Additional calculations for the report from the Czech Republic pursuant to Article 19(2) of Directive 2009/28/EC in accordance with Commission requirements

Table: Yield and value allocation of individual products

Crop	Production	Biofuel yield	Allocation ratio for biofuel based on energy content
Oilseed rape	Rapeseed oil Rapeseed meal	2.55 – 2.42 kg rape to 1 kg rapeseed oil Average: 2.48 kg	59.3 %
	Methyl esters from fatty acids in rapeseed oil Rapeseed meal Glycerol	2.61 – 2.48 kg rape to 1 kg rapeseed methyl esters Average: 2.55 kg	58 %
Winter wheat (soft)	Bioethanol Whole dried grains	3.4 – 3.2 kg wheat to 1 kg bioethanol Average: 3.3 kg	64 %
Maize (corn)	Bioethanol Whole dried grains	2.85 – 2.63 kg maize to 1 kg bioethanol Average: 2.74 kg	70 %
Sugar beet; industrial	Bioethanol Molasses	1 187 – 1 212 kg sugar beet to 1 kg bioethanol Average: 1 199 kg	79.5 %

Table: Parameters for calculating direct emissions of N_2O from crop residues

	Oilseed rape	Winter wheat (soft)	Grain maize	Sugar beet; industrial
Ratio of the quantity of crop residues to harvested crop (are – original condition)	1.85: 1	1.6: 1	2.1: 1	0.8: 1
Harvesting of above-ground crop residues in relation to total cultivated area (w – %)	10	50	-	-
Typical values for nitrogen content in above-ground portion of crop residues (w – %, d – dry matter)	0.8	0.5	0.6	2.2
Proportion of below-ground to above-ground portion of crop residues (w – %)	22	21	23	-
Typical values for nitrogen content N in below-ground portion of crop residues (w – %, d – dry matter)	0.9	0.7	0.8	-
Manure (are – original condition, w – %)	N 0.42	P_2O_5 0.22	K_2O 0.50	CaO 0.45

Emission factors

Diesel		3.757 kg $CO_{2eq}.kg^{-1}$	(JEC 2007)
Electricity		0.802 kg $CO_{2eq}.kWh^{-1}$	(• R)
Mineral fertiliser	N – nitrogen	6.065 kg $CO_{2eq}.kg^{-1}$	(JEC 2007)
	P_2O_5 – phosphorus	1.018 kg $CO_{2eq}.kg^{-1}$	(JEC 2007)
	K – potassium	0.584 kg $CO_{2eq}.kg^{-1}$	(JEC 2007)
	CaO – calcium	0.124 kg $CO_{2eq}.kg^{-1}$	(JEC 2007)
	biocides	17.258 kg $CO_{2eq}.kg^{-1}$	(JEC 2007)
Seeds: oilseed rape		2.00 kg $CO_{2eq}.kg^{-1}$	(• R)
winter wheat		0.65 kg $CO_{2eq}.kg^{-1}$	(• R)
grain maize		2.1 kg $CO_{2eq}.kg^{-1}$	(• R)
sugar beet; industrial		2.2 kg $CO_{2eq}.kg^{-1}$	(• R)

N_2O - for added nitrogen kg N_2O-N/kg N 0.01 (0.003 - 0.03) IPCC, 2006

- for leaked nitrogen kg N_2O-N/kg N 0.0075 (0.0005 – 0.025) IPCC, 2006
- for volatilization and re-deposition kg N_2O-N/kg NH_3-N 0.01 (0.002 – 0.05) IPCC, 2006

Table: Calculation of typical emissions from oilseed rape cultivation (g CO_{2eq}/MJ)

NUTS 1	NUTS 2		Energy inputs from technical cultivation operations	Seeds	Production and transport of industrial fertilisers	Production and transport of biocides	Production and transport of CaO	Drying	Direct N_2O emissions	Indirect N_2O emissions	Total typical emissions
Territory: Czech Republic	name	**code**									
	NUTS Prague	**CZ01**	**3.01**	**0.096**	**10.59**	**0.63**	**0.30**	**0.67**	**6.32**	**1.49**	**23.1**
Code: CZ0	NUTS St•ední • echy (Central Bohemia)	**CZ02**	**3.18**	**0.102**	**10.48**	**0.66**	**0.32**	**0.67**	**6.25**	**1.54**	**23.2**
	NUTS Jihozápad (South-west)	**CZ03**	**3.38**	**0.107**	**10.37**	**0.69**	**0.34**	**0.67**	**6.20**	**1.48**	**23.2**
	NUTS Severozápad (North-west)	**CZ04**	**3.27**	**0.104**	**10.45**	**0.67**	**0.32**	**0.67**	**6.25**	**1.35**	**23.0**
	NUTS Severovýchod (North-east)	**CZ05**	**3.25**	**0.103**	**10.45**	**0.67**	**0.32**	**0.67**	**6.27**	**1.76**	**23.5**
	NUTS Jihovýchod (South-east)	**CZ06**	**3.3**	**0.105**	**10.41**	**0.69**	**0.33**	**0.67**	**6.20**	**1.67**	**23.0**
	NUTS St•ední Morava (Central Moravia)	**CZ07**	**3.1**	**0.100**	**10.52**	**0.65**	**0.31**	**0.67**	**6.26**	**1.48**	**23.1**
	NUTS Moravskoslezsko (Moravia-Silesia)	**CZ08**	**3.29**	**0.104**	**10.42**	**0.68**	**0.33**	**0.67**	**6.27**	**1.73**	**23.5**
Total for entire Czech Republic			**3.22**	**0.103**	**10.46**	**0.67**	**0.32**	**0.67**	**6.25**	**1.56**	**23.2**
Disaggregated default values for cultivation 'e_{ec}' pursuant to part D of Annex IV to Directive 2009/30/EC of the European Parliament and of the Council											**29.0**

