

# Irish Biodiesel Production and Market Outlook



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The Tipperary Institute, Thurles



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# Overview

- o Motivation
- o Biodiesel Production
- o Market Outlook
  - o Government/EU Policy
- o Summary



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# Motivation

- Fuel:  
produced 'locally' and used 'locally'
- Promote employment:  
production/management/quality  
agriculture/plant and associated  
trades/suppliers
- Reduce energy dependence



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# Biodiesel Production: Source of Our Fuel

- Pure Plant Oil (PPO) from Oil Seed Rape
  - Grown in Ireland
  - Pressed on site
    - Co-products rape seed cake
      - Animal Feed Industry
        - Displaces Imported Soya
        - High Oil Content
      - Fuel
    - Also rape straw



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# Biodiesel Production: Oil Seed Rape

- o Winter - Best Yields
- o Typically 1.5 to 1.7 tonnes per acre
- o over 2.0 tonnes achieved
  
- o Spring Varieties
- o Typically 1.0 to 1.25 tonnes per acre



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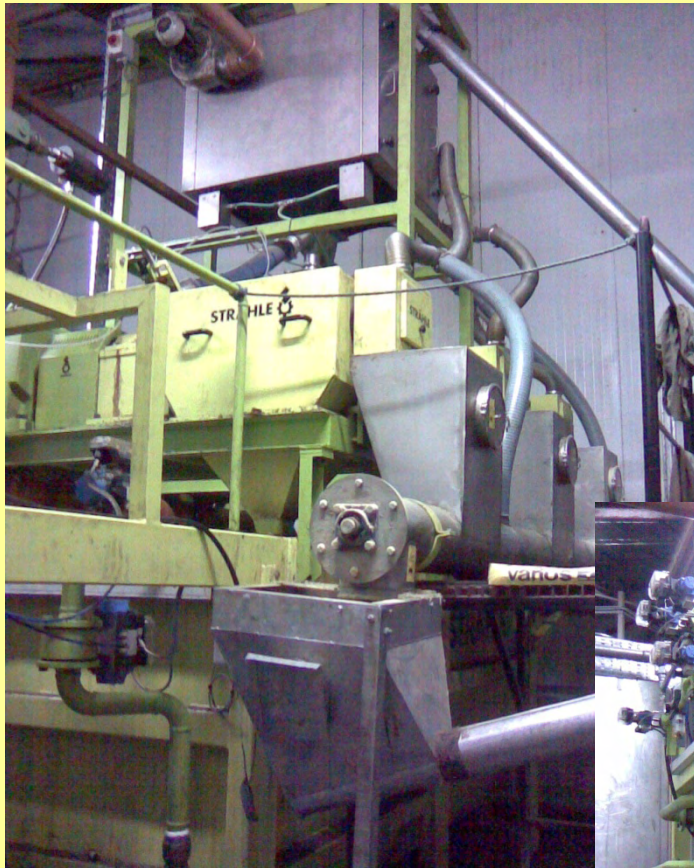
# Biodiesel Production: Oil Seed Rape

- Winter seed at 7 % moisture
- 1.5 tonnes seed  
= 0.5 tonnes of oil per acre
- 555 L per acre (approx)
- Approx 1 tonne of cake per acre



