平成16年度環境省委託事業

平成１６年度ＣＤＭ／ＪＩ事業調査

リトアニアにおける自動車燃料用バイオエタノールの製造事業調査

報　告　書

平成 17 年 3 月

三 井 造 船 株 式 会 社

目　次

１ 調査概要

1.1 調査の背景と目的

近年、バイオマスエネルギーが地球温暖化対策の重要な柱として注目を集めているが、バイオマスのエネルギー利用方法のうち、自動車燃料用としてバイオマス由来のエタノールを使用する動きが顕著である。

リトアニアでは 2003 年のＥＵ加盟に伴ってＥＵの方針に沿ったエネルギー政策が採られ、再生可能エネルギーの利用拡大が見込まれている。また、同国は寒冷地ではあるがこれまで農業国としての色彩が強く、また耕作適地が多く存在し、エタノール生産国としての条件を備えている。

このような状況の下、本調査は、リトアニアにおいて麦等の穀物およびその農産残渣を原料とする無水エタノール製造設備を建設し、生成したエタノールをガソリンブレンド用として販売するプロジェクトにつき、JI の実施可能性を調査・検討することを目的とする。

1.2 プロジェクトの概要と企画立案の背景

1.2.1 対象地域

このプロジェクトの対象地域はリトアニア国内及び EU 主要国である。

1.2.2 事業概要

このプロジェクトはリトアニアで生産される小麦を主原料として無水エタノールを製造するものである。

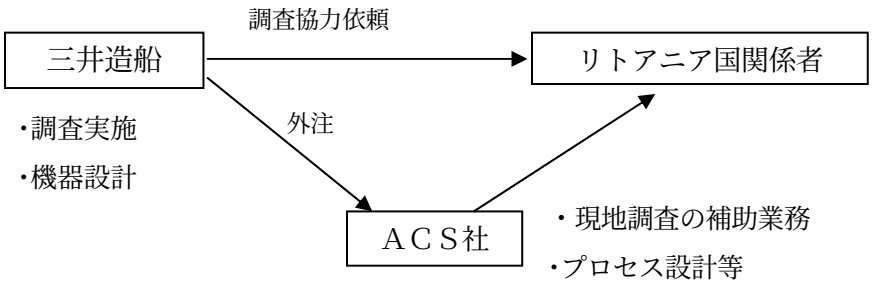
原料作物は原則としてプラントの周辺 50㎞から調達し、供給者との長期契約を結ぶことにより必要原料量を確保する。原料はサイロで長期間備蓄することができるので、エタノール製造プラントは年間を通じて継続的に稼動することができる。

エタノール工場は、原料の調達、エタノールの製造、製品エタノールの流通の利便性･経済性を考慮して、穀物生産の中心的地域であり、交通の要衝である中南部の Kaunas 市近郊に設置される。

穀物を原料とした場合にはエタノール発酵は従来技術を用いることで対応可能であり、木質系原料からのエタノール製造技術がまだ研究開発段階であることから、エタノール発酵プロセスは従来技術を適用する。一方、発酵液の脱水方法については膜分離法を用いることによりエネルギー消費の低減を図る。

ＥＵ諸国においてはバイオ燃料を段階的に導入することがＥＵ指針により合意されており、ホスト国もこの遵守を表明しているので、バイオエタノール混合ガソリンも導入される可能性が高い。そこで、本プロジェクトではリトアニア国内市場以外に EU 主要国への輸出も見据えてエタノール生産規模を 480kl/d とした。

1.3 調査の実施体制



1.4 調査の実施

事前にリトアニアの地球温暖化対策に係る政策･方針、プロジェクトの実施にあたって必要となる事項に関する情報・データについて文献調査を行った。また現地調査方法の検討を行った。

現地調査は 2 回実施したほか、第 2 回の現地調査に先立って調査内容に関する現地協力者との事前協議を実施した。各調査の概要は次の通りである。

第 1 回現地調査（平成 16 年 7 月）

- リトアニアのバイオエタノール製造･利用状況
- バイオエタノール原料の生産、流通状況
- リトアニアのエネルギー事情
- プロジェクト･スキームの検討

第 2 回現地調査事前協議（平成 16 年 12 月）

- 現地協力者との契約内容協議
- リトアニアの現地情報聴取
- 事業計画の検討

第 2 回現地調査（平成 17 年 1 月）

- リトアニアの政策･方針
- バイオエタノール原料の生産、流通状況
- 事業内容の確認

2 ホスト国の概要

2.1 ホスト国の基本情報

正式名称	リトアニア共和国
面積	6.5 万 km^2
人口	344 万人（2004 年 6 月 1 日現在）（リトアニア統計局）
首都	Vilnius（ヴィルニュス）
民族	リトアニア人 81.8%、ロシア人 8.1%、ポーランド人 6.9%
通貨	リタス(LTL)　　（1993 年 6 月 25 日導入）
為替レート	対ユーロ固定相場制（1 ユーロ＝3.4528 リタス）
公用語	リトアニア語

Base 802841AI (C00449) 10-02

2.2 政治状況

2.2.1 政治体制･動向

リトアニアは共和制国家であり、憲法により、大統領、議会、政府及び司法が最高権力を保持している。

大統領は国家の元首であり、普通直接選挙（秘密投票制）によって選挙され、任期は 5 年である。大統領は、議会の承認を得て首相や他の閣僚、官僚、憲法裁判所の裁判官を任命する。また外交や防衛方針の策定にも加わり、それらを指揮する職務も担う。

現在の大統領は 2004 年 7 月に就任したヴァルダス･アダムクスである。大統領は首相にブラザウスカス氏を指名し、2004 年 10 月に議会の総選挙が行われた結果、議会は首相を承認し、12 月 14 日に大統領令により第二次ブラザウスカス内閣が正式に発足した。社会民主党、新同盟、及び農民党による連立政権である。

リトアニア政府要人

2004 年 12 月 15 日現在

President	**Adamkus,** Valdas
Prime Minister	**Brazauskas,** Algirdas Mykolas
Min. of Agriculture & Forestry	**Prunskiene,** Kazimiera
Min. of Culture	**Prudnikovas,** Vladimiras
Min. of Defense	**Kirkilas,** Gediminas
Min. of Economy	**Uspaskich,** Viktor
Min. of Education & Science	**Motuzas,** Remigijus
Min. of Environment	**Kundrotas,** Arunas
Min. of Finance	**Butkevicius,** Algirdas
Min. of Foreign Affairs	**Valionis,** Antanas
Min. of Health	**Padaiga,** Zilvinas
Min. of Internal Affairs	**Furmanavicius,** Gintaras Jonas
Min. of Justice	**Buzinskas,** Gintautas
Min. of Social Security & Labor	**Blinkeviciute,** Vilija
Min. of Transport	**Balcytis,** Zigmantas
Chmn., Bank of Lithuania	**Sarkinas,** Reinoldijus
Permanent Representative to the UN, New York	**Serksnys,** Gediminas

（出典：アメリカ中央情報局資料）

リトアニアの主要政策は、民主主義、市場経済を基礎とする国家基盤を確立するとともに、ロシア、ポーランドといった周辺諸国との善隣関係を構築し、西欧機構に自国を統合させることにより、自国の独立及び安全保障を確立することである。