Table: Calculation of typical emissions in g CO_{2eq}/MJ bioethanol produced from winter wheat (soft)

NUTS 1	NUTS 2		Energy inputs from technical cultivation operations	Seeds	Production and transport of industrial fertilisers	Production and transport of biocides	Production and transport of CaO	Drying	Direct N_2O emissions	Indirect N_2O emissions	Total typical emissions
Territory: Czech Republic Code: CZ0	name	**code**									
	NUTS Prague	**CZ01**	**3.09**	**0.14**	**9.69**	**0.55**	**0.34**	**1.13**	**5.06**	**1.82**	**21.8**
	NUTS St•ední • echy (Central Bohemia)	**CZ02**	**3.30**	**0.15**	**9.68**	**0.59**	**0.37**	**1.14**	**4.95**	**1.87**	**22.0**
	NUTS Jihozápad (South-west)	**CZ03**	**3.65**	**0.16**	**9.67**	**0.64**	**0.40**	**1.14**	**4.96**	**1.86**	**22.5**
	NUTS Severozápad (North-west)	**CZ04**	**3.48**	**0.15**	**9.67**	**0.61**	**0.38**	**1.14**	**4.92**	**1.76**	**22.1**
	NUTS Severovýchod (North-east)	**CZ05**	**3.46**	**0.15**	**9.70**	**0.61**	**0.38**	**1.14**	**4.94**	**2.20**	**22.6**
	NUTS Jihovýchod (South-east)	**CZ06**	**3.62**	**0.16**	**9.67**	**0.64**	**0.40**	**1.13**	**4.96**	**2.12**	**22.7**
	NUTS St•ední Morava (Central Moravia)	**CZ07**	**3.26**	**0.15**	**9.69**	**0.58**	**0.36**	**1.13**	**4.94**	**1.80**	**21.9**
	NUTS Moravskoslezsko (Moravia-Silesia)	**CZ08**	**3.52**	**0.15**	**9.68**	**0.62**	**0.38**	**1.16**	**4.97**	**2.19**	**22.6**
Total for entire Czech Republic			**3.42**	**0.15**	**9.68**	**0.605**	**0.38**	**1.14**	**4.96**	**1.95**	**22.3**
Disaggregated default values for cultivation 'e_{ec}' pursuant to part D of Annex IV to Directive 2009/30/EC of the European Parliament and of the Council											**23.0**

Table: Calculation of typical emissions in g CO_{2eq}/MJ bioethanol produced from grain maize

NUTS 1	NUTS 2		Energy inputs from technical cultivation operations	Seeds	Production and transport of industrial fertilisers	Production and transport of biocides	Production and transport of CaO	Drying	Direct N_2O emissions	Indirect N_2O emissions	Total typical emissions
Territory: Czech Republic	name	**code**									
	NUTS Prague	**CZ01**	**2.6**	**0.046**	**8.3**	**0.33**	**0.23**	**1.42**	**5.21**	**1.51**	**19.6**
Code: CZ0	NUTS St•ední • echy (Central Bohemia)	**CZ02**	**2.6**	**0.047**	**8.3**	**0.34**	**0.23**	**1.42**	**5.19**	**1.31**	**19.5**
	NUTS Jihozápad (South-west)	**CZ03**	**2.9**	**0.052**	**7.5**	**0.38**	**0.26**	**1.42**	**5.16**	**1.32**	**19.0**
	NUTS Severozápad (North-west)	**CZ04**	**2.8**	**0.05**	**8.2**	**0.36**	**0.25**	**1.41**	**5.19**	**1.23**	**19.4**
	NUTS Severovýchod (North-east)	**CZ05**	**2.7**	**0.05**	**8.2**	**0.36**	**0.25**	**1.44**	**5.20**	**1.76**	**19.9**
	NUTS Jihovýchod (South-east)	**CZ06**	**2.8**	**0.05**	**8.2**	**0.36**	**0.25**	**1.42**	**5.18**	**1.45**	**19.7**
	NUTS St•ední Morava (Central Moravia)	**CZ07**	**2.6**	**0.046**	**8.3**	**0.33**	**0.23**	**1.42**	**5.22**	**1.26**	**19.4**
	NUTS Moravskoslezsko (Moravia-Silesia)	**CZ08**	**2.7**	**0.05**	**8.2**	**0.36**	**0.25**	**1.42**	**5.19**	**1.50**	**19.7**
Total for entire Czech Republic			**2.7**	**0.049**	**8.15**	**0.35**	**0.24**	**1.42**	**5.19**	**1.42**	**19.5**
Disaggregated default values for cultivation 'e_{ec}' pursuant to part D of Annex IV to Directive 2009/30/EC of the European Parliament and of the Council											**20.0**