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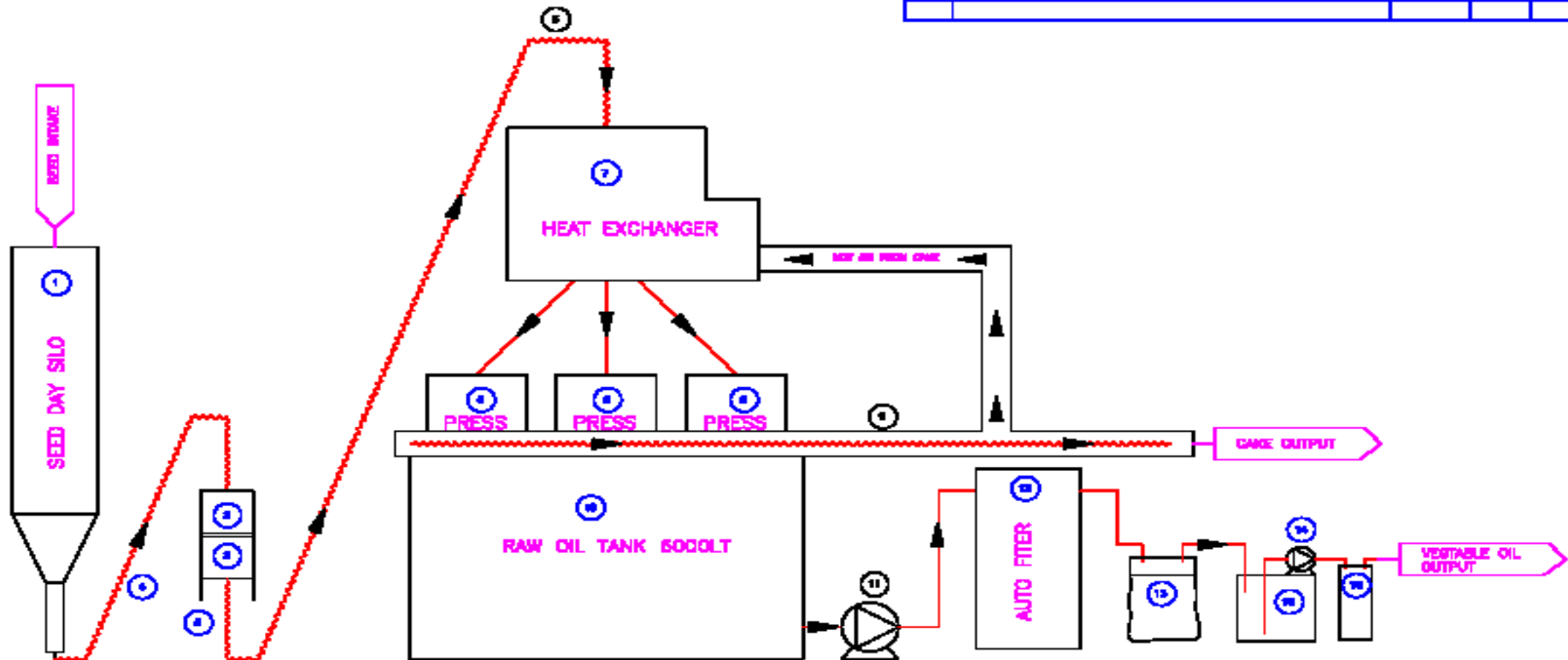




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# Biodiesel Production: Drawing of Press Area

Rev/No	Revision made	Date	Signature	Checked
A	FOR EXTERNAL DISTRIBUTION	13/03/08	NM	



**KEY:**

1. ONE DAY SILO
2. SEED CLEANER
3. SEED SCALE
4. SEED SIZER
5. SEED SCREW FOR CLEANER AND SCALE
6. SCREW TO HEAT EXCHANGER
7. HEAT EXCHANGER
8. SEED PRESSES

9. SCREW FOR CAKE COOLING
10. RAW OIL TANK
11. PUMP
12. FULLY AUTOMATED FILTER
13. PUMP
14. PUMP
15. SMALL TANK
16. MULTI CANDLE FILTER

Drawn by N MURPHY	Checked by N MURPHY	Approved by -- date	File name SEED OIL	Date 13/03/08	Scale N/A
<b>SEED PRESS FLOW DIAGRAM</b>					
GRO OIL LTD.				Sheet A	Total 1/1