リトアニア議会は一院制で 141 議席あり、議員の任期は 4 年である。議会選挙は全国区比例代表制（70 議席）と小選挙区直接選挙制（71 議席）を併用し、小選挙区直接選挙制においてはいずれの候補も過半数の得票率に達しない場合、上位 2 名での決選投票が行われる。

2.2.2 行政組織

リトアニア中央政府の行政機関には、司法省、外務省、経済省、大蔵省、国防省、環境省、運輸省、文化省、厚生労働省、内務省、保健省、農業省、教育･科学省がある。行政区分は、10 の郡と 56 の市や地区に分けられている。各郡の名称は郡庁の置かれた市と同じである。

2.3 経済状況

2.3.1 概要

リトアニアは 1991 年の独立以来、市場経済化に向けた諸改革を推進し、特に 1996 年の保守連立政権成立以降の大規模民営化等を通じてマクロ経済指標は大幅に改善した。外国からの直接投資の増大、輸出入の拡大によって着実に経済成長しており、1998 年のロシア金融危機の影響によって 1999 年にマイナス成長となった以外は 3%後半から 6%の経済成長率を達成している。失業率が 2003 年に 10.7%と比較的高かったが 2004 年には 6.7%と改善している。

独立後は対ロシア貿易の割合を徐々に減らしているが、ロシア金融危機により、特に農業製品の対ロシア輸出が激減し、経済成長率が大幅に低下した経験などから、貿易相手国の多様化、ロシア依存型貿易からの脱却が進められている。その結果、2002 年上半期には英国が前年まで主要貿易パートナーであったロシアを抜いた。その他の主要貿易相手国は、ドイツ、ラトビア、デンマーク等であるが、2002 年の同国総輸出額の 50.4%及び総輸入額の 46.4%が対 EU 諸国で占められている。リトアニアは 2001 年 5 月に世界貿易機関（WTO）に加盟し、その後は NATO 及び EU への加盟を最大の外交目標としてきたが、それぞれ 2004 年 3 月、及び 5 月に加盟を実現した。ロシア、バルト諸国、北欧諸国等の周辺国との善隣関係の維持も図ってきている。

大規模国営企業、特にエネルギー関連部門での民営化がほぼ完成しつつあり、これまでに国営企業全体の約 80%の民営化が終了し、GDP に占める民間企業の寄与度は 2002 年に 74%増加した。リトアニア経済は急速に市場経済へ移行しつつある。

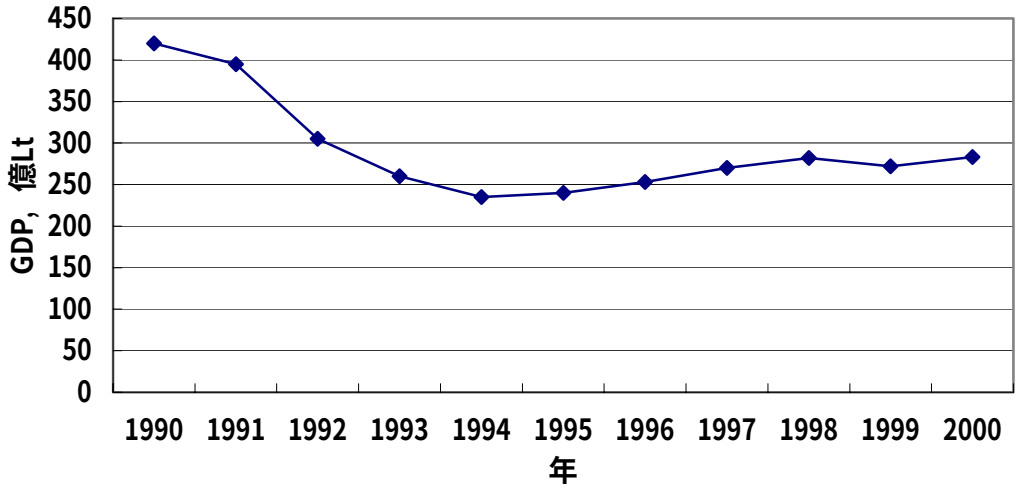
GDP は 2002 年に 6.8%、2003 年には 9%それぞれ増加した。これには特にサービス分野の輸出の寄与が大きいが、エネルギー、建設、輸送、通信といった分野への投資が活発であったこともあげられる。今後も GDP は着実に増加すると予想されている。

2003 年における輸出額は前年比 8.7%の増加している。（2002 年には 10.7%であった。）輸入は 2002 年に 12.4%であったが、2003 年には 4.9%に減少した。

主要経済指標

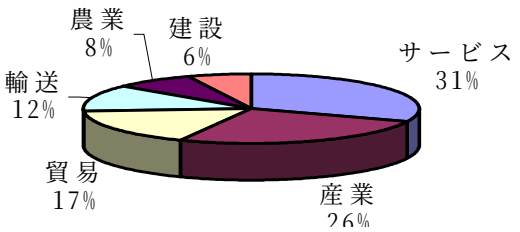
主要産業　(2003 年)	サービス 62.6%、農業：6.1%、その他産業 25.1%
GDP（2003 年）	16,270 百万 EUR（リトアニア統計局)
一人当り GDP（2003 年）	4,710EUR（リトアニア統計局）
GDP 実質成長率（2003 年）	9.7%（リトアニア統計局）
物価上昇率（2003 年）	-1.3%　(リトアニア統計局)
失業率（2003 年）	12.4%（リトアニア統計局）
総貿易額（2003 年）	(1) 輸出　6,158 百万 EUR（リトアニア統計局） (2) 輸入　8,526 百万 EUR（リトアニア統計局）
主要貿易品目	(1) 輸出　繊維、鉱物（原油・天然ガス含む）、機械・化学製品、木材 (2) 輸入　機械製品、鉱物、化学製品、車輌
鉱工業生産(2003 年)	前年比 13.9%増（2002 年は前年比 2.7%増）
発電量(2003 年)	前年比 23.4%増　（2002 年は前年比 19.9%増）
小売業売上高（2003 年)	前年比 14.3%増　（2002 年は前年比 12.6%増）
平均月給（2003 年)	1,072.6 LTL

GDPの推移



（出典：　Lithuania National Energy Strategy 2002 ）

GDP 寄与率



（出典： Lithuania National Energy Strategy 2002 ）

国内総生産 (1996 年～2003 年)

	1996	1997	1998	1999	2000	2001	2002	2003
Gross domestic product at current prices, mill LTL.	32290	39378	44377	43359	45526	48379	51643	56179*
Changes of gross domestic product at constant prices of 2000, %	4,7	7,0	7,3	-1,7	3,9	6,4	6,8	9,7*
Gross domestic product, per capita, at current prices, LTL	8965	11014	12503	12303	13009	13897	14887	16264*

（出典：リトアニア国統計局）

Document updated: 2005 02 01

2.3.2 貿易･国際収支

経済省は貿易に関する法的枠組を EU 法規に適合するように調整しつつある。２００３年の政府決議では、輸出入の手続きに係る国内規制を変更することとなっている。

統計によれば２００３年の貿易額は２００２年比 7.3%増で、輸出は 9.1%、輸入は 6%の延びであった。輸入が輸出を上回っている。リトアニアの主要貿易相手国は、ロシア（輸出は全体の 10.1%, 輸入は全体の 22.1%), ドイツ(それぞれ 9.9%、16.1 %), ラトビア(それぞれ 9.7%、1.6%), スイス(それぞれ 11.7%、1.1 %), UK(それぞれ 6.4%、3.3%)等である。しかし対 EU では、輸出が 42.0%、輸入が 44.5%と、対 CIS のそれぞれ 17.0%, 25.3%を大きく上回っており、貿易相手として EU との結びつきが強いことを示している。