Table: Calculation of typical emissions in g CO_{2eq}/MJ bioethanol produced from industrial sugar beet

NUTS 1	NUTS 2		Energy inputs from technical cultivation operations	Seeds	Production and transport of industrial fertilisers	Production and transport of biocides	Production and transport of CaO	Drying	Direct N_2O emissions	Indirect N_2O emissions	Total typical emissions
Territory: Czech Republic	name	**code**									
	NUTS Prague	**CZ01**	**1.98**	**0.004**	**4.57**	**0.43**	**0.16**	**-**	**3.36**	**1.097**	**11.6**
Code: CZ0	NUTS St•ední • echy (Central Bohemia)	**CZ02**	**2.02**	**0.004**	**4.49**	**0.44**	**0.16**	**-**	**3.34**	**1.091**	**11.5**
	NUTS Jihozápad (South-west)	**CZ03**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	NUTS Severozápad (North-west)	**CZ04**	**2.04**	**0.004**	**4.44**	**0.45**	**0.16**	**-**	**3.35**	**1.014**	**11.5**
	NUTS Severovýchod (North-east)	**CZ05**	**2.04**	**0.004**	**4.45**	**0.45**	**0.16**	**-**	**3.36**	**1.219**	**11.7**
	NUTS Jihovýchod (South-east)	**CZ06**	**2.07**	**0.005**	**4.38**	**0.46**	**0.16**	**-**	**3.35**	**1.244**	**11.7**
	NUTS St•ední Morava (Central Moravia)	**CZ07**	**2.03**	**0.004**	**4.47**	**0.44**	**0.16**	**-**	**3.45**	**1.075**	**11.5**
	NUTS Moravskoslezsko (Moravia-Silesia)	**CZ08**	**2.05**	**0.004**	**4.42**	**0.45**	**0.16**	**-**	**3.34**	**1.202**	**11.6**
Total for entire Czech Republic			**2.03**	**0.004**	**4.46**	**0.44**	**0.16**	**-**	**3.36**	**1.134**	**11.6**
Disaggregated default values for cultivation 'e_{ec}' pursuant to part D of Annex IV to Directive 2009/30/EC of the European Parliament and of the Council											**12.0**

Report to the Commission containing the information requested under Article 19(2) of Directive 2009/28/EC Czech Republic

Requirement under the Directive - content of the report:

By 31 March 2010, Member States shall submit to the Commission a report including a list of those areas on their territory classified as level 2 in the nomenclature of territorial units for statistics (NUTS) or as a more disaggregated NUTS level in accordance with Regulation (EC) No 1059/2003 of the European Parliament and of the Council of 26 May 2003 on the establishment of a common classification of territorial units for statistics (NUTS) where the typical greenhouse gas emissions from cultivation of agricultural raw materials can be expected to be lower than or equal to the emissions reported under the heading 'Disaggregated default values for cultivation' in part D of Annex V to this Directive, accompanied by a description of the method and data used to establish that list. That method shall take into account soil characteristics, climate and expected raw material yields.

Communication to the Commission:

(a) Territorial units and NUTS classification in the Czech Republic

By Resolution No 707/1998 the Czech Government defined territorial units for statistics in the Czech Republic in compliance with the EU NUTS definition. The Czech NUTS classification was drawn up on the basis of the Eurostat methodological principles and standard. The definition of the NUTS territorial units approved by the Government was sent to Eurostat for an opinion. Eurostat accepted the distribution of territorial units in the Czech Republic.

On the basis of Act No 347/1997 on the establishment of higher territorial self-governing units (*vyšší územní samosprávnýé celky*) the Czech Republic was divided from 1 January 2000 into 14 regions (*kraje)* – higher territorial self-governing units. These regions are on average 2.5 times smaller in terms of population and 4 times smaller in terms of area than the average NUTS 2 region in the EU. They are therefore classified as NUTS 3.

