


PETROL



Introduction of the EU Biofuel Directive – PETROL's Experience

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HOW DEPENDENT IS SLOVENIA ON ENERGY IMPORT?

SLOVENIA (%)	1994	2004	2005
Primary Energy	48	52	52
Crude Oil	100	100	100
Natural Gas	98	99	99

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ALTERNATIVE ENERGY SOLUTIONS

ALTERNATIV ENERGY PRODUCTION 1000 toe,	1994	2004	2005
SOLAR -EU	225	691	841
-Slovenia	-	-	-
BIOMAS -EU	49 876	75 309	80 784
-Slovenia	263	470	476
GEO THERMAL -EU	3 425	5 464	5 395
-Slovenia	-	-	-
WIND -EU	300	5 057	6 060
-Slovenia	-	-	-
HYDRO -EU	28 129	27 830	26 394
-Slovenia	292	352	298



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Basis

- EU Directive 2003/30/EC of 8.5.2003 on the Promotion of the Use of Biofuels or Other Renewable Fuels for Transport
- amending Directive 98/70/EC as regards the specification of petrol, diesel and gas-oil and introduction of a mechanism to monitor and reduce greenhouse gas emissions (GHGE) from the use of road transport fuels
- Renewable Energy & Climate Change Package (23 of January 2008)



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Key goals of the Biofuel Directive

- to promote the use of biofuel in transport with the aim of reducing the environmental impact of fossil fuels
- to define a minimum share of biofuel to be sold on the market of each Member State by 2010 (% of the quantity of fossil fuels sold (diesel, petrol) – from 2% in 2005 to 5.75% in 2010)



Selected topics of the Fuel Quality Directive

Article 7a: Decarbonisation of road fuels: CO₂ mitigation options for fossil fuels and partial substitution of fossil fuels by low carbon fuels

Separate “High Biofuel Petrol” Grade – vapour pressure waiver permitted for petrol containing ethanol



- The reduction shall equal an additional 1% of the emissions in 2010 per year for each year up to and including 2020
- The level of LC GHGE per unit of energy reported in 2020 shall be no greater than 90% of the level reported in 2010



GHGE Savings from different biofuels

Type	Source	WTW GHGE savings compared to %CO2 eq/MJ	
		Gasoline	Diesel
Ethanol	EU cereal	40%	
	Sugar cane or cellulosic	80%	
FAME	EU OIL seeds		50%
BTL	EU waste wood		90%



Greenhouse Gas emission reductions:

- From 1 January 2009, Member states shall require suppliers of fuels for road transport and non-road mobile machinery that are placed on the market, to monitor and report the LCA of GGE from those fuels – no approved model
- From 1 January 2011, Member states shall require suppliers of fuels for road transport and non-road mobile machinery that are placed on the market, to reduce GGE from those fuels



TWO KEY QUESTIONS:

How to achieve a 10% GHGE savings as requested by Article 7a through blending of biofuels?

How to achieve 10% Biofuels as requested by the Biofuels directive?

10% bio-components in road fuels on an energy basis and 10% GHGE reduction by 2020 are not equivalent targets.



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Requirements deriving from the
REGULATIONS on the content of biofuel (Slovenia):

In 2007 – biofuel share: at least 2%
of all fuels used for transport purposes (petrol, diesel)

Petrol d.d.

-148.000 kg bioethanol

- 5.279.826 kg biodiesel

i.e. 0,45 %



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PETROL's Activities

Biodiesel Pilot project -2004

- First activities for the implementation of the Directive's requirements were carried out in 2004 (selection of biofuels, testing of blending options and methods, recording and checking of biodiesel suppliers, etc.)