貿易収支

年	輸出		輸入		バランス	
	LTL mill.	EUR mill.	LTL mill.	EUR mill.	LTL mill.	EUR mill.
2002	20290,7	5876,6	28562,2	8272,2	-8271,5	-2395,6
2003	22145,1	6413,7	30268,7	8766,4	-8123,6	-2352,7

Document updated: 2004 07 28

主要な輸出先

Union, Country	1996		1997		1998		1999		2000		2001		2002		2003	
	LTL mill.	%	LTL mill.	%	LTL mill.	%	LTL mill.	%	LTL mill.	%	LTL mill.	%	LTL mill.	%	LTL mill.	%
EU	**4413,7**	**32,9**	**5024,3**	**32,5**	**5637,1**	**38,0**	**6020,6**	**50,1**	**7295,6**	**47,9**	**8755,2**	**47,8**	**9827,1**	**48,4**	**9311,6**	**42,0**
CIS	**6096,7**	**45,4**	**7158,4**	**46,4**	**5296,3**	**35,7**	**2186,4**	**18,2**	**2477,0**	**16,3**	**3614,3**	**19,7**	**3899,9**	**19,2**	**3754,7**	**17,0**
EFTA	**214,2**	**1,6**	**206,5**	**1,3**	**326,4**	**2,2**	**322,0**	**2,7**	**378,2**	**2,5**	**352,4**	**1,9**	**832,6**	**4,1**	**3114,9**	**14,1**
CEFTA	**550,9**	**4,1**	**495,0**	**3,2**	**583,8**	**3,9**	**723,6**	**6,0**	**1060,0**	**7,0**	**1337,0**	**7,3**	**971,2**	**4,8**	**1067,8**	**4,8**
Switzerland	122,2	0,9	103,6	0,7	117,6	0,8	184,1	1,5	193,5	1,3	107,7	0,6	337,2	1,7	2580,0	11,7
Russia	3224,7	24,0	3776,2	24,5	2451,6	16,5	842,8	7,0	1083,7	7,1	2019,7	11,0	2469,9	12,2	2244,6	10,1
Germany	1722,6	12,8	1754,6	11,4	1946,9	13,1	1927,7	16,0	2183,5	14,3	2303,1	12,6	2103,9	10,4	2196,1	9,9
Latvia	1236,2	9,2	1329,0	8,6	1640,3	11,1	1535,0	12,8	2287,8	15,0	2316,3	12,6	1955,0	9,6	2139,6	9,7
United Kingdom	373,3	2,8	489,0	3,2	513,7	3,5	608,0	5,1	1185,9	7,8	2532,6	13,8	2727,2	13,4	1407,6	6,4
France	213,2	1,6	335,8	2,2	515,8	3,5	564,9	4,7	667,6	4,4	601,3	3,3	834,3	4,1	1119,4	5,1
Denmark	347,5	2,6	522,1	3,4	606,6	4,1	744,6	6,2	743,9	4,9	822,2	4,5	1037,9	5,1	1047,2	4,7
Estonia	336,4	2,5	389,2	2,5	390,3	2,6	282,4	2,4	343,0	2,3	595,2	3,2	773,9	3,8	954,5	4,3
Sweden	231,2	1,7	300,2	1,9	384,3	2,6	506,5	4,2	667,5	4,4	671,3	3,7	853,3	4,2	889,9	4,0
Netherlands	436,9	3,3	434,6	2,8	369,7	2,5	423,1	3,5	730,4	4,8	538,6	2,9	639,2	3,2	756,2	3,4
Poland	426,8	3,2	359,6	2,3	448,5	3,0	545,4	4,5	832,3	5,5	1148,3	6,3	721,7	3,6	746,1	3,4
Belarus	1366,0	10,2	1586,4	10,3	1314,3	8,8	710,1	5,9	442,8	2,9	714,5	3,9	650,8	3,2	702,8	3,2
USA	110,5	0,8	244,2	1,6	422,1	2,8	530,0	4,4	739,2	4,9	696,8	3,8	714,7	3,5	622,0	2,8
Ukraine	1028,1	7,7	1365,8	8,8	1152,2	7,8	441,8	3,7	670,8	4,4	618,9	3,4	527,5	2,6	526,9	2,4
Norway	62,0	0,5	71,7	0,4	75,5	0,5	134,0	1,1	170,6	1,1	239,1	1,3	485,0	2,4	516,5	2,3
Italy	362,5	2,7	472,1	3,1	615,2	4,1	507,9	4,2	356,4	2,3	369,3	2,0	565,8	2,8	481,8	2,2
Belgium	139,1	1,0	203,2	1,3	193,9	1,3	206,4	1,7	241,3	1,6	299,5	1,6	388,7	1,9	477,7	2,2
Turkey	111,9	0,8	125,8	0,8	128,4	0,9	123,8	1,0	266,8	1,8	260,2	1,4	352,8	1,7	372,3	1,7
Finland	131,0	1,0	114,5	0,7	125,5	0,9	124,4	1,0	194,1	1,3	255,1	1,4	239,1	1,2	333,4	1,5
Spain	133,3	1,0	140,5	0,9	169,0	1,1	174,7	1,5	182,0	1,2	247,4	1,3	220,5	1,1	194,8	0,9
Others	1304,2	9,7	1322,6	8,6	1261,0	8,5	897,6	7,6	1054,4	6,7	974,9	5,4	1692,3	8,3	1835,6	8,3