For the purposes of providing data, particularly for drawing on the EU Structural Funds, combined regions, i.e. NUTS 2 areas, were formed. This NUTS 2 level was created in the Czech Republic for statistical reasons alone. This unit is known as a cohesion region. **There are eight cohesion regions in the Czech Republic.**

The decisive factor for combining regions into areas (NUTS 2) was their size, measured according to population, in order to ensure that data on NUTS 2 areas in the Czech Republic were comparable with those on areas of the same NUTS level across the EU. In the Czech Republic a territorial unit has a population of over 1 million.

The CZ NUTS system classifies territorial units in the Czech Republic in accordance with the principles drawn up in the EU context. The classification comprises 6 NUTS levels with the following definitions:

- NUTS 0 = State (i.e. Czech Republic)
- NUTS 1 = territory (i.e. Czech Republic)
- NUTS 2 = area (i.e. combined regions)
- NUTS 3 = region *(kraj)* (i.e. higher territorial self-governing unit)
- NUTS 4 = district
- NUTS 5 = municipality (i.e. as a rule, a basic territorial unit)

Breakdown of NUTS classification in the Czech Republic:

NUTS 1		**NUTS 2**		**NUTS 3**	
territory	**code**	**area**	**code**	**region *(kraj)***	**code**
Czech Republic	CZ0	NUTS Prague	CZ01	Prague Capital City	CZ010
		NUTS Central Bohemia	CZ02	Central Bohemia Region	CZ020
		NUTS South-West	CZ03	South Bohemian Region	CZ031
				Plze• Region	CZ032
		NUTS North-West	CZ04	Karlovy Vary Region	CZ041
				Ústí nad Labem Region	CZ042
		NUTS North-East	CZ05	Liberec Region	CZ051
				Hradec Králové Region	CZ052
				Pardubice Region	CZ053
		NUTS South-East	CZ06	Vyso•ina Region	CZ061
				Southern Moravia Region	CZ062
		NUTS Central Moravia	CZ07	Olomouc Region	CZ071
				Zlín Region	CZ072
		NUTS Moravian Silesia	CZ08	Moravian-Silesian Region	CZ08

Map 1 (please see original) : NUTS 2 areas

Map 2 (please see original): NUTS 3, identical to regions *(kraje)*

The Czech Republic has a total of 8 combined regions (NUTS 2).

(b) Requirements under the Directive regarding combined regions

Establishment of combined regions (NUTS 2) where the typical greenhouse gas emissions from cultivation of agricultural raw materials can be expected to be lower than or equal to the emissions reported under the heading 'Disaggregated default values for cultivation' in part D of Annex V to this Directive, accompanied by a description of the method and data used to establish that list. That method shall take into account soil characteristics, climate and expected raw material yields.

(c) Methodology

Soil characteristics, climate and expected yields may be established on the basis of:

- evaluated soil-ecological units (term defined below in this section)
- classes of protection of agricultural land resources (term defined below in section (d))
- average yield of agricultural crops (according to up-to-date statistics)

At the present time and probably also in the future, traditional crops such as industrial sugar beet and cereals are most likely to play a crucial role in the production of energy from renewable sources for transport and other purposes. The main cereals involved are wheat, triticale, rye and, to some extent, maize. Oilseed rape is the principal source of vegetable oils and, subsequently, fatty acid methyl esters (FAME) and standard fuel for diesel engines in pure form and blends.

These are main crops which are grown on a long-term basis in the Czech Republic to a very good standard and in some areas to a high standard. The cultivation of these crops fulfils the requirements of good agricultural practice. In addition, there is substantial scope for further optimisation of cultivation by including these crops in appropriate crop rotation systems aimed at maintaining the productivity of the soil, for which the carbon balance is crucial.

The values of evaluated soil-ecological units and classes of protection of agricultural land resources were obtained from the sources of the **Research Institute for Soil Improvement and Protection,** and yields per hectare ($t.ha^{-1}$) for the reference crops – industrial sugar beet, cereals and oilseed rape - were obtained from the sources of the **Czech Statistical Office** and average yields were calculated.

*(d) Definition of the term 'evaluated soil-ecological unit' (*bonitovaná pudní ekologická jednotka - *BPEJ)*

A description and classification of **evaluated soil-ecological unit** are given in Ministry of Agriculture Decree No 327/1998, which sets out the characteristics of evaluated soil-ecological units and the procedure for managing and updating them. That Decree implements Act No 284/1991 on land reparcelling and land offices.

Definition and explanation of the term BPEJ:

The evaluated soil-ecological unit (hereinafter "BPEJ") is defined by climate region, principal soil type, slope and exposure, coarse fragment content and soil depth, which pinpoint the main soil and climate conditions of the assessed land.

Explanation of other related terms:

- climate region defines an area with approximately the same climate conditions for growth and development of farm crops;
- principal soil unit refers to a particular group of soil forms with related properties, identified by genetic soil type, subtype, soil-forming substratum, granularity, soil depth, degree of hydromorphism, possibly strong slope or morphology of the terrain and improvement measures;
- slope and exposure to cardinal points describe the formation of the agricultural land surface;
- coarse fragment content, which means the gravel and rock content of the topsoil in proportion to the gravel and rock content of the subsoil to a depth of 60 cm, and soil depth.