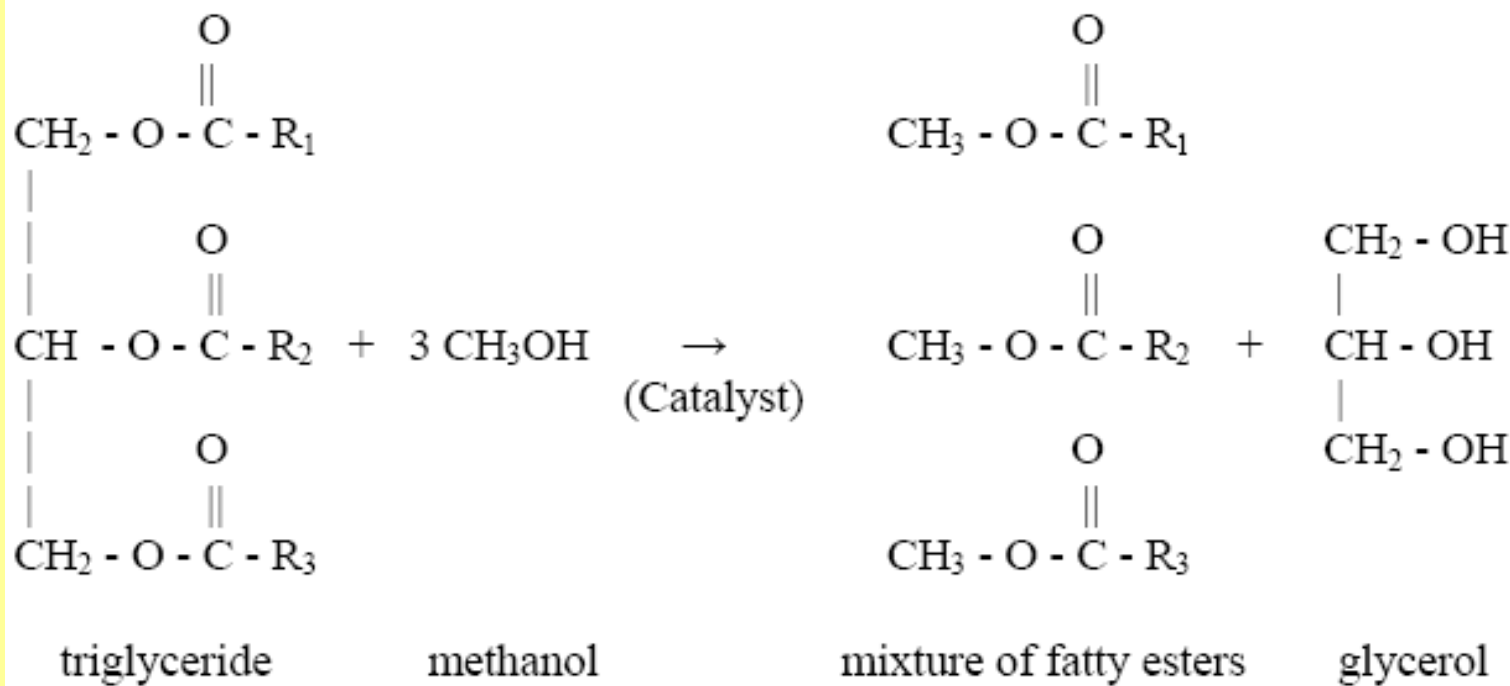
# Biodiesel Production:

- o Transesterification Process
- o Methanol - NaOH



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# Biodiesel Production:



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# Biodiesel Production:

- Glycerol - properties tested to determine suitability as a fuel
- Glycerol is a valuable side product
- High demand for boiler applications
- Feed for anaerobic digestion



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# Biodiesel Production: CEN Standard



- European Standard EN14214
- for Automotive fuels – Fatty acid methyl esters (FAME) for diesel engines



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<b>Criteria</b>	<b>Derv (EN590)</b>	<b>Biodiesel (EN14214)</b>
Density @ 15°C (g/cm <sup>3</sup> )	0.820-0.845	0.86-0.90
Viscosity @ 40°C (mm <sup>2</sup> /s)	2.0-4.5	3.5-5.0
Flashpoint (°C)	>55	>120
Sulphur (mg/kg)	10	10
Ash (% mass)	0.01	0.02
Water (mg/kg)	<200	<500
Carbon Residue (% m/m)	<0.30	<0.30
Total Contamination (mg/kg)	<24	<24
Copper Corrosion 3h/50°C	Class 1	Class 1
Cetane Number	>46	>51
FAME content (%)	Max. 5	Min. 96.5
Methanol (% mass)	n/a	<0.2
Ester Content (% mass)	<5	>96.5
Mono/di/triglycides (% mass)	n/a	<0.8/<0.2/<0.2
Free/total Glycerol (% mass)	Unknown	<0.02/<0.25
Iodine Number g iodine/100 g	n/a	120
Phosphorus (mg/kg)	n/a	<10
Alkaline Metals Na. K (mg/kg)	n/a	<5

