

Food and Energy Resilience in Agriculture (lessons from an organic carbon-neutral farm)



Eco Innovation Forum November 2010

> Paul Sousek Cottage Farm



- 1. What's a carbon-neutral farm?
- 2. About us
- 3. Our renewable energy
- 4. Revolution in Farming
- 5. Summary

What's a carbon-neutral farm?

- Farm producing food
- while sequestering at least as much carbon as it produces in the process, including lifestyle, house, farm machinery, deliveries & other transport

Which means:

- Minimal, near zero use of fossil fuels
- Powered by renewable energy
- Employing Organic or Permaculture methods
- Mainly for local consumption
- To create largely self-sufficient resilient food supply
- In a truly sustainable environmentally friendly way

How many are there?

Very few – our agriculture is almost entirely oil dependant !

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About us

I ain't no farmer !

- Born in Prague, immigrated to UK after 1968
- Spent almost 30 years in Market Research
- Discovered Peak Oil in 2005
- Decided to create a lifeboat: quit job, sold up, bought a farm, invested pension in agricultural land, started farming
- No experience in farming, never sat in a tractor
- But attended one day course: 'Cows for beginners'
- And aiming for self-sufficiency

How hard can it be ...



About us



Farming: It's all about food, energy and the next generation

- Organic conversion completed July 2009
- Herd of native breed Red Ruby cattle
- Herd of native breed Wiltshire Horn sheep
- Geese, chickens, vegetable garden, orchard
- Lots of trees, planting more for wood
- All equipment second hand
- Simple organic fresh meat box scheme
- Monthly deliveries, carbon free locally
- plus Carbon sequestration into the soil

Helping to create a resilient local community

... a quick word about Peak Oil





Peak Oil and its effects

Peak Oil marks the 'peak' in world oil production followed by the end of cheap oil and the inexorable decline in future oil production (worsened by the OPEC export squeeze)

Predictions:

- Hikes & volatility in the price of energy, hence food, transport, ...
- Collapse of world economic growth: long term depression
- Destruction of asset values/ pensions/ government income
- Public services (NHS/ emergency/ local gov/ schools) minimised
- Probable collapse of world financial system, dependent on growth
- Perhaps even breakdown of law and order

When will that happen? Hasn't it already? First peak oil shock: 2007/8 Next: each time we try to grow Hence food and energy resilience of paramount importance



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... reducing consumption "you can't have too much insulation"

- Loft insulation increased to 10", needs more
- Cavity wall insulation to extension, needs more
- Old part of house: cob, excellent insulation
- 100% low energy light bulbs (used to be 1.6 kW)
- Draft excluders, double glazing
- Heavy curtains (or secondary/ triple glazing)
- Wash mach & dishwasher connected to hot water
- Tumble drier retained, but used only exceptionally
- Electric kettle replaced by hob kettle
- Home made bread but keeping the toaster !
- New appliances "A" class, solar lights
- Estimated reduction of 30%, more possible

And now for some specifics ...









... for water

"You've got a gusher!"

- Switched from metered supply to own bore hole
- Bore hole 30 m deep, 200 m run to storage tank
- Pressure vessel (red)
- Three filters (blue) (water very high in iron and manganese)
- Salt container (overnight automatic filter cleaning)
- Storage tank (1.5m3) at highest point on farm
- Pressure activated pump to supply (1.5-3 bar)
- UHV filter
- Supplies the house and whole farm (field drinkers)
- Water bill reduced from £1500 to £100/year

Largely carbon neutral resilient water supply, minimal bills







... for water heating

"Use Solar. It's free!"

- Oil boiler retained for emergencies
- Installed a large heat store
- Powered by 40 water heating solar thermal tubes
- plus wood burner with internal boiler
- plus electrical immersion heater running on surplus
- Supplies plenty of hot water all year
- plus helps heating the house via connection to central heating circuit
- Coils positioning in heat store important
- All largely carbon neutral, resilient and bills free







...for space heating

"Use wood, it's carbon neutral (and free)"

- Heat store, powered by Solar and Wood burner with internal boiler
- Wood burner sufficient to heat whole house (4 beds)
- Plus installing Rayburn wood burning cooker
- 6m3 required for the winter, mainly waste wood
- Cutting trees hard work
- Chain saw, log splitter and circular saw and plenty of storage needed →
- All largely carbon neutral, resilient and bills free