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Activities have been introduced to understand the quality requirements and offer technical support to the procurement and admixing procedures on the basis of knowledge from literature, best practices and obtained test results (knowledge and experience in admixing of biodiesel and diesel fuel is necessary in order to provide bio fuel for specific purpose of use and in compliance with prescribed specifications - limitations arise due to different types of diesel engines and specific climate demands/seasons);



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PETROL's Decisions

- to add 5% biodiesel to fossil diesel (B5), in accordance with the EN 590 standard for diesel
- to blend biofuel through in-line devices in Petrol's main storage depots
- 2007/2008- to add up to 5% bioethanol (E5) in accordance with the EN 228 standard for gasoline (petrol)



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Quality Standards

- Biodiesel conforming to the EN 14 214 (SIST EN 14214) requirements
- Conforming to the AGQM (Arbeitsgemeinschaft Qualitätsmanagement Biodiesel e.v.) recommendations
- Supplier audits, entry control of key parameters
- Raw material for the production of biodiesel: fresh rape seed or soybean oil (soy content max 30%).
- Preventive biociding of diesel fuel (if necessary)
- Sources of supply – domestic producer



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- The FIE manufacturer's position is:
- European standard EN 14214 at the point of sale used in mixtures of up to 5% by volume with fossil diesel fuel complying with the EN 590 diesel fuel standard should not give end-users any serious problems.
- The final product B5 must also comply with EN 590. Any new biodiesel blend, e.g. B10 in Europe or B20 in the USA has to be standardized (with special emphasis on oxidation stability) and validated carefully before release.
- To date, experience in Europe has been mainly associated with the methyl esters of rapeseed oil. The service experience with these fuels will apply/extend to all FAMES (like those derived from soybean, tallow and used frying oil) has yet to be determined. FAMES tested to date appear to have good lubricity and cetane numbers, but have risks which are discussed below.

The following biodiesel characteristics are the concerns of the FIE manufacturers:

- - free methanol,
- - water,
- - free glycerine,
- - mono, di- and triglycerides - free fatty acids,
- - total solid impurity level,
- - alkali/alkaline earth metals,
- - oxidation stability.



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Challenges and Difficulties (Supply)

- Mayor providers: relatively vast supply of biodiesel, but not all types are completely suitable (also sold outside the official sales network)
- Minor providers: uncontrolled production and use (non-registered producers, non-standard biodiesel)
- Demanding organisation of logistic routes
- Expensive preparation of tanks and blending devices



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Challenges and difficulties (Properties and Use of Biodiesel)

- Limited winter properties (quality) of biodiesel
- Quality assurance; obtaining of quality certificates from producers
- Extensive and time consuming analysis of entry control
- Lack of knowledge and relatively great customer distrust of biodiesel
- Production of technologically more demanding diesel engines (Common rail)



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Gradual introduction of regular blending procedures and sale of biodiesel (B5 blend) at storage depots and service stations

- 1st phase: blending of B5 in the Zalog storage depot (2004/05)
- 2nd phase: blending of B5 in the Zalog and Rače storage depots (2005/06)
- 3rd phase: blending of B5 in all storage depots (2007/08) – Zalog, Rače and Sermin



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Preliminary preparations at service stations for B5 (1) sale

- Conforming to the AGQM recommendations
- Selection of a service station with sufficient quantities of fuel sold (at least 1m litres/year)
- Suitable age of tanks and installations
- Obligatory cleaning of tanks and pipelines prior to the introduction of biodiesel



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Monitoring service stations selling B5

- Regular inspection and, if necessary, more frequent cleaning of fuel dispenser filters
- Regular checking of fuel quality at service stations (visual checking, periodically also laboratory checking)



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- quality control of biodiesel from the producer before discharge into the store tank (biodiesel must meet the requirements of EN 14214),
- regular quality control of biodiesel in store tanks (decisions on the scope of testing and frequency shall have to be made),
- quality control of the admixing procedure of biodiesel with diesel fuel (determination of FAME content in diesel fuel before the distribution to the customer/consumer),
- random quality control of bio fuel samples taken from public filling stations or locations of larger customers/consumers (fleets of public transportation, ect.).
- Increase in QC costs by 30% annually



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Gained Experience and Recommendations (1) (Suppliers)

- Supplier audit prior to each purchase decision
- Obligatory Quality Certificate to accompany each supply
- Entry control (more frequent and thorough in the first phase)
- Monitoring and occasional checking of suppliers



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Gained Experience and Recommendations (2) (Biodiesel Quality)

