

# Economic benefits of locally owned on farm wind clusters in Aberdeenshire

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1

## Outline

- 1) Objectives
- 2) On farm wind turbines in Aberdeenshire
- 3) Costs and returns
- 4) Local economic and employment benefits

2

## 1) Study objectives



- to determine the economic benefits of local ownership of on-farm wind clusters in Aberdeenshire
- in terms of local income and jobs

*A study undertaken by SAC on behalf of several local on farm wind developers*

3



## 2) Wind farm developments in Aberdeenshire

4

## Aberdeenshire – wind farms - January 2009



Source: SNH

## Patterns of wind farm development in Aberdeenshire



- (i) **First commercial schemes - 2005-07** – operational
- (ii) **First farmer schemes – 2007- 2010** - operational
  - mostly 0.8 or 0.85MW turbines
- (iii) **Larger farm schemes – currently in planning**
  - 0.8, 0.85MW and move towards 2.3MW turbines
- (iv) **Introduction of Feed in Tariffs – 2010** - support moves back to smaller turbines – farm schemes move away from 2.3MW back towards 0.85MW and below

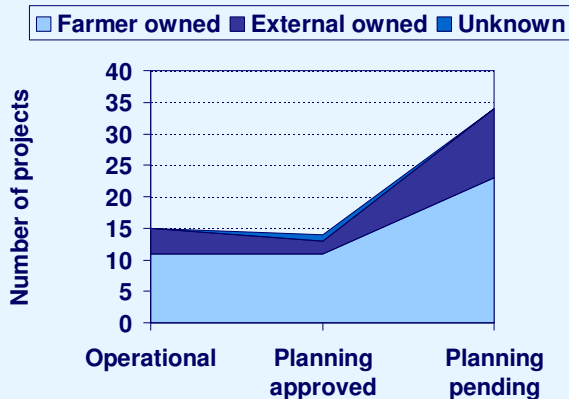
## Wind farm developments in Aberdeenshire – April 2010



- 83.95MW operational
- 110.45MW planning permission granted
- **194.4MW sub total (Operating or permitted)**
  
- 190.78MW planning permission pending
- **385.18MW total**

7

## Wind farms in Aberdeenshire – 71% of projects farmer owned



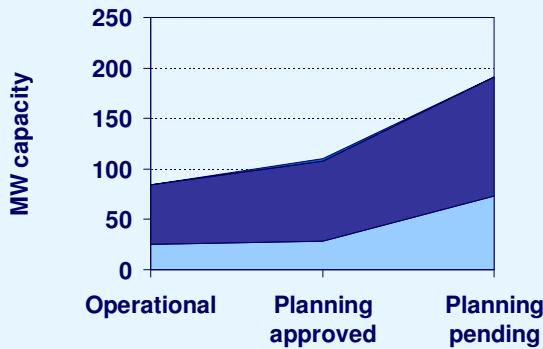
Source: Aberdeenshire Council, SAC, industry, April 2010

8

## Wind farms in Aberdeenshire – 33% of capacity farmer owned



Farmer owned External owned Unknown/joint

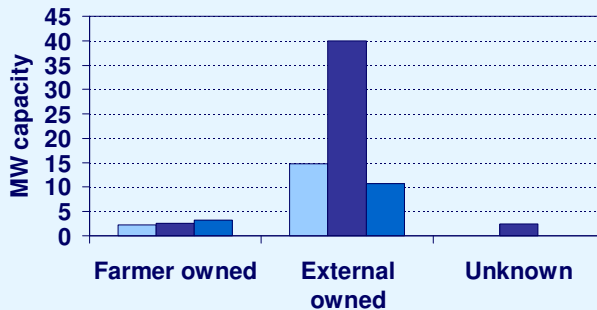


**NOTE – these estimates exclude the large number of projects that are not yet in planning**

## Wind farms in Aberdeenshire – farmer owned projects much smaller



Operational Planning approved Planning pending



## Wind farm developments in Aberdeenshire – summary



- 71% of wind projects in operation, permitted and in planning are farmers owned
- 33% of wind project capacity in operation, permitted and in planning is farmer owned
- farmer owned schemes are much smaller 2.40MW compared to 24.19MW developed by outsiders
- these estimates exclude the large number of projects that are not yet in planning

11



## 3) Costs and returns of local farmer owned wind turbines project

12

## Typical costs and returns – 0.8MW turbine – capital costs



	Single 800 kW turbine
Turbine	870,000
Civils/electrical engineering	125,000
Grid connection	150,000
Financing	50,000
Professional	80,000
Interest During Construction	20,000
Insurance	10,000
Contingency	95,000
<b>Total capital cost</b>	<b>1,400,000</b>

13

## Typical costs and returns – 0.8MW turbine – operating costs



Maintenance	20,000
Meter operator	500
Rates	7,000 or 0
Community benefit	2,000
Insurance	5,000
Telecom lines	600
Contingency	10,000
<b>Sub total</b>	<b>45,100</b>
Capital & interest*	121,800
*( 20 yrs @ 6%)	
<b>Total</b>	<b>166,900</b>

14

## Typical costs and returns – 0.8MW turbine – power output



- Rated output
- $800\text{kw} * 24 \text{ hrs} * 365 \text{ days} = 7,008,000\text{kWh}$
- Capacity factor 34%
- Actual output = **2,382,720kWh**

15

## Typical costs and returns – 0.8MW turbine – ROC income



- ROC's = 10.5p/kWh
- 'brown' electricity price + ROCs, LECs, embedded benefits and REGOs
- Income =  $2,382,720 * 10.5\text{p}$
- = **£250,186**

NOTE – ROC (Renewable Obligation Certificate), LEC (Levy Exemption Certificate), REGO (Renewable Energy Guarantee of Origin)