(e) Definition of the term 'classes of protection of agricultural land'

Agricultural land resources consist of plots which are cultivated for agricultural purposes and plots which have been and will again be cultivated for agricultural purposes but are currently lying fallow. Agricultural land resources also include ponds with fish farms or water fowl and non-agricultural land required for farming purposes.

In the Czech Republic the following legislative instruments and methods of protecting agricultural land are applied:

- Czech National Council Act No 334/1992 on the protection of agricultural land resources;
- Ministry of the Environment Decree No 13/1994 regulating certain aspects of the protection of agricultural land resources (Decree implementing Act No 334/1992);
- Methodological Guideline of the forest and soil protection department of the Ministry of the Environment of 12 June 1996 for withdrawing land from agricultural land resources in accordance with Czech National Council Act No 334/1992, which classifies individual five-digit BPEJs, reflecting the ALR (agricultural land resources) quality category, in five ALR classes of protection (I to V);
- in order to optimise State land management, up-to-date information on BPEJs from the VUMOP (Research Institute for Soil Improvement and Protection) is used.

The different groups of evaluated soil-ecological units are classified as follows for the purposes of protection of agricultural land:

Protection of agricultural land resources - Class I

The most highly valued land in the individual climate regions, mainly on level or only gently sloping parcels, which may be removed from agricultural land resources only in exceptional cases and mostly for purposes connected with the restoration of the ecological stability of the landscape or for linear constructions of fundamental importance.

Protection of agricultural land resources - Class II

Agricultural land with above-average production capacity in the individual climate regions. This is highly protected land which may be removed from agricultural land resources only on certain conditions and, in the spatial planning context, may be used for building purposes only subject to certain conditions.

Protection of agricultural land resources - Class III

In the different climate regions this mainly concerns land with an average production capacity, which in a spatial planning context may be assigned for building and other non-agricultural purposes.

Protection of agricultural land resources - Class IV

In the context of the different climate regions, mainly covers land with a below-average production capacity, which has only limited protection and may be used for building and other non-agricultural purposes.

Protection of agricultural land resources Class - V

This covers soils with a very low production capacity such as shallow soils and soils that are hydromorphic, have a high coarse fragment content* and are seriously threatened with erosion. Most of these soils are dispensable from an agricultural point of view. A purpose that is more efficient than farming may also be permitted. These are mainly soils with a low level of protection, apart from defined protected belts and preservation areas.

[* Translator's note: The word used in Czech here appears to be a typing error. I assume that it should read either *'skeletovité'* (with a high coarse fragment content) or *'št•rkovité'* (gravelly).]

(f) Dominant features of BPEJs in combined regions

(f)(1) Climate region

For evaluating and defining BPEJs, specific climate regions were established which are more suitable for agricultural purposes than other climate systems. Data such as the following were taken as the basic criteria: total average daily temperatures of 10°C or higher, average annual temperatures and average temperatures during the growing period (IV-IX), average total annual rainfall and rainfall during the growing period (IV-IX), probability of the occurrence of dry growing periods expressed as % (IV-IX), calculation of moisture certainty, calculation of drought limit in the growing period and other factors, altitude, data on known climatic singularities, mesorelief factor.

Code	**Character-istics**	**Total temper-atures over 10°C**	**Average annual temper-atures (C°)**	**Average total annual rainfall (mm)**	**Probability of drought in growing period (%)**	**Moisture certainty in growing period**
0	very warm, dry	2800-3100	9-10	500 - 600	30-50	0-3
1	warm, dry	2600 - 2800	8-9	<500	40-60	0-2
2	warm, moderately dry	2600 - 2800	8-10	500 - 600	20-30	2-4
3	warm, moderately humid	2500 - 2800	(7)8-9	550-650	10-20	4-7
4	moderately warm, dry	2400 - 2600	7-8,5	450-550	30-40	0-4
5	moderately warm, moderately humid	2200 - 2500	7-8	550 - 650	15-30	4-10
6	moderately warm (to warm), humid	2500 - 2700	7.5-8.5	700 - 900	0-10	>10
7	moderately warm, humid	2200 - 2400	6-7	650-750	5-15	>10
8	moderately cold, humid	2000 - 2200	5-6	700 - 800	0-5	>10
9	cold, humid	<2000	<5	>800	0	>10