- Biodiesel must completely meet the standard (EN 14 214) *
- Raw material basis defined
- Entry control (more frequent and thorough in the first phase)
- Note: Some key items in Petrol's purchase specifications are more demanding than the standard requirements (water content, oxidation stability)



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Gained Experience and Recommendations (3) (Storage and Manipulation)

- Preliminary preparation of tanks and pipelines for biodiesel storage
- Guaranteed fuel quantities
- Regular draining of tanks
- Regular control of tanks (including microbiological control)

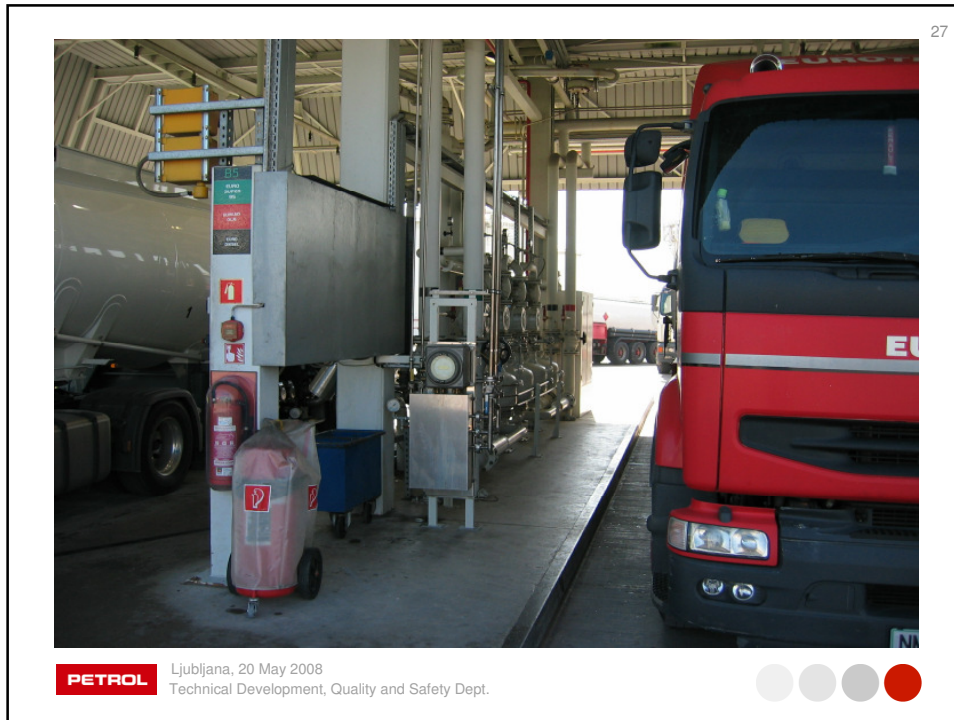


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Current Situation - Slovenia

- A new Regulation on Biofuel - introducing several new issues, among other things specific obligations of budget customers - to be adopted soon
- New production capacities planned (Pinus, Nafta Lendava)
- Options studied for the introduction of other alternative fuels (presently only at the initiative and consultation level)



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Current Situation - Petrol (B5)

- Approximately 20% of all PETROL's service stations currently included in the B5 system and under additional control
- No problems or complications noticed
- Gradual inclusion of additional service stations in the B5 system



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Current Situation - Petrol (B100)

- Currently 1 service station selling B100
- Options studied for the inclusion of additional service stations into the B100 system
- One major buyer of B100 – LPP (20 buses)
- Activities under way for the promotion of B100 sales (particularly to major customers)

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Bioethanol Use

- Maximum oxygenate contents specified
- 5% by volume for ethanol
- 15% by volume for ethers
- Other oxygenates different values
- Maximum 2.7% oxygen content overall
- Vapour pressure
- No waiver permitted for increase in vapour pressure when blending ethanol in petrol
- Vapour pressure set at 60kPa



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Biofuel Related to Gasoline Specification

- New petrol specification created with higher max Oxygenates and overall oxygen content (3.7%)
- Maximum ethanol content of 10%
- Labelling of blends to avoid mis-fuelling
- Vapour pressure
Derogation from 60kPa for ethanol containing petrol Blends. Level of derogation depends on % ethanol
- Commission commitment to bring forward proposal for stage II vapour recovery legislation