16

## Typical costs and returns – 0.8MW turbine – FIT income



- FIT's = 14.4p/kWh
- 'brown' electricity price of 5p/kWh + FITs at 9.4p/kWh,
- Income = 2,382,720 \* 14.4p
- = **£343,112**

NOTE – FIT (Feed in Tariff)

17

## Typical costs and returns – 0.8MW turbine – operating costs



<b>Annual costs</b>	<b>166,900</b>
<b>A – ROC's</b>	
Annual income (ROCs)	250,185
Annual return (ROCs)	<b>83,285</b>
<b>B - FITs</b>	
Annual income (FITs)	343,112
Annual return (FITs)	<b>176,212</b>

18

## Typical costs and returns – 0.8MW turbine – farmer owned vs leased out



<b>Leased out</b>	<b>9,000</b>
Annual return (ROCs)	83,285
<b>Increased income</b>	<b>74,285</b>
Annual return (FITs)	176,212
<b>Increased income</b>	<b>167,212</b>

19

## Farmer owned wind turbine developments – 0.8kW - summary



- High risk through planning stage with no guarantee of success
- + high capital costs
- = open mainly to larger, owner occupied farms
- But where farmers are prepared to take the risks and develop themselves the returns are far higher (20\* leasing)
- FITs – will boost uptake of wind power on farm, spreading benefit to smaller farms
- This extra income is a major boost to farming families
- AND to the local economy

20

## 4) Economic and employment benefits of local ownership

21

### Local economic impact assessment - outline

Where turbines are owned by local farmers incomes will be raised and a proportion of this will be spent locally, helping generate employment e.g.;

- household expenditure in local shops, restaurants, etc
- Increased investment in;
  - farming
  - diversified businesses
  - property renovation

Employment may be direct, indirect or induced

**Where turbines are owned by external investors these local benefits do not arise**

22

## Local economic impact assessment - employment impact



- (i) Project expenditure estimated
  - by category
- (ii) Then converted using employment multiplier
  - Scottish Input – output tables
- (iii) To give estimates of direct, indirect and induced employment attributed to -
  - Scotland (O’Herlihy)
  - Aberdeenshire (SAC/industry)
- (v) Results - per 0.8Mw turbine
  - extrapolated across all farmer owned schemes through planning in Aberdeenshire

23

## Local economic impact assessment - 0.8MW turbine – total jobs created



	Project spend (£)	Spend (£) per job created	Jobs created
1) Wind assessment and feasibility review	80,000	47,596	1.68
2) Planning process	2,000	42,937	0.05
3) Construction (roads)	90,000	51,177	1.76
4) Construction/erection services		51,177	0.00
5) Internal grid and grid connection	150,000	74,405	2.02
<b>TOTAL I - construction</b>	<b>322,000</b>		<b>5.50</b>
6) Operation and maintenance	20,000	47,596	0.42
7) Land agreement - local owned	176,212	75,988	2.32
<b>TOTAL II - annual</b>	<b>196,212</b>		<b>2.74</b>

Source: SAC

24

## Local economic impact assessment - 0.8MW turbine – Aberdeenshire jobs



	Share of jobs retained in Scotland	- of which in Aberdeenshire	Jobs in Aberdeenshire
1) Wind assessment and feasibility review	100%	50%	0.84
2) Planning process	100%	100%	0.05
3) Construction (roads)	100%	100%	1.76
4) Construction/erection services	33%	100%	
5) Internal grid and grid connection	50%	80%	0.81
<b>TOTAL I - construction</b>			<b>3.45</b>
6) Operation and maintenance	66%	50%	0.14
7) Land agreement - local owned	100%	65%	1.51
<b>TOTAL II - annual</b>			<b>1.65</b>

Source: SAC

## Local economic impact assessment - 0.8MW turbine – local income effect



	FARMER owned	EXTERNALLY owned	Difference
	Output/expenditure(£)		
<b>TOTAL I - construction</b>	<b>322,000</b>	<b>322,000</b>	<b>0</b>
Operation and maintenance	20,000	20,000	0
Land agreement	176,212	9,000	167,212
<b>TOTAL II - annual</b>	<b>196,212</b>	<b>29,000</b>	<b>167,212</b>

Source: SAC

## Local economic impact assessment - 0.8MW turbine – local jobs effect



	FARMER owned	EXTERNALLY owned	
	Aberdeenshire jobs created		Difference
<b>TOTAL I - construction</b>	<b>3.45</b>	<b>3.45</b>	<b>0</b>
Operation and maintenance	0.14	0.14	0
Land agreement	1.51	0.09	1.42
<b>TOTAL II - annual</b>	<b>1.65</b>	<b>0.23</b>	<b>1.42</b>

Source: SAC

## Summary - local ownership of wind turbines brings benefits



-ADDITIONAL annual income to the local economy of -  
**£167,000** per **0.8MW** turbine and in **Aberdeenshire**;

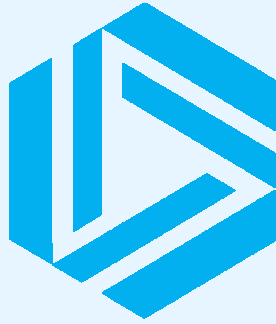
- **£11m** for operational/approved projects\*
- a further **£15.3m** from projects in planning#

- ADDITIONAL employment to the local economy of **1.42 jobs** per **0.8MW** turbine and in Aberdeenshire;

- **94 jobs** for operational/approved projects\*
- a further **130 jobs** from projects in planning#

-These are general estimates, each project is unique  
-Surveying actual impact would provide firmer data  
-Farmers are expected to be particularly good at recycling extra income back to the farm & local economy

-( farmer owned projects \*53MW in operation or permitted, #73MW in planning)



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