Document updated: 2004 07 26

主要な輸入先

Union, country	1996		1997		1998		1999		2000		2001		2002		2003	
	LTL mill.	%	LTL mill.	%	LTL mill.	%	LTL mill.	%	LTL mill.	%	LTL mill.	%	LTL mill.	%	LTL mill.	%
EU	**7254,7**	**39,8**	**9997,2**	**44,3**	**10939,9**	**47,2**	**8990,5**	**46,5**	**9443,7**	**43,3**	**11178,2**	**44,0**	**12714,4**	**44,5**	**13457,6**	**44,5**
CIS	**6601,5**	**36,2**	**6940,2**	**30,7**	**6035,2**	**26,0**	**4725,9**	**24,4**	**6910,0**	**31,7**	**7469,0**	**29,4**	**7431,0**	**26,0**	**7663,8**	**25,3**
CEFTA	**1480,8**	**8,1**	**1983,9**	**8,8**	**2094,2**	**9,0**	**1869,8**	**9,7**	**1776,6**	**8,1**	**2022,3**	**8,0**	**2231,9**	**7,8**	**2585,1**	**8,5**
EFTA	**432,4**	**2,4**	**390,3**	**1,7**	**466,3**	**2,0**	**398,2**	**2,1**	**383,5**	**1,8**	**480,6**	**1,9**	**711,4**	**2,5**	**641,0**	**2,1**
Russia	5286,3	29,0	5719,8	25,3	4901,0	21,2	3877,3	20,1	5973,1	27,4	6428,0	25,3	6070,7	21,3	6694,3	22,1
Germany	2801,8	15,4	3939,7	17,5	4210,7	18,2	3197,8	16,5	3285,1	15,1	4377,7	17,2	4851,2	17,0	4877,9	16,1
Poland	795,2	4,4	1104,4	4,9	1272,0	5,5	1094,9	5,7	1076,2	4,9	1233,0	4,9	1366,3	4,8	1559,0	5,2
Italy	692,0	3,8	921,1	4,1	1010,8	4,4	802,4	4,1	788,7	3,6	1073,0	4,2	1386,1	4,9	1307,0	4,3
France	385,9	2,1	635,9	2,8	796,5	3,4	696,9	3,6	922,1	4,2	956,7	3,8	1099,8	3,9	1256,5	4,2
Sweden	567,1	3,1	754,2	3,3	853,3	3,7	660,4	3,4	743,2	3,4	771,4	3,0	932,3	3,3	1054,8	3,5
UK	597,0	3,3	775,0	3,4	853,1	3,7	807,5	4,2	985,3	4,5	851,8	3,4	939,0	3,3	1004,4	3,3
China	111,1	0,6	203,3	0,9	237,5	1,0	261,0	1,3	336,2	1,5	500,2	2,0	673,6	2,4	925,8	3,1
USA	477,6	2,6	654,5	2,9	661,4	2,9	738,4	3,8	517,4	2,4	771,9	3,0	811,8	2,8	893,1	3,0
Denmark	661,6	3,6	846,7	3,8	879,4	3,8	750,7	3,9	675,7	3,1	742,0	2,9	832,8	2,9	856,3	2,8
Netherlands	356,9	2,0	499,0	2,2	517,7	2,2	447,6	2,3	496,2	2,3	598,2	2,4	642,1	2,2	770,9	2,5
Finland	589,0	3,2	631,7	2,8	734,2	3,2	598,6	3,1	557,1	2,6	582,3	2,3	648,1	2,3	737,0	2,4
Japan	210,5	1,2	361,6	1,6	459,4	2,0	306,3	1,6	406,1	1,9	482,4	1,9	609,9	2,1	673,7	2,2
Belgium	255,7	1,4	392,1	1,7	436,9	1,9	412,4	2,1	430,8	2,0	497,9	2,0	529,8	1,9	490,5	1,6
Latvia	311,1	1,7	390,1	1,7	428,2	1,8	388,8	2,0	360,1	1,6	392,4	1,5	454,7	1,6	480,1	1,6
Czech	319,6	1,8	417,9	1,9	387,0	1,7	351,9	1,8	299,3	1,4	344,1	1,4	367,1	1,3	452,2	1,5
Belarus	432,2	2,4	510,7	2,3	519,4	2,2	431,7	2,2	394,4	1,8	483,4	1,9	424,2	1,5	449,8	1,5
Ukraine	598,8	3,3	464,5	2,1	446,6	1,9	299,7	1,5	330,8	1,5	414,3	1,6	466,2	1,6	436,8	1,4
Estonia	238,7	1,3	291,2	1,3	349,7	1,5	291,6	1,5	254,1	1,2	274,9	1,1	301,0	1,1	422,3	1,4
Spain	123,3	0,7	211,7	0,9	281,1	1,2	242,8	1,3	242,3	1,1	323,5	1,3	362,5	1,3	400,1	1,3
Others	2423,9	13,1	2851,8	12,6	2938,4	12,6	2679,2	14,0	2751,8	12,5	3314,1	12,9	4793,0	16,5	4526,1	15,0

[1] Imported goods by country are broken up according to the country of the origin of goods. Document updated: 2004 07 26

2.3.3 為替

2002 年 2 月よりユーロとの固定相場制が導入されており､1 リタスに対し 3.4528 ユーロと設定されている。なおリトアニア通貨は 2007 年にユーロに移行することになっている。

2.3.4 投資動向

海外からの直接投資は､2001 年に 14.2%､2002 年には 23.6%と大幅な増加を示したが､2003 年は 3.9%の増加にとどまった。主な投資国は、デンマーク、スウェーデン、ドイツ、エストニア、フィンランド、USA、ロシア等である。

リトアニアへの主要外国投資

	Foreign direct investment							
	2003 01 01		2003 07 01		2004 01 01		2004 07 01	
	LTL million	%	LTL million	%	LTL million	%	LTL million	%
Total	**13183.8**	**100.0**	**14046.4**	**100.0**	**13699.4**	**100.0**	**14658.1**	**100.0**
Denmark	2261.9	17.2	2317.5	16.5	2374.4	17.3	2312.7	15.8
Sweden	2016.3	15.3	2070.6	14.7	2009.8	14.7	2053.1	14.0
Germany	1263.6	9.6	1335.0	9.5	1334.8	9.7	1362.8	9.3
Estonia	1547.3	11.7	1749.4	12.5	1150.7	8.4	1301.2	8.9
Finland	814.7	6.2	993.0	7.1	1172.7	8.6	1252.9	8.5
USA	1141.9	8.7	1154.9	8.2	1162.1	8.5	1251.2	8.5
Russia	687.3	5.2	866.5	6.2	796.2	5.8	1109.6	7.6
Netherlands	239.7	1.8	231.1	1.6	467.7	3.4	524.9	3.6
United Kingdom	709.5	5.4	672.9	4.8	679.2	5.0	508.6	3.5
Norway	388.5	2.9	418.7	3.0	421.1	3.1	439.9	3.0
Other countries	2113.1	16.0	2236.8	15.9	2130.7	15.5	2541.2	17.3

(出典： リトアニア国統計局)

2.4 社会事情

2003 年におけるリトアニアの平均収入は 1056LTL であった。最高平均月給は金融業で、最低平均月給は農業となっている。年金制度は主として国により運営されている。社会保険税は賃金の 31%に相当する額（30%が企業負担、１%が被雇用者負担）とされている。政府は、老齢年金受給年齢の 65 才への引き上げ、社会保障制度の改革を進めている。現在、老齢年金受給年齢は、55 才（女）及び 60 才（男）であるが、2009 年までにそれぞれ 60 才および 62.5 才とい

った程度に達する。

リトアニアの労働時間は週 40 時間、5 日間であり、年間最低 28 日間の休暇がある。

失業者の割合は過去において 10 数%と大きかったが、2004 年 7 月時点では 6.7%に低下している。

Labour force activity rate, employment rate, unemployment rate

Aged 15–64, per cent

	2000		2002		2003	
	Women	Men	Women	Men	Women	Men
Activity rate	67,1	74,2	65,7	73,2	66,5	73,1
Employment rate	57,5	60,1	57,1	62,3	58,4	63,7
Unemployment rate [1]	13,9	18,8	12,9	14,6	12,2	12,7

[1] calculated for population aged 15 years and older. Document updated: 2004 10 01

（出典：リトアニア国統計局）

近年、女性の社会への影響力は比較的大きく、例えばリトアニアの国会議員の 22%は女性で占められている。

Members to the Seimas of the Republic of Lithuania

	Number		Sex distribution, %	
	Women	Men	Women	Men
VII Seimas (1992)	10	131	7,1	92,9
VIII Seimas (1996)	25	114	18,0	82,0
IX Seimas (2000)	15	126	10,6	89,4
X seimas (2004)	31	110	22.0	78.0