# Biodiesel Production:



- o EN590 & EN14214 test many of the same fuel properties
- o EN14214 tests (amongst others) for:
  - o Water content
  - o Sediment
  - o Ester (biodiesel) content
  - o Cetane number
  - o Oxidation stability



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# Biodiesel Production: Blends

- Biodiesel blends
  - mixture of biodiesel with commercially available mineral diesel
- Commercially available mineral diesel is required to meet the EN 590 specification for Automotive Fuels – Diesel
- The most common blend is B30
- B30:  
30 % Biodiesel : 70 % mineral diesel



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# Biodiesel Production: Blends

property	B30	EN590
Density g/cm <sup>3</sup>	0.832-0.862 (0.849 actual)	0.82-0.845
viscosity	3.27 (2 - 4.5) mm <sup>2</sup> /s	
Flash point	72 (> 55 deg C)	
Sulphur content	13.2 (max. 50) mg/kg	
water	126 (max. 200) ppm	
Carbon residue	0.14 (max. 0.3) % (m/m)	
Total contamination	3 (max. 24) mg/kg	
Copper corrosion	1 (1)	
Cetane no.	54.6 (min.46)	

Tested B30 to EN590 - all parameters within spec. except for 30 % biodiesel content rather than the existing 5 % allowable in EN590 mineral diesel and density due to the physical nature of the components being mixed



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# Biodiesel Production: Future Process Development

- As mentioned earlier
- EU is in the process of developing a standard for FAEE
- biodiesel made from oil and ethanol produced from renewable sources within Ireland
- potential future development of Ecoola's process, reducing further our import dependence



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# Biodiesel Production: Environmental

- Carbon neutral
- Biodegradability 87 % (OECD 301B)
- Low hazard to waters (WGK classification)
- Large discharge can lead to physical rather than toxic effects (compared to mineral oil)



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# Market Outlook: Ireland 90% Dependent on Imported Fuels in 2006

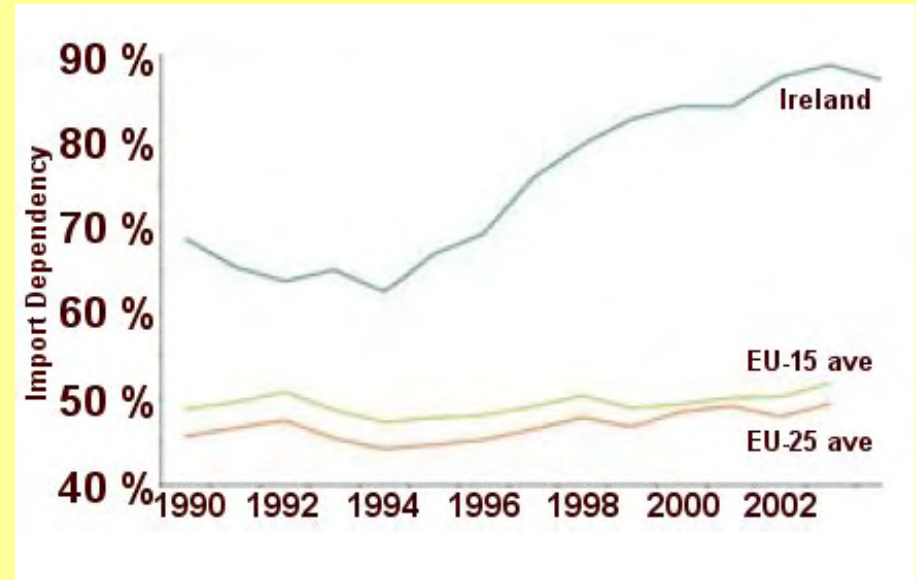
Import dependency, is important for assessing Ireland's vulnerability to international price fluctuations and interruptions to supply.<sup>1</sup>

1990 - Domestic resources 31% of requirements  
Since mid-1990s import dependency has grown significantly - increased energy use - decline in indigenous natural gas production - decreasing peat production.

2003 - Ireland's import dependency 89% - up from 69% in 1990.

