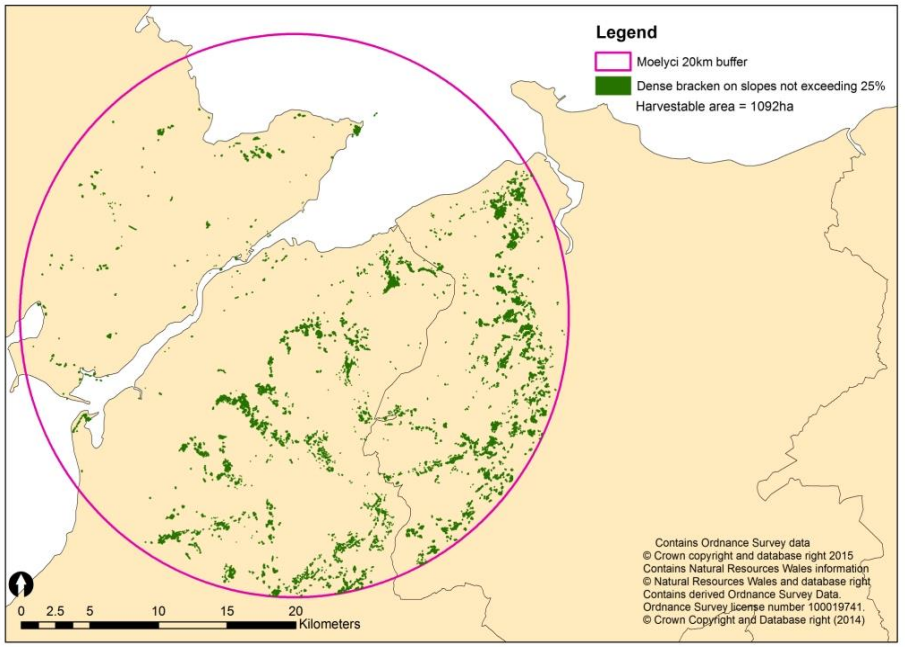
20km radius Feedstock mapping

Road verge densities A+B+Minor



Moelyci 20km buffer (No exclusion of road lengths within DLUAs)	Total road length (km)	Yield (t) min 0.08	Yield (t) max 0.4	Yield (t) typical 0.35
A class road	251.24	40.1984	301.488001	175.868
B class road	125.665	20.1064	150.798001	87.9655
Minor road	873.593	139.77488	1048.311601	611.5151

Bracken distribution <20% slope



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Cwm Harry at Moelyci – Farm Scale stand-alone IFBB pilot

- Moelyci – 390 acre traditional Welsh Hill farm .
- 600-1000T pa wet feedstock available now.
- Plenty of room for solar assisted presscake drying
- On-site Biomass boiler and heat main for buildings
- Integration with parallel technologies planned (e.g. Micro IVC with heat recovery and solar collectors)
- Pilot supply-chain co-operative planned.
- Integrated exemplar site to show it can be done
- Increase range of feedstocks that can be used
- Diversify and grow income streams from the activity
- More efficient utilisation of heat, water and nutrients – on-site if possible
- Make smaller, more localised plants affordable , adaptable and viable
- Keep revenue capture within local economy
- Provide a replicable business model for communities and clusters of small farms and SME's

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Diolch yn Fawr iawn
Thank you very much