（出典：リトアニア国統計局） Document updated: 2005 02 03

2.5 エネルギー状況

リトアニアは固有のエネルギー資源が乏しく、国内エネルギー生産では原子力発電の占める割合が大きい。

2.5.1 電力

2001 年にリトアニアの電力経済の改革が行われ、新設された Lithuanian Electric Power Plant, Mazeikiai Electric Power Plant, Rytu Skirstomieji Tinklai 及び Vakaru Skirstomieji Tinklai が 2002 年から運転を開始した。この他、Lietuvos energija の発電所も稼動している。Vakaru Skirstomieji Tinklai は 2003 年に民営化され、さらに Mazeikiai Electric Power Plant の民営化が進められている。

2003 年におけるリトアニアの発電量は前年度より 10%増の 19.5TWh であったが、その構成は、原子力発電が 79.5%、火力発電が 15.4%、水力発電が 5.1%である。2002 年比では発電量が 10%増加したが、これは輸出の伸びによるものである。輸出電力量は 2001 年と 2002 年にそれぞれ 1.9 倍、 1.2 倍増加した。

リトアニアの発電設備はもともと市場経済への移行以前からかなりの発電能力があったが、その後の経済不況から稼動状況は発電能力を大きく下回る状況が続いた。現在でも国内電力需要は発電能力の 3 分の 1 くらいである。

Lignalina 原子力発電設備はソビエト連邦の支配下に建設されたもので、安全性に問題があるため 2009 年までに完全閉止される予定であるが、その発電量の代替は当面既存の火力発電プラントの稼働率を高めることで対応可能である。また将来的には主に火力発電設備の新設が予想される。火力発電の燃料はロシアから比較的安価に提供される天然ガスが最も有力で、既にリトアニア国内に張り巡らされているパイプランで供給できる。その供給能力は約 60 億㎥であり、現在の需要量の約 2 倍である。また量的には少ないが国内で開発する再生エネルギーも一部寄与することになる。

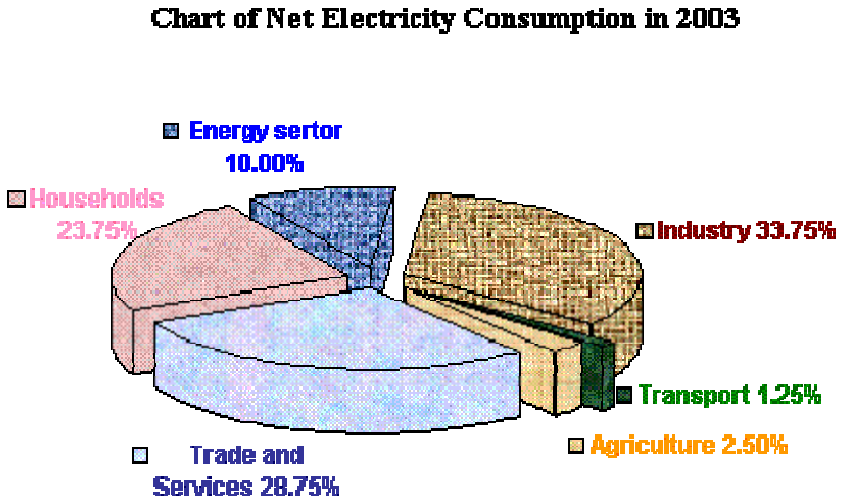
リトアニアの一人当たり電力需要は 2000 年に 2.5MWh であったが、2020 年には基本成長シナリオの場合に 4.45MWh、高度成長シナリオの場合に 5.4MWh になると予想されている。この増加率は EU 全体の平均増加率である約 20%を大きく上回っている。

Energy Balance

(TWh)

Year	2000	2001	2002	2003*
Gross production	11.4	14.7	17.7	19.5
Ignalina NPP	8.4	11.3	14.1	15.5
Thermal power plants	2.4	2.7	2.8	3.0
Kruonis HPP	0.3	0.4	0.4	0.7
Hydro power plants	0.3	0.3	0.4	0.3
Import and export (+/-)	-1.3	-3.9	-6.5	-7.5
Consumed in the country	10.1	10.8	11.2	12.0
By power plants for own needs	1.4	1.5	1.6	1.7
Kruonis HPP	0.4	0.5	0.6	0.9
Losses incurred due to transmission and distribution	1.3	1.4	1.4	1.4
Net consumption	7.0	7.4	7.6	8.0
By energy sector enterprises	0.8	0.9	0.9	0.8
In industry (excluding the energy sector)	2.3	2.3	2.5	2.7
In the transport sector	0.1	0.1	0.1	0.1
In agriculture	0.2	0.2	0.2	0.2
In the trade and services sector	1.8	2.0	2.1	2.3
In households	1.8	1.8	1.8	1.9

（出典： Lithuanian National Energy Strategy 2002）



2002 年 1 月に電力に関する法律が発効した。これは EU の法律に基づいて、発電、送配電、電力供給の規制に関する基本原則を定めたものである。また、電力の供給者と消費者との関係、電力会社間の競争原理の導入についても規定しており、電力消費者と電力会社との直接契約ができるように段階的に改善していくことが示されている。最近のリトアニア政府決議によれば、大口の電力消費者は購買先の電力会社を自由に選択することができるようになった。

現在、リトアニアの電力システムは、ラトビア、エストニア、ベラルーシ、及びロシアのエネルギーシステムとリンクしており、バルト諸国の余剰電力を効率的に使用できるようにバルト諸国共通システムを開発が進められている。またポーランドとの間で電力システムを統合する動きがあり、これが実現すれば EU 諸国への電力輸出が可能となる。

リトアニアがイグナリナ原子力発電プラントを閉止してエネルギーシステムを近代化するのを支援するために、EU は 2004 年から 2006 年に 285 百万ユーロの予算配分を約束している。

