



**AGRICULTURE AND FOOD DEVELOPMENT AUTHORITY**

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# **Economic and behavioural factors motivating private afforestation decisions in Ireland**

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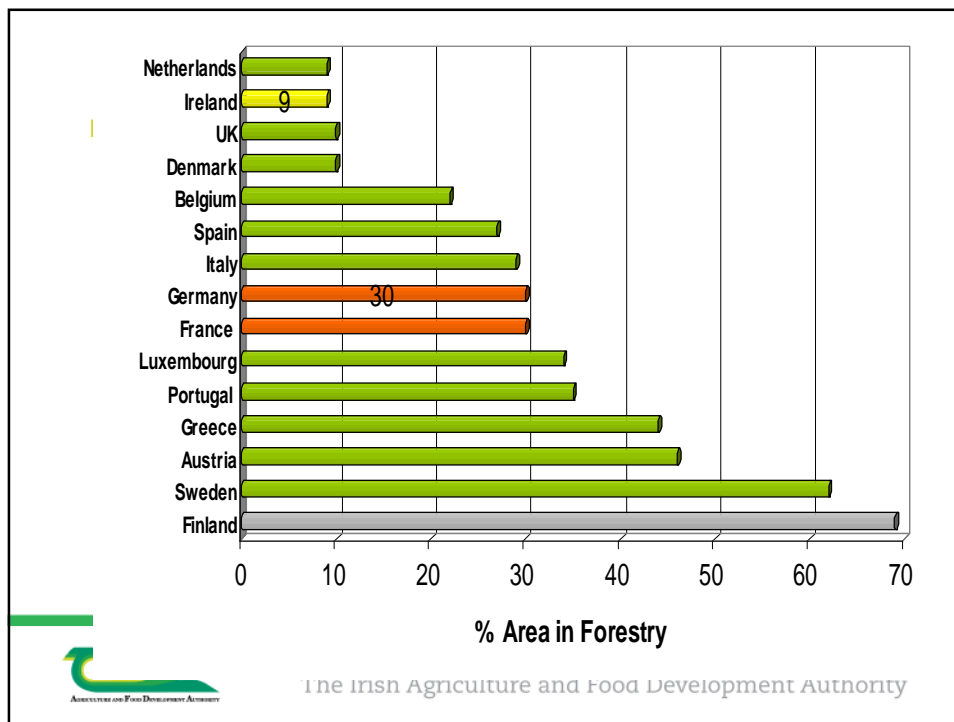
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## Targets

17% by 2030

- Currently just over 11%
- Requires 20,000 ha afforestation/yr
- Critical mass needed to support timber processing sector

Renewable Energy Directive (2009/28/EC)  
mandatory target for Ireland to achieve  
16 % of total final energy consumption from  
renewables by 2020.

## Increasing demand....

### Demand for forest biomass on the island of Ireland to 2020

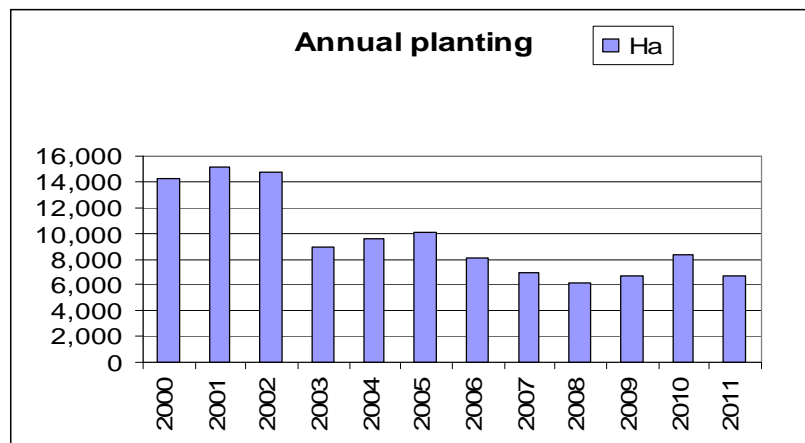
	2011	2020
	Demand in '000 m <sup>3</sup> /annum	
Combined Heat & Power (CHP)	388	1,550
Heat only	1,092	1,425
Co firing	109	109
<b>TOTAL</b>	<b>1,589</b>	<b>3,084</b>

Source: Roundwood Demand Group, (COFORD, 2010)



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## Decreasing afforestation .....