	0	1	2	3	4	5	6	7	8	9	Mostly 8-9
CZ03-South-West	0.00	0.00	0.00	0.00	8.77	27.47	0.00	44.38	12.35	7.02	**x**
CZ04-North-West	0.00	35.89	6.41	0.01	9.73	17.07	0.00	12.13	11.96	6.80	**x**
CZ05 - North-East	0.01	0.00	0.00	26.87	0.00	25.91	0.70	27.86	14.96	3.68	**x**
CZ06- South-East	22.92	0.00	9.12	9.04	2.87	12.50	0.45	29.58	12.36	1.15	**x**
CZ07 - Central Moravia	1.54	0.00	0.00	44.09	0.00	9.39	13.46	17.64	12.97	0.91	**x**
CZ08- Moravian Silesia	0.00	0.00	0.00	0.00	0.00	15.26	33.56	26.86	21.47	2.86	ü
CZ0l-Prague	0.00	0.03	95.95	0.00	1.62	2.39	0.00	0.00	0.00	0.00	**x**
CZ02- Central Bohemia	0.00	9.26	19.14	16.84	13.79	30.92	0.00	9.25	0.81	0.00	**x**

(f)(2) Slope

Code	Category	Characteristics
0	0-1	completely level
1	1-3	level
2	3-7	gentle slope
3	7-12	medium slope
4	12-17	strong slope
5	17-25	steep slope
6	>25	precipice

(%)	0-1	2	3	4	5-6	Mostly 4-6
CZ03-South-West	40.68	46.78	10.88	1.52	0.13	**x**
CZ04-North-West	39.61	43.21	12.93	3.19	1.06	**x**
CZ05-North-East	35.98	31.51	8.19	2.40	0.56	**x**
CZ06-South-East	45.45	41.78	10.15	2.18	0.45	**x**
CZ07-Central Moravia	39.52	33.97	16.28	7.69	2.52	ü
CZ08-Moravian Silesia	38.10	43.89	13.36	3.66	1.00	**x**
CZ0l-Prague	57.15	35.13	4.99	1.60	1.13	**x**
CZ02-Central Bohemia	53.00	39.00	6.67	1.15	0.19	**x**

(f)(3) Exposure

Indicates the position of the BPEJ site in relation to the cardinal points.

Code	Characteristics
0	exposure in all directions
1	south (south-west to south-east)
2	east and west (south-west to north-west, south-east to north-east)
3	north (north-west to north-east)

(%)	no distinction	1	3	mostly 3
CZ03-South-West	95.39	0.82	3.79	**X**
CZ04-North-West	92.95	4.02	3.03	**X**
CZ05-North-East	.94.98	0.97	4.05	**X**
CZ06-South-East	95.58	1.66	2.76	**X**
CZ07-Central Moravia	94.17	1.11	4.72	**X**
CZ08-Moravian Silesia	94.87	0.09	5.04	ü
CZ0l-Prague	95.45	4.55	0.00	**X**
CZ02-Central Bohemia	97.21	2.27	0.52	**X**

(f)(4) Soil depth

Shows the soil profile thickness, which is limited at a given depth by either solid or broken rock or a high coarse fragment content.

Code		Characteristics
0	>60 cm	deep soil
1	30 - 60 cm	medium-deep soil
2	<30cm	shallow soil

(%)	0	0-1	2	0-2	Mostly 2 and 0-2
CZ03-South-West	20.31	72.05	5.80	1.83	**X**
CZ04-North-West	35.94	56.77	3.43	3.85	**X**
CZ05 North-East	44.52	49.77	1.94	3.77	**X**
CZ06- South-East	39.52	54.70	4.14	1.64	**X**
CZ07 - Central Moravia	53.37	36.87	3.07	6.69	**X**
CZ08-Moravian Silesia	47.55	40.98	7.48	3.99	ü
CZ0l-Prague	48.54	47.31	1.95	2.20	**X**
CZ02- Central Bohemia	48.65	47.27	3.01	1.08	**X**

(f)(5) Coarse fragment content

The coarse fragment content reflects an overall appraisal of the gravel and stone content of the topsoil and subsoil. The coarse fragment content is expressed as a volume percentage of the soil material, the numerator representing fragments in the topsoil and the denominator fragments in the subsoil. Gravel means solid rock fragments measuring 4-30 mm, while stones are solid fragments measuring 30-300 mm. Fragments in excess of 300 mm are boulders.

Code		Characteristics	
0	no coarse fragment content; impurities	with total coarse fragment content of	up to 10%
1	low coarse fragment content	with total coarse fragment content of	10 - 25%
2	medium coarse fragment content	with total coarse fragment content of	25 - 50%
3	high coarse fragment content	with total coarse fragment content of	above 50%

(%)	0	1	0-1	2	0-3	2-3	Mostly 2 and 2-3
CZ03-South-West	13.65	5.76	49.48	29.28	0.56	1.27	ü
CZ04-North-West	27.42	5.56	38.45	24.73	1.57	2.28	**x**
CZ05 - North-East	33.39	3.82	34.79	17.34	1.31	2.46	**x**
CZ06- South-East	37.98	2.60	39.12	18.67	0.48	1.17	**x**
CZ07 - Central Moravia	49.80	2.89	26.78	13.84	2.58	4.11	**x**
CZ08- Moravian Silesia	41.80	3.71	25.59	24.90	1.01	2.98	**x**
CZ0l-Prague	42.00	4.90	32.37	18.54	1.15	1.04	**x**
CZ02- Central Bohemia	43.07	4.95	35.61	15.29	0.38	0.69	**x**