Energy

for electricity

"Free as the wind, and sun"

- 5kW wind turbine
- 8m3 of reinforced concrete foundations
- 8m tower, 5 m rotor diameter
- Grid connected, but can run off-grid
- 1.5 kW solar PV panels (more when prices fall)
- Grid connected but can also run off-grid
- New circuit for surplus: immersion/storage heater
- Expect to generate 50% more than we use
- Bills down from £1800 -> £300, plus double ROCs for wind turbine plus FiTs for PV system, plus export)
- All largely carbon free, resilient & generating income



for transport

"powered by sunshine"

- Bio-diesel of our own manufacture
- Made from waste vegetable oil
- Ford car, Land Rover and Ford tractor
- All running fine with no modifications, even in cold
- (natural rubber fittings will need changing)
- (fuel filter needs to be changed after a month)
- No good in oil boiler, what a mess, needs mods
- Made from waste veg oil, Methanol and KOH.
- Could use farm grown oil
- Separating, reacting, washing, drying and polishing all in one unit
- All largely carbon free and 60% cheaper







Summary for the farm

Island of carbon neutral resilient energy and food production

- Reduced energy consumption
- Own water supply
- Water heating solar, wood & immersion
- Space heating mainly own wood, some electric
- Electricity wind and PV solar
- Transport energy bio-diesel from waste oil
- Producing food without a hint of fossil fuels
- by organic methods for local consumption
- All largely carbon-neutral and resilient
- Can supply neighbours with food and energy

Can that be generalised?







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Peak Oil makes resilient farming a necessity

- Farms will need to become energy self-sufficient
- Farms can become net energy exporters
- Farms well suited to solar and/or wind energy production
- Dairy farms sitting on methane goldmines
- Anaerobic digesters for local non-mineral refuse
- Bio-diesel from waste oil a temporary fix, but farms can grow and process all of their own transport energy
- Farms suited to undertake reforestation of the moors for energy and construction material

Obstacles:

- Planning issues wind turbines and solar farms
- Taxation issues red diesel and carbon/ methane tax
- Market Access issues the supermarket stranglehold

Planning issues

- Increasing obstacles to farm-sized wind turbines
- English Nature/ Defra report: min 50m separation to hedges for bat protection – now enforced by many councils!

but

- Hedges are ideal for sitting 3-20kW wind turbines
- Sitting turbines in-field is dangerous to farmers, deaths will result
- Bats protected by switching to renewable energy, not by planning obstacles.
- Also typical farm has 10 miles of hedges 10% could be used for wind turbines with minimal impact on bats.

Possible solutions:

- Allow farm size wind turbines under permitted development rights, subject to 100m buffer to housing
- Remove silly restrictions on sitting in hedges

Taxation issues

- Farmers are actively discouraged from using on-farm bio-diesel through provision of tax free 'Red Diesel'
- But are free to discharge methane from slurry straight into the atmosphere

Possible solutions:

- Remove the crutch of tax free Red Diesel
- Encourage on-farm bio-diesel production for farm machinery through tax or regulation
- Ensure manufacturers of farming machinery include bio-diesel in their guarantees
- Discourage spreading of slurry before methane extraction through tax or regulation
- Encourage energy production with FiTs and capital subsidies if necessary.
- Tax allowances or farming subsidies to benefit farms with net energy export balance

Market Access issues

- Farmers profits are being squeezed to zero by supermarkets
- Supermarkets sell almost no local food
- The few local products are carted all over the country

Possible solutions:

- Force every supermarket to devote up to 20% of floor area to local food producers
- Force supermarkets to display food miles and energy consumption for every food item
- Regulate food prices such that end price is never more than 50% above price paid to producer.

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Summary

- In just 4 years Cottage Farm has become a carbonneutral net energy exporter and resilient food producer for our local area and elsewhere.
- The farming sector as a whole can do the same.
- The farming sector can become a massive net energy exporter
- Food production can become much less dependent on fossil fuels and thus much more resilient
- Provided the obstacles of planning, taxation and market access are addressed
- Time is of the essence we have less than 10 years
- To have any chance of success we need to start now in 2010/2011. Currently, we are far too complacent.