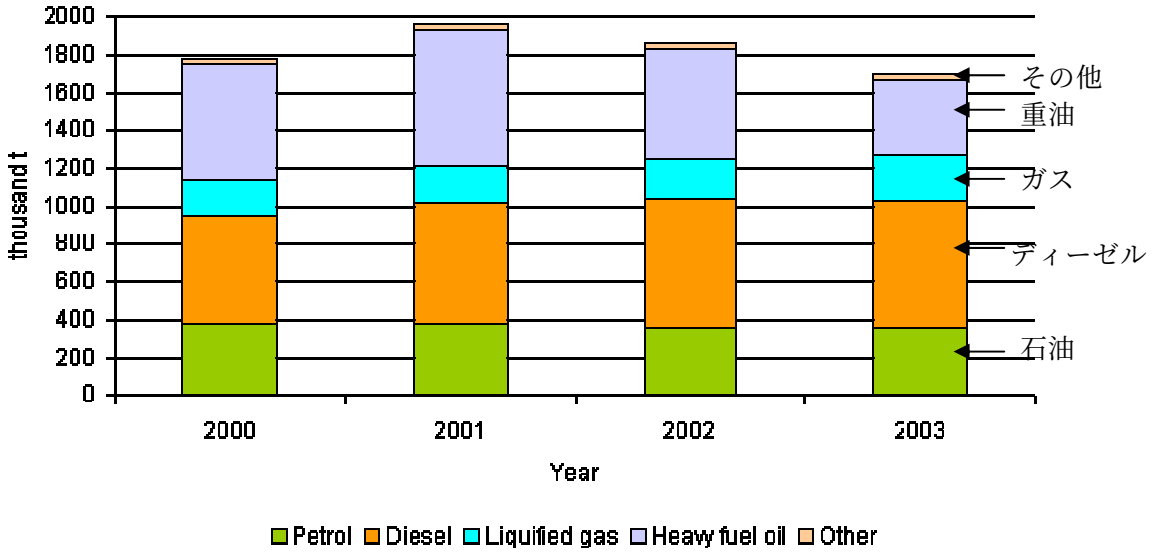
2.5.2 熱供給

リトアニアの都市部住居地域のおよそ 75%が地域熱供給システムから熱を供給されている。10,500MW の熱供給力があり、熱供給のパイプライン網は 2,400 km に及ぶ。しかしこの熱供給方法はあまり効率的でないとして、システム再構築の必要性が指摘されている。具体的には、必要に応じて現在のボイラを熱電併給システムに取り替えることである。また再生可能エネルギーや一般ゴミのエネルギー利用も図ることとされている。

2.5.3 石油

石油部門は市場経済への移行に伴い既にほぼ EU 市場への適合を終えている。

石油精製は主に Mažeikiai で行われており、リトアニア国内で消費される石油製品の内の 90%が Mažeikiu Nafta AB で製造されたものである。



Consumption of Petroleum Products, thousand tons

Maž ekiu Nafta AB での石油精製はリトアニア経済にとって非常に重要であり、EU 指針に沿って設備の近代化が進められている。2003 年にその第 1 段階が終了した。同社の 2003 年の精油量は 719 万トンであり、その 40%が国内で消費され、残りは主に西欧諸国に輸出されている。

Maž eikiu Nafta AB.が運営する Butinge 石油ターミナルでの 2003 年の取扱高は 1070 万トンであった。石油製品の輸出に係るターミナルの設備能力は年間 1400 万トンであり、石油輸入については 600 万トンである。

LPG の市場は 1993 年以来自由化されている。LPG の国内消費量は 2003 年に 231,000 トンであった。このうち 151,000 トンが輸送用である。2002 年の消費量は 212,800 トンであ、うち輸送用は 148,000 トンであった。

Klaipeda にある石油製品のターミナル(Klaipedos Nafta AB) は主要ターミナルの一つで、重油 500 万トン、軽油 300 万トン程度の処理能力がある。2003 年の実績で 660 万トンの石油製品をタンカーに積み込んだ。このうち 52.5%は Maž eikiu Nafta AB の輸出製品, 20.5%はロシアからの輸入品、26%はベラルーシの精油所からの輸入である。

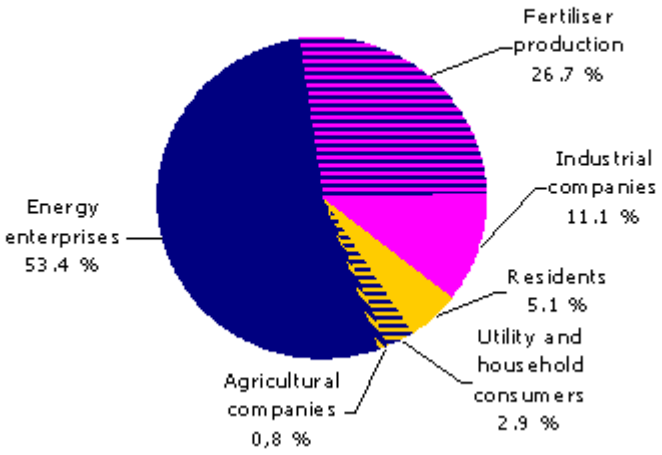
国内の石油資源は乏しく、原油掘削量は 4 社で 39 万トン程度である。これは国内需要の 13%にあたる。

2.5.4 ガス

国内エネルギー収支における天然ガスの割合は 2003 年に 26%であった。リトアニアの国内ガス市場は EU 指令により自由化の方向へ向かっている。

天然ガスは主にロシアの Gazprom AAB から供給されている。2003 年には 2,937.9 百万 m3 のガスが輸入された。2002 年の 2,711 百万 m3 に比らべて 8.4%以上の伸びである。購入者は、Dujotekana UAB (1728.3 百万 m3)、 Lietuvos Dujos AB (436.0 百万 m3) 、及び Achema AB (773.6

million m 3)である。これらのガス会社の他には、Haupas UAB が 2003 年に Gazprom AAB と契約を結び、Druskininkai の消費者に 4,000 m3 以上のガス供給を始めた。リトアニアのガス消費量は、2003 年に 2,894.3 百万 m3、 2002 には 2,679.8 百万 m3 である。



Breakdown of Gas Consumption, %

リトアニア政府は 2001– 2004 年にかけて Lietuvos Dujos AB の民営化を進め、 2004 年３月に完了した。現在 Lietuvos Dujos AB の株式のシェアは、Ruhrgas AG (ドイツ)が 35.49%, Gazprom AAB (ロシア) が 34%; リトアニア政府が 24.36%、残り 6.15%を個人が所有している。

2.5.5 固有資源

政府計画（2001-2004 年）では、リトアニア固有の資源と再生可能エネルギーの利用拡大が謳われている National Energy Strategy によれば、EU 指針の要求に沿うべく、２０１０年にエネルギー収支全体の１２％を固有資源と再生可能エネルギーで賄うことと目標設定されている。 経済省は 2003 年にバイオ燃料に関する法律の改正案を作成した。ここでは、 石油由来の燃料への依存を減らして自国の固有エネルギー源の利用を高め、エネルギー源の保全を図り、EU 指針（”the Directive 2003/30/EC of the European Parliament and of the Council of 8 May 2003 on the promotion of the use of biofuels or other renewable fuels for transport”）を履行するため、バイオ燃料の製造及び使用がしやすい条件を整備することを主要な目標としている。リトアニア議会は２００４年２月５日にこの法律を採択した。 (Official Gazette, 2004, No. 28-870).