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New Findings and Challenges (1)

With reference to the proposal of a new Regulation on Biofuel (Slovenia):

- Quantity requirements arising from the EU Directive, also contained in the new Regulation, are very difficult or almost impossible to meet under present conditions.
- Lack of initiatives and requirements to stimulate and bind a wider circle of consumers to use biofuel
- A percentage of minimum annual share of biofuel expected to decrease with biofuel price (stock exchange quotation), exceeding the price of fossil diesel including excise duty



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New Findings and Challenges (2)

General:

- In order to meet the expected quantity requirements of the EU Directive, it is strictly necessary to introduce new types of biofuel
- A growing voice of "opposition" to biofuel:
 - advocating the prohibition of use of food in fuel production
 - warning of the danger of excessive wood exploration (deforestation)
- Better co-operation and flexibility of engine producers necessary (many of whom are still sceptical as regards biofuel, and limit its use in vehicles)



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What is Biodiesel Often Claimed to be?

- Biodiesel is a non-toxic*fully renewable* fuel produced from new or used vegetable or animal oil or fat that can be run in any* diesel engine without any* modification and is virtually sulphur free*
- Not quite non-toxic (biocides, antioxidants, process leftovers)
- Not fully renewable (methanol input, energy required to grow feedstock and process seeds and oils)
- Not in any diesel engine (only up to up to B5 – B20)
- Not without modifications (fuel injection system and controls, no natural rubbers, different maintenance schedule)
- Biodiesel lifecycle SO₂ emissions are comparable to petroleum diesel lifecycle SO₂ emissions



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Biodiesel is a Renewable Fuel, Although

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- Many lifecycle analyses (LCA) show that biodiesel is a largely renewable fuel
- A more recent LCA1 suggests that it takes 1.08-1.32 MJ of fossil energy input for every 1MJ of biodiesel energy
 - Higher energy inputs into Soy agriculture
 - Electricity, herbicides, machinery, fuel, fertilizers, lime, ...
- Still considered far more energy efficient than ethanol



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For Consideration...Are We on the Right Way?

Fuel		Density kg/m ³	LHV MJ/kg	Carbon %m	CO ₂ emissions	
					kg/kg	g/MJ
Gasoline	2002	750	42.9	87.0%	3.19	74.35
	2010	745	43.2	86.5%	3.17	73.38
Ethanol	2002	794	26.8	52.2%	1.91	71.38
	2010	752	42.1	85.2%	3.12	74.25
Gasoline/Ethanol blend 95/5	2002	752	42.1	85.2%	3.12	74.25
	2010	747	42.3	84.6%	3.10	73.31
MTBE ⁽¹⁾		745	35.1	68.2%	2.50	71.23
ETBE ⁽¹⁾		750	36.3	70.6%	2.59	71.40
LPG ⁽²⁾		550	46.0	82.5%	3.02	65.68
CNG/CBG ⁽³⁾			45.1	69.2%	2.54	56.24
Diesel	2002	835	43.0	86.2%	3.16	73.54
	2010	832	43.1	86.1%	3.16	73.25
Bio-diesel ⁽⁴⁾		890	36.8	76.5%	2.81	76.23
Diesel/bio-diesel blend 95/5	2002	838	42.7	85.7%	3.14	73.66
	2010	835	42.8	85.6%	3.14	73.39
Synthetic diesel		780	44.0	85.0%	3.12	70.80
DME ⁽⁵⁾		670	28.4	52.2%	1.91	67.36
Naphtha		720	43.7	84.9%	3.11	71.22
Methanol		793	19.9	37.5%	1.38	69.10
Hydrogen			120.1	0.0%	0.00	0.00



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- Changes to the fuel specification can **increase** or reduce costs for those sectors. The specification also has some **impact on the cost** of fuel supplied and the **size** of the fuel markets and implications for overall energy use, greenhouse gas emissions and the level of health impacts from air pollution. **The implications of any cost changes have been assessed and taken into account**, and the changes proposed are believed to not increase overall costs to society.



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