SustainFARM

Public Goods Tool

CASE STUDY: DENMARK

Location

The *C*ombined *F*ood and *E*nergy (CFE) experimental system was established in 1995 in the experimental farm in Taastrup under Department of Plant and Environmental Sciences, University of Copenhagen. The farm is located about 20 km west of the city of Copenhagen. The site has sandy clay loam and soil depth is 1-2 m. Conventional arable production is dominant in the surrounding areas with large farms.

The farm

The CFE system consists of 10.1 ha of spring barley, winter wheat, oat and lucerne/ryegrass and 0.75 ha of biofuels (biomass belts) consisting of five belts of short rotation coppice. Each biomass belt is 10 m wide and consists of 5 double rows of SRC (3 middle double rows of three willow clones bordered by one double row of common hazel on one side and one double row of alder on the other side (Fig. 1). The biomass belts are harvested and chipped every 4 years and the wood chips taken to a nearby heat and power station for the production of heat and electricity. The food and fodder crops grown between the biomass belts are harvested annually. The popular crop rotation is oat: winter wheat and ryegrass: barley under-sown with lucerne and ryegrass: lucerne and ryegrass. The CFE system is managed organically, without the use of fertilizers, herbicides or pesticides and with the nutrient sources mainly derived from biological nitrogen fixation.

Figure 1. Short rotation coppice belt at the experimental farm Taastrup, Denmark

Results

As an experimental site, scores varies across the spurs, with an average performance in terms of sustainability (Fig. 2). It scores well for social capital due to high levels of employment, good training opportunities for staff and access for the public (Fig. 3). Its lowest score is for the agricultural systems diversity with limited marketing channels and on-farm processing. The LER is 1.19 which suggests that 19% more land is needed under a monocropping scenario to achieve the same level of production (based on metabolizable energy) as the CFE system (Fig. 4). The energy benchmarking shows that the arable enterprise is very efficient compared to the benchmark (36% of arable benchmark systems), but because the woodchip produced is exported to a nearby power station, there is no renewable energy sources used on the farm.

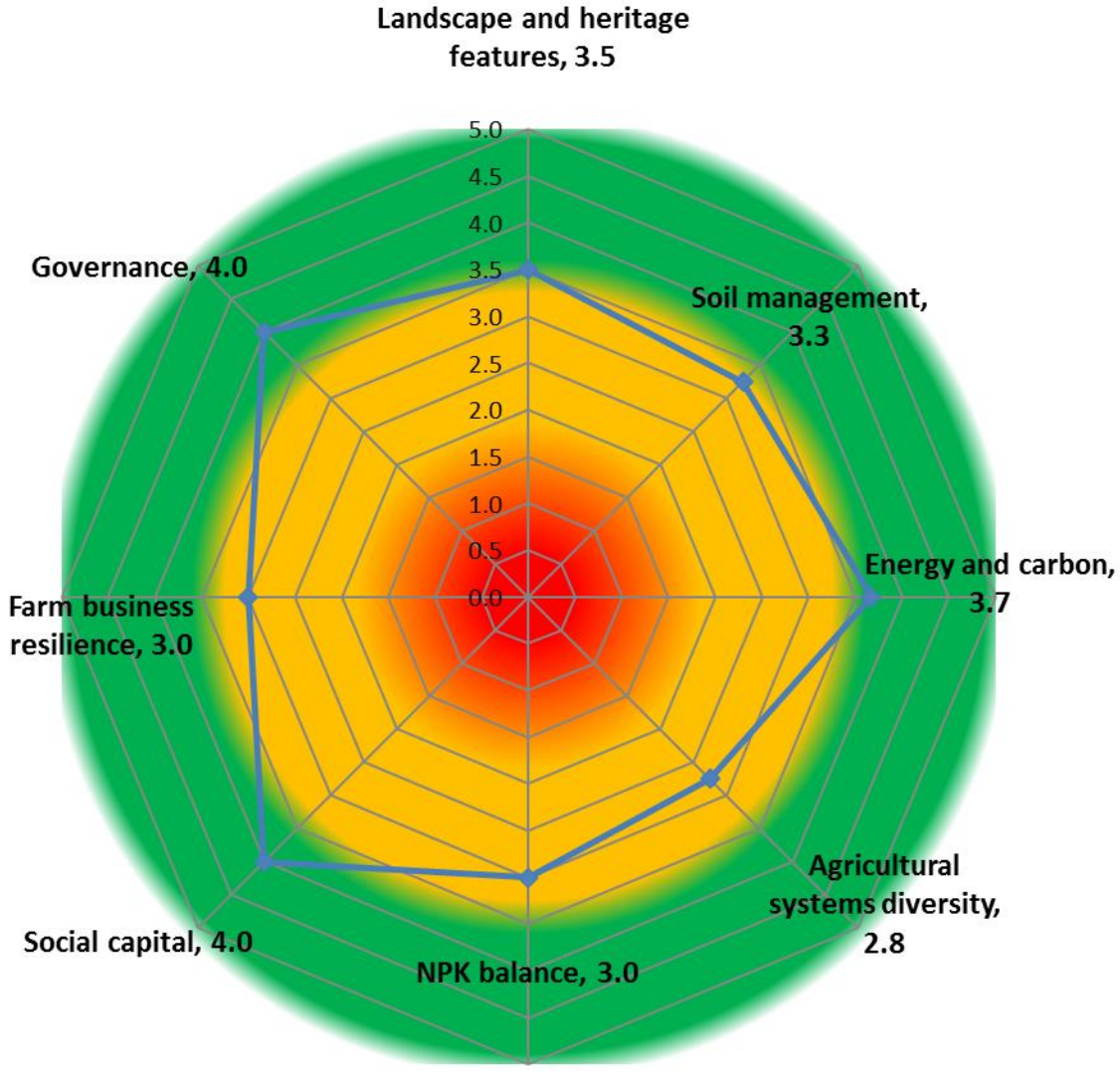

Figure 2. Spur scores for the CFE system on Højbakkegård experimental farm, Denmark