(f)(6) Soil types

The legal instrument which lays down the characteristics of evaluated soil-ecological units and the procedure for managing and updating them is Ministry of Agriculture Decree No 327/1998, as amended (by Decree No 546/2002). In the course of the evaluation survey, 2199 BPEJs were defined and this basic group was subsequently broken down into the following 13 soil types:

Group 1: predominantly chernozemic soils – this group covers all chernozems and soils with similar properties. Larger coarse fragments are not found in this group. Where they do exist, they are derived from terrace gravel or flysch. The vast majority of soils of the chernozemic type are concentrated in very warm and warm climate regions, with the exception of non-chernozemic soils occurring in the context of eroded soils.

Group 2: brown earth – this group covers mainly brown and slightly gleyic brown earth with a less marked illimerisation process. The soils in this group are medium-heavy to heavy, mostly with no coarse fragment content and very deep. Moisture averages are mainly favourable.

Group 3: luvisols – group of soils with a marked illimerisation process. Luvisols have a light-coloured eluvial horizon below the topsoil down to a depth of 0.3-0.4 m. A transitional horizon often tongues into the illuvial horizon. Only a slight sign of gleying is tolerated. The characteristic substratum consists of loess blankets and slope deposits, generally with no coarse fragment content, occurring mainly in flat areas.

Group 4: rendzinas and pararendzinas – this group covers brown rendzinas and pararendzinas, including slightly gleyic varieties, which have developed on characteristic carbonaceous rock or earth. Soil profile medium-deep to deep. The coarse fragment content depends on the soil-forming substratum. Average moisture ranges from good to temporarily unfavourable.

Group 5: soil on sand and gravel and similar substrata, including slightly gleyic varieties (regosols) – group covering all soils on the substrata mentioned, possibly with a less permeable subsoil, of a light or fairly light medium-heavy granularity, considerably dependent on rainfall during the growing season.

Group 6: cambisols – this group mainly covers soil on solid rock. It does not include soils with a high coarse fragment content – shallow, strongly sloping and some light and heavy soils forming separate groups. Cambisols are the typical soils of hilly country and lower and medium-level highland locations.

Group 7: strongly acid soils in moderately cold and cold areas (dystric cambisols, podzols, kryptopodzols) – these soils developed in higher-level highland and mountain locations. Typical features of these soils are the higher content of lower quality humus and the strongly acid or acid soil reaction. The classification is based on association with a climate region and on granular composition.

Group 8: shallow soils – cambisols, rankers, lithosols – this group covers soils with a thin soil profile and predominantly high coarse fragment content.

Group 9: soil in markedly sloping areas – this group covers soils on slopes of more than 12°. It is divided into two categories: slope code 4 (over 12°) and 5-6 (over 17°).

Group 10: gleyic (marbled) soil – pseudogley – the characteristic feature of this soil group is periodic waterlogging within the profile, particularly in the spring. Unlike luvisols, the soil profile must display marked signs of periodic surface waterlogging. These soils are distributed over moderately warm to cold areas, where they occur on level or gently sloping or depressed ground.

Group 11: soils in alluvial locations – fluvisols – soils in level areas on both non-calcareous and calcareous deposits along watercourses, including gleyed and gleyic subtypes and varieties. Within the classification the criteria are granular composition, the level of the watercourse and occurrence in a given climate region. Most of these soils have no coarse fragment content.

Group 12: floodplain soil – chernic soil – this group is characterised by deep, thick humus horizons, always attaining a depth of 30 cm, with a fairly high to high humus content. Subsoil water level generally 1-2 m. Chernic soil occurs in level parts of floodplains and in depressed areas of plateaux in very warm and warm climate regions.

Group 13: hydromorphic soils – gleys and catenas – these soils occur on markedly sloping ground; for the purposes of defining the principal land units (HPJs), a classification based on the character of the relief was therefore used in addition to a genetic classification. After relief, the second most important feature is the degree of hydromorphism.