2004 - Dependency fell to 87% - small increase in indigenous gas - build up of peat stocks - increasing contribution of renewables

2003 - Import dependency for the EU-15 - 52%, EU-25 - 49%



<sup>1</sup> SEI, Energy Focus, May 2006.

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# Market Outlook: EU Policy

- Directive 2009/28/EC
- Promotion of the use of energy from renewable sources
- Promotes security of energy supply
- Provides opportunities for employment and regional development for SMEs
- Reduce EU dependence on imported oil for transport
- Commission & member states should support national & regional developments
- Decentralised energy production-use of local energy sources, local security of energy supply, shorter transport distances
- 10 % minimum energy for transport from biofuels to be achieved by all Member States by 2020



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# Market Outlook: Government/Biofuel Obligation

- Energy (Biofuel Obligation and Miscellaneous Provisions) Bill 2010
- introduces a Biofuel Obligation in Ireland since the Renewable Energy Directive (2009/28/EC) has placed a requirement on all Member States that 10% of transport energy will be renewable by 2020



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# Market Outlook: Government/Biofuel Obligation

- Biofuels have a central role to play in the delivery of this target and also in the delivery of reductions in Greenhouse Gas emissions, as one of the few available and effective means of reducing emissions from transport



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# Market Outlook: Government/Biofuel Obligation

- The Biofuel Obligation is designed to provide the biofuels sector with the certainty it needs to invest and grow in a sustainable way, while protecting the consumer from rapid price movements in either the hydrocarbons or soft commodities markets.



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# Market Outlook: Government/Biofuel Obligation

- o oil companies that sell road transport fuel will include a certain volume of biofuels in their sales. The obligation will only relate to the biofuel component of the fuel.
- o the initial percentage rate for biofuel penetration shall be 4.166 % and the Minister may review this rate over time



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# Market Outlook: Government/Biofuel Obligation

- NORA will automatically open an account for each obligated party currently paying the NORA levy. Biofuel producers and biofuel suppliers who wish to opt into the Biofuel Obligation will be obliged to open a biofuel obligation account
- biofuel obligation accounts will be credited with a certificate for each litre of biofuel sold and in particular cases two certificates will be awarded per litre if NORA determines that the biofuel is made from biodegradable waste or residue



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# Market Outlook: Government/Biofuel Obligation

- o The biofuel obligation scheme, through the Energy Bill 2010 amending NORA 2007, is Irelands response to its obligations under Dir. 2009/28/EC



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# Market Outlook: EU Policy

- Directive 2009/28/EC
- Promotion of the use of energy from renewable sources
- Promotes security of energy supply
- Provides opportunities for employment and regional development for SMEs
  - Security for imported supplies
- Reduce EU dependence on imported oil for transport
  - But still importing biofuel (and from UK experience it will only increase)



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# Market Outlook: EU Policy

- Commission & member states should support national & regional developments
  - No support either regional or national – just full rate of duty
- Decentralised energy production-use of local energy sources, local security of energy supply, shorter transport distances
  - Where is the incentive to achieve this
- 10 % minimum energy for transport from biofuels to be achieved by all Member States by 2020
  - Why only 4 % being considered at the moment, Why is there no push to achieve 10 % sooner



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# Market Outlook: EU Policy

- Saudi Arabia - A top Saudi energy official expressed serious concern on Monday that world oil demand could peak in the next decade and said his country was preparing for that eventuality by diversifying its economic base
- Mohammed al-Sabban (AP Feb. 15<sup>th</sup> 2010)\*, lead climate talks negotiator, said the country with the world's largest proven reserves of conventional crude is working to become the top exporter of energy, including alternative forms such as solar power

*\* Senior Economic Advisor to the Minister of Petroleum and Mineral Resources, Saudi Arabia*



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# Market Outlook:

- o Biodiesel and blends
  - o Local authorities
  - o Captive fleets
  - o Semi-state
  - o Development of markets resulting from the biofuel obligation?
- o Glycerol
  - o Fuel
  - o Feedstock for AD
- o Rape cake
  - o Feed
  - o fuel



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# Summary:

- o Biodiesel Production
  - o Not a problem
- o Market Outlook
  - o Volume sales possibly a different story!



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○ Thank you for your attention!

○ Any questions?

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