Energy resources and consumption, 1,000 tonnes of oil equivalent*

Year	996	1997	1998	1999	2000	2001	2002	2003
Production of primary energy	**4342.8**	**3908.1**	**4438.9**	**3482.2**	**13184.3**	**4108.8**	**4848.0**	**5145.4**
Crude oil	155.4	212.3	277.5	232.5	322.3	479.7	442.0	389.5
Solid fuel	526.1	537.1	593.3	644.2	638.9	640.1	679.1	688.3
Nuclear, hydro and geothermal energy	3661.3	3158.7	3568.1	2605.5	2223.1	2989.0	3725.4	4065.8
Biogas	-	-	-	-	-	-	1.5	1.8
Recovered products	**-**	**-**	**-**	**-**	**14.9**	**11.6**	**4.2**	**1.2**
Import	**7939.6**	**8732.3**	**9619.0**	**7210.8**	**7634.0**	**9308.7**	**9018.3**	**10148.5**
Natural gas	2168.2	2002.3	1753.8	1826.2	2065.2	2145.3	2168.7	2355.4
Crude oil, other inputs to refineries	4123.8	5718.8	6746.4	4623.3	5103.5	6732.4	6374.5	7252.9
Petroleum products	1353.6	793.9	919.9	583.6	330.5	311.0	289.3	311.6
Electricity	6.5	20.0	33.1	53.6	12.3	16.9	26.4	-
Solid fuel	254.9	163.9	149.8	96.8	89.5	71.9	143.5	188.9
Orimulsion and crude light oils	32.6	33.4	16.0	27.3	33.0	31.2	15.9	39.7
Export	**2943.9**	**3752.8**	**4925.1**	**2932.3**	**3321.3**	**5428.6**	**5308.5**	**6080.4**
Crude oil	122.9	193.3	264.8	228.6	316.6	357.3	126.3	293.9
Petroleum products	2366.7	3206.4	4096.9	2417.7	2869.6	4699.4	4578.6	5112.6
Electricity	450.7	323.2	556.1	284.2	127.2	357.9	584.3	647.7
Solid fuel	3.6	29.9	7.3	1.8	7.9	14.0	19.3	26.2
Marine bunkers	**128.5**	**59.3**	**50.4**	**72.3**	**91.4**	**98.2**	**108.8**	**108.5**
Changes in stocks	**71.3**	**-33.0**	**152.2**	**170.4**	**-206.9**	**208.4**	**168.3**	**-120.9**
Gross inland consumption	**9281.3**	**8795.3**	**9234.6**	**7858.8**	**7213.6**	**8110,7**	**8621.5**	**8985.3**
Statistical difference							**29.4**	**39.0**
Primary energy transformation	**-2796.8**	**-2450.9**	**-2808.2**	**-2042.0**	**-1675.6**	**-2201.0**	**-2542.3**	**-2739.9**
Interproducts transfers	**-**	**-**	**-**	**-9.1**	**-12.4**	**-14.9**	**-4.3**	**-6.2**
Distribution and transmission loses	**650.5**	**535.9**	**516.9**	**439.9**	**388.2**	**377.5**	**354.6**	**359.1**
Consumption for the energy branch	**691.6**	**714.6**	**828.3**	**646.3**	**719.9**	**917.1**	**946.0**	**968.5**
Non – energy consumption	**611.6**	**589.5**	**636.9**	**645.0**	**648.7**	**714.2**	**734.5**	**763.1**
Final consumption	**4530.8**	**4504.4**	**4444.3**	**4076.5**	**3768.8**	**3886.0**	**4069.2**	**4187.5**

* Source of information – Statistics Lithuania. Energy balance (1996-2000, 2001, 2002, 2003)

Main fuel and energy final consumption

	1996	1997	1998	1999	2000	2001	2002	2003
Hard coal,thous.t	320	242	204	159	118	102	199	258
Peat, thous.t	28	33	29	28	14	13	15	14
Peat blocks, thous.t	20	23	15	18	10	9	11	16
Firewood and wood waste, thous.m^3	2390	2439	2670	2910	2958	2986	3008	3013
Natural gas, mill.m^3	569	562	527	456	455	485	533	551
Fuel oil, thous.t	284	277	255	205	152	134	86	46
Diesel oil, thous.t	526	635	696	634	566	639	665	664
Motor gasoline, thous.t	660	658	631	494	381	372	361	360
Aviation fuel [1)], thous.t	33	31	28	26	26	33	30	32
Liquefied petroleum gases, thous.t	69	91	104	135	185	189	211	229
Electricity, GWh	6524	6736	6753	6543	6197	6446	6723	7179
Heat [2)] , GWh	11942	11579	10665	9383	8430	8871	9055	9290

[1)] Kerosene type jet fuel, gasoline type jet fuel, aviation gasoline.

[2)] Final consumption does not include heat produced in utilization installations for own use of the enterprise.

Document updated: 2004 08 31

（出典：リトアニア国統計局）

2.5.6 エネルギー政策

EU 指令に基づいて 2009 年までに原子力発電所が閉鎖されることに伴って今後のエネルギー戦略が策定され、2002 年 10 月に改正国家エネルギー戦略が国会の承認を得たが、これは Ignalina 原子力発電プラントの閉止を踏まえて、エネルギー開発のガイドラインを示しており、今後 20 年間のリトアニアのエネルギーシステムの長期戦略目標を定めている。この中で、EU 指針に従い、石油・天然ガスセクターの自由化、市場開放、天然ガス輸送・販売、発電、石油精製･輸送セクターといったエネルギー企業の民営化､原子力発電プラントの閉止に伴う対応等が盛り込まれており､今後10年以内にリトアニアのエネルギーシステムのEUのそれへの統合、2010 年までに再生可能エネルギーの割合を 12%とすることなども示されている。（2000 年には未利用の再生可能エネルギーは総エネルギーバランスの 9%を占めていた。）

国家エネルギー戦略によれば、未利用再生可能エネルギーの利用に関する目標として、毎年石油換算で 2 百万トン分を有効利用することと定められている｡未利用再生可能エネルギーには、太陽光、風力、水力、バイオ燃料、廃棄物等が含まれる。このためのプロジェクトに対して国が支援するとしている。例えば、政府がバイオ燃料のパイロットプロジェクトへの投資支援策を講じること、農業省がエネルギー作物栽培の支援を行うこと、自治体がバイオ燃料使用の方策を定め履行することが義務づけられている。

リトアニアでは EU 指針（EU Directives 92/81/EC 及び 92/82/EC）に従って 2004 年 2 月にバイオ燃料の使用に関する法律が成立した。これを受けて、リトアニアでは現在、バイオ燃料の品質規格、取り扱い基準等、バイオ燃料導入のための具体的取り扱いを定めた法律を準備中であり、近々国会に提出されることになる。このバイオ燃料法の主要なポイントは、①バイオ燃料の化石燃料への混合率が 5%を超える場合には販売者に表示義務を課す。②政府等は輸送用バイオ燃料の使用率が、2005 年末までに輸送用石油系燃料全体の 2%以上、2010 年末までに 5.75%以上となるように施策を講じることである。

また 2004 年 5 月 1 日から化石燃料に対して物品税が課せられており､バイオ燃料の使用にインセンティブを与えている。

2.5.7 燃料エタノールの展望

リトアニアには自動車燃料用としてエタノールへの潜在需要が存在するが、現時点ではまだ顕在化していない。

リトアニア政府は化石燃料への依存度低減、農業支援、温暖化ガスの排出抑制の点から、国内で供給過剰となっている農産物及び農産廃棄物を有効利用してバイオマスエタノールを石油由来の燃料用添加剤の代替エネルギーとして導入することを国策に掲げており、自動車用燃料へのエタノール混合をEU指針に基づいて実施することとしている。輸送用バイオ燃料の利用促進に係るEU指針（EU Directive 2003/30/EC of the European Parliament and of the Council）によれば、加盟国は2005年からバイオ燃料および他の再生可能エネルギーの導入を義務づけられ、各国が決定する導入目標の参考値として、2005年末までについて石油系輸送用燃料のエネルギー値の2%と定められている｡またその後の導入率は毎年0.75%ずつ増加することになっている。リトアニアにおいてもこのＥＵ指令に従うことが2004年のバイオ燃料法で明示されている。