(%)	1	2	3	4	5	6	7	8	9	10	11	12	13	Mostly 8-9
CZ03-South-West	0.10	1.67	3.35	0.13	1.89	31.16	10.46	6.22	1.63	27,46	2.97	0.00	12.97	**x**
CZ04-North-West	18.37	2.95	0.57	8.06	5.72	18.63	10.57	3.86	4.12	16.58	4.46	1.26	4.84	**x**
CZ05 - North-East	3.51	9.52	8.30	5.63	6.38	19.28	10.65	1.95	5.13	16.97	6.43	1.60	4.43	**x**
CZ06-South-East	24.85	6.66	0.73	1.97	1.50	26.77	8.63	4.16	2.61	9.06	5.05	2.62	5.39	**x**
CZ07 - Central Moravia	15.23	10.58	4.68	5.94	2.40	13.03	5.56	3.08	10.16	11.94	13.95	1.42	2.03	ü
CZ08-Moravian Silesia	0.15	2.36	8.12	1.51	3.48	13.12	10.70	7.48	4.64	35.77	8.90	0.05	3.71	**x**
CZ0l-Prague	15.35	17.32	0.22	2.29	6.80	40.90	0.00	1.97	2.67	1.99	7.92	1.68	0.90	**x**
CZ02-Central Bohemia	15.99	9.80	4.97	5.35	5.46	30.88	0.56	3.18	1.30	10.03	6.03	3.09	3.36	**x**

(g) Main features of classes of protection of agricultural land resources in groups of regions:

(%)	1	2	3	4	5	Mostly 4-5
CZ03-South-West	13.63	18.84	16.37	24.12	27.04	
CZ04-North-West	18.11	14.94	21.3	21.64	24.01	**x**
CZ05 - North-East	23.24	19.09	21.17	18.95	17.55	**x**
CZ06- South-East	28.2	18.23	14.63	22.91	16.03	**x**
CZ07 - Central Moravia	19.77	20.05	21.33	16.79	22.07	**x**
CZ08-Moravian Silesia	21.86	26.53	17.43	11.29	22.88	**x**
CZ0l-Prague	30.53	9.06	22.83	26.71	10.87	**x**
CZ02- Central Bohemia	24.18	20.51	20.6	20.66	14.05	**x**

(h) Lowest average yield of agricultural crops

	Average yield (t/ha)			
Region	**Industrial sugar beet**	**Cereals**	**Oilseed rape**	**Lowest yield**
CZ03-South-West	_	4.41	2.92	
CZ04-North-West	54.32	4.61	3.02	**x**
CZ05-North-East	54.46	4.72	3.03	**x**
CZ06-South-East	53.33	4.67	2.97	**x**
CZ07-Central Moravia	54.83	5.16	3.13	**x**
CZ08-Moravian Silesia	54.05	4.65	3.00	**x**
CZ0l-Prague	56.33	5.23	3.25	**x**
CZ02-Central Bohemia	55.00	4.95	3.08	**x**
Total Czech Republic	**54.62**	**4.80**	**3.05**	

(i) Results and assessment

Table 4 shows typical emissions of greenhouse gases (g CO_{2eq}/MJ) (disaggregated default values) for cultivation of industrial sugar beet, cereals, particularly wheat and maize used to produce bioethanol and oilseed rape used to produce rapeseed oil, fatty acid methyl esters (FAME) and hydrogenated fuel. This table also gives an informed estimate (in %) of possible savings CO_{2eq}/MJ through more appropriate incorporation of these crops e.g. with fodder and legumes in the crop rotation system, optimisation of the use of mineral and organic manure and an increase in the genetic potential by means of new varieties.

Table 4: Typical emissions from cultivation e_{ec} of sugar beet, wheat, maize and oilseed rape for processing into biofuel with estimate of possible decrease

Crop	**Biofuel**	**Typical greenhouse gas emissions (CO_2eq/MJ)**	**Informed estimate of potential decrease**
Industrial sugar beet	Bioethanol	12	5
Cereals: wheat maize	Bioethanol	23 20	15 10
Oilseed rape	Rapeseed oil FAME Hydrogenated fuel	30 29 30	15 15 15

This outline of industrial sugar beet, cereal (particularly wheat and triticale by way of a supplement, rye and maize) and oilseed rape yields provides sufficient evidence of the stable production potential originally specified for both foodstuffs and biofuels. Typical greenhouse gas emissions from cultivation do not exceed the value laid down by the Directive and there is considerable potential for reducing it, particularly through appropriate crop rotation, farming techniques, fertilising, optimum use of biocides and new varieties. Under the Directive the entire territory of the Czech Republic falls within the list according to the findings described above.

(i) Annexes – maps (please see original for maps)

Climate region:

VT – very warm, dry
T1 –moderately warm, dry
T2 – warm, moderately dry
T3– warm, moderately humid
MT1 – moderately warm, dry
MT2 – moderately warm, moderately humid
MT3 – moderately warm (to warm), possibly humid)
MT4 – moderately warm, humid
MCH – moderately cold, humid
CH – cold, humid

Regional border
National border

Soil type groups:

Chernozemic soils
Brown earth
Illimerised soils
Rendzinas
Group of soils on sand
Group of brown soils
Acid brown and podzolic soils
Shallow soils and protosoils
Soils on strongly sloping ground
Gleyic soils
Alluvial soils
Floodplain soils
Hydromorphic soils

Regional border
National border

Classes of protection for agricultural land resources

Most highly valued soils
Soils with an above–average production capacity
Soils with an average production capacity
Soils with a below–average production capacity
Soils with a very low production capacity

Regional border
National border