Source: Forest Service, 2012



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## However....

“..the rate of planting in Ireland lags far behind levels that would be expected from a comparison of the returns from farm forestry with competing agricultural alternatives” ... and

.... net present value (NPV) of forestry returns in Ireland exceeded that of beef and sheep enterprises... Behan (2002)

Breen et al (2010) ... largest NPV arising from a land use change from cattle farming to conifer forestry

Economic **and** behavioural factors

## Previous studies.....

Frawley and Leavy (2001)...main reason for not converting land to forestry was that their farm was “too small/need the land”.

McDonagh et al (2010)... for 48%, most important barrier to planting land was they “needed their land for agriculture”... and...second most important barrier was irreversibility

Wiemers and Behan (2004)... strong link with existing agricultural land use...reluctant to convert agriculture to forestry in spite of higher NPV from forestry.

Ni Dhubhain and Gardiner (1994).. 39% of those who would not plant - land was “too good for forestry”.



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## Survey questionnaire

March/April 2010

800 postal questionnaires

Sample from:

- General population of farmers
  - With and without forests
- General population of forest owners
  - Farmers and non-farmers
- 345 complete questionnaires analysed



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## Theoretical Model

Assume two elements to planting decision:

- Decision whether to plant or not
- How much land to plant

Double hurdle model (Cragg 1971)

- Dhakal et al (2008) planting behaviour in New Zealand
- Newman et al (2009) decision to buy pre-prepared meals in Ireland

Probit model: planting- binary choice

Truncated regression: how much land?



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## Double hurdle model

Stage 1:  $P_i^* = \beta X_i + e_i$  with  $P=1$  if  $P_i^* > \tau_i$  and  $P=0$  otherwise where  $e_i \sim N(0, \sigma^2)$  (1)

Stage 2:  $A_{if} = \alpha Z_i + u_i$ ,  $u_i \sim N(0, \sigma^2)$  (2)

Where  $P_i^*$  is a latent variable ( $-\infty < P_i^* < +\infty$ ) determining the observed decision to plant of the  $i^{\text{th}}$  household ( $P_i = 1$  if a farmer has planted,  $P_i = 0$  if farmer has not planted);

$X_i$  is a vector of explanatory variables influencing the decision whether to plant and  $\beta$  the vector of coefficients;

$\tau_i$  is a cut off point for having forestry planting;  $A_{if}$  is the area of planted land (ha);

$Z_i$  a vector of explanatory variables determining the % of planted land;

$\alpha$  the vector of coefficients and  $e_i$  and  $u_i$  are normally distributed error terms



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## Significance of variables tested

### Positive

Extent of land: significant in both models. Farmers with more land are

- a) more likely to plant and
- b) likely to plant more land

Level of premium payment: positive and significant on decision to plant but not on extent of planting

Off-farm income: significant in both models

### Negative

Irreversibility



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**Age:** Older farmers more likely to plant and also to plant larger area

**Inheritance:** Affects the decision to plant but not the extent of planting



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**Knowledge** of timber and non-timber benefits:  
large influence on planting but not on extent

Potential for **tourism** not significant



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**Expected income from thinnings:**  
**not significant**  
**(52% don't know)**







### Conclusions

Irreversibility  
Farmers like/need to farm  
Importance of premium payment  
Age, education, off-farm income, inheritance

## Informing policy

Knowledge gaps

- Value of timber
- Wider benefits of forests

Negative cultural bias

Complexity of decision

Strong role for extension services



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