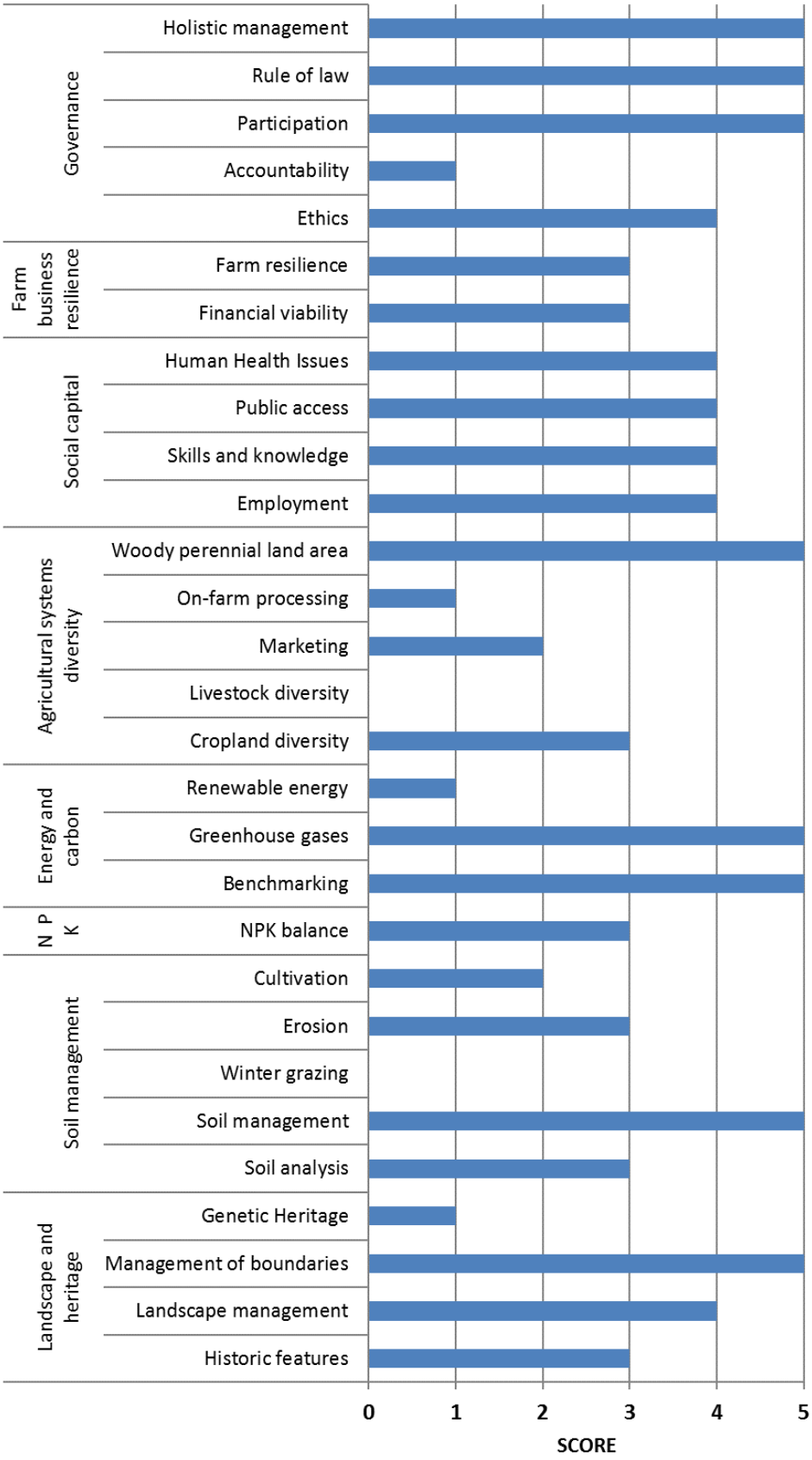

Figure 3. Bar chart showing sub-spur scores CFE system, Denmark

Key assessment criteria		
Land Equivalent Ratio	**1.19**	
Farm gate NPK balance		
N balance per ha	42	kg
P balance per ha	-6	kg
K balance per ha	17	kg
Energy benchmarks (energy use as % of average figures)		
Arable	36%	
Beef & sheep	No beef or sheep	
Dairy	No dairy	
Pigs	No pigs	
Poultry - layers	No layers	
Poultry - broilers	No broilers	
Domestic	no domestic	
Total farm renewable energy	0%	
CO_2 balance	-0.8	tonnes CO_2 equivalent yr
Labour use - ALUs	8.1	**Please note:** 1 ALU is one full-time employee working 2200 hours per year

Figure 4. Key results for CFE system, Denmark

Acknowledgements

SustainFARM is a three year project, funded in the UK by Defra, in Denmark by Innovations Fonden (InnoFond), in Italy by Ministry of Education, Universities and Research (MIUR), in Poland by the National Centre for Research and Development (NCBiR) and in Romania by Executive Agency for Higher Education, Research, Development and Innovation Funding as part of the European FACCE SURPLUS ERA-NET co-fund programme formed in collaboration between the European Commission and a partnership of 15 countries in the frame of the Joint Programming Initiative on Agriculture, Food Security and Climate Change (FACCE-JPI).