現在リトアニア国内で輸送用燃料としての無水エタノールを製造しているのはStumbras社のみであり、生産能力は約1万kl／年である。しかし、リトアニアではエタノール混合ガソリンの使用が法律で定められておらず、国内需要はほとんどないため、そのほとんどはEUに輸出されている状況である。

リトアニアの自動車用燃料全体の需要量は、2000 年時点で約 140PJ であった。自動車用燃料需要は少なくとも 1995 年以降は年々増加していて、その傾向は今後も続き、2010 年には約 200PJ になると予想されている。このうち輸送用ガソリンの消費量は 2003 年に約 36 万トンであった。

リトアニアで2006年から実施される見込みのバイオ燃料混合では、それぞれ輸送燃料ごとにＥＵ指針で示された混合率が適用されるものと思われる。ガソリン需要が2005年から2010年まで毎年5%ずつ増加するとすれば、リトアニアにおけるガソリン混合用無水エタノールの需要は、2005年に約8千トン、2010年には約3万トンとなる。これに対して、無水エタノール生産設備増設後のStumbras社の予想生産能力は約2万kl/年であるから、今後無水エタノールの生産規模拡大が必要となる。

年	ガソリン推定 消費量（t）	エタノール 混合率（%）	エタノール 消費量（t）
2004	378,000		
2005	396,900	2.00	7,900
2006	416,700	2.75	11,500
2007	437,600	3.50	15,300
2008	459,500	4.25	19,500
2009	482,400	5.00	24,100
2010	506,600	5.75	29,100

一方、EU に於けるエタノール混合ガソリンは、既にスウェーデン、ドイツ、フランス、スペインイタリア、ＵＫ等でバイオ燃料が導入されており、ほとんどの国でバイオエタノール製造者や原料バイオマス生産者に税額控除、補助金等のインセンティブが付与されている状況であり、今後もバイオエタノール需要の増加が見込まれている。

Number of road vehicles

（各年末現在）

	1995	1996	1997	1998	1999	2000	2001	2002	2003
Total	**879791**	**924524**	**1024935**	**1129849**	**1233651**	**1317716**	**1280096**	**1333114**	**1414806**
Motorcycles [1)]	20033	19402	19128	19266	19515	19842	20244	21017	21873
Buses	17052	15482	14888	15156	15590	15069	15171	15376	15543
Passenger cars [1)]	718469	785088	882101	980910	1089334	1172394	1133477	1180945	1256853
Personal passenger cars per 1000 inhabitans	190	208	235	260	291	315	304	316	336
Lorries	101422	81291	84731	89866	86824	88346	89373	93508	97454
Road tractors	7469	7992	8939	9588	9752	10267	11016	12037	13063
Special purpose road vehicles [1)]	15346	15269	15148	15063	12636	11798	10815	10231	10020

[1)] Data provided by the Ministry of Interior; since 2003 year – State enterprise “Regitra”.

Document updated: 2004 06 09

（出典：リトアニア国統計局）

2.6 農業の状況

リトアニアは元々農業･林業国であるが､この分野の生産はGDPの6.1%を占めるに過ぎない。主要な農産物は小麦、ライ麦、菜種、亜麻、砂糖大根、じゃがいも等である。2003年における麦の生産量は冬物が1,386,400トン､春物が1,245,400トンで､豆類は48,500トンであったが､その12%が輸出されている。

単位耕地面積あたりの穀類生産量は、近年は約3 ton/haで推移している。これはEUの平均に比べて約半分の生産性である。この低生産性の原因は、農民が地域固有の穀物種を時代遅れの技術で、適当な農業機械も無しに、かつ肥料を十分に使わずに栽培しているためとされている。

農業従事者の割合は総労働者人口の約 20%を占める一方で、収入は一般的に他の産業より低水準である。

リトアニア農業省の資料によれば2003年10月時点での耕作可能面積は約140.3万haで､このうち作付面積は約128.8万haであった。また農業用地は約156万haである。一方、ＦＡＯの統計資料（2002年）では、耕作可能面積は293万haとなっている。

リトアニアの土地利用面積（2002 年）

Arable & Permanent Crops (1000ha)	2,989
Arable Land (1000ha)	2,930
Permanent Crops (1000ha)	59

（出典：FAOSTAT）

リトアニアにおける穀類生産高は約 260 万～280 万トン/年であるが、このうち食品用に使われるのは約 150 万トンで、残りは国内外の市場で販売される。

農作物の収穫量　（1,000 トン）

	1995	1996	1997	1998	1999	2000	2001	2002	2003
Cereals grain	1906.5	2615.1	2945.3	2716.8	2048.6	2657.7	2345.3	2539.1	2631.8
Leguminous crops for grain	47.5	87.4	106.4	104.1	63.8	73.0	52.2	62.9	48.5
Flax fiber	9.4	6.2	5.0	5.6	4.3	7.2	4.0	6.2	9.9
Rape	18.9	22.6	37.2	71.9	115.1	81.0	64.8	105.6	119.5
Sugar beet	692.4	795.5	1001.9	949.2	869.9	881.6	880.4	1052.4	977.4
Potatoes	1593.5	2044.3	1829.8	1849.2	1708.1	1791.6	1054.4	1531.3	1445.2
Vegetables	368.7	432.6	415.0	436.9	325.1	329.4	322.0	290.0	568.6
Fodder root-crops	2188.9	1718.4	1829.7	2026.0	1573.3	1399.4	1382.9	1136.2	944.7
Green fodder from arable land	10095.8	9290.1	9438.0	10211.5	7422.9	6960.8	7352.3	5718.5	2690.2

（出典：リトアニア国統計局）

Document updated: 2004 06 22

CROPLAND, HARVEST AND FECUNDITY ACCORDING TO FARM CATHEGORIES

	2003			2002		
	All farms	Individual and family farms	Agricultural ventures and enterprises	All farms	Individual and family farms	Agricultural ventures and enterprises
Grain, in total						
Area, thousand ha	885.2	722.4	162.8	954.2	810.4	143.8
Yield, thousand tones	2680.3	2117.1	563.2	2602.0	2109.0	493.0
Fecundity, 100 kg/ha	30.3	29.3	34.6	27.3	26.0	34.3
Winter grain						
Area, thousand ha	422.4	329.2	93.2	388.7	314.4	74.3
Harvest, 1,000 tones	1386.4	1050.9	335.5	1329.8	1018.2	311.6
Yield, 100 kg/ha	32.8	31.9	36.0	34.2	32.4	42.0
Spring grin						
Area, thousand ha	441.9	376.7	65.2	529.3	464.9	64.4
Harvest, 1,000 tones	1245.4	1029.3	216.1	1209.3	1037.6	171.7
Yield, 100 kg/ha	28.2	27.3	33.2	22.8	22.3	26.6
Legume crop						
Area, thousand ha	20.9	16.5	4.4	36.2	31.1	5.1
Harvest, 1,000 tones	48.5	36.9	11.6	62.9	53.2	9.7
Yield, 100 kg/ha	23.2	22.4	26.4	17.4	17.1	19.2
Sugar-beet						
Area, thousand ha	25.9	16.2	9.7	29.2	18.5	10.7
Harvest, 1,000 tones	977.4	605.8	371.6	1052.4	672.7	379.7
Yield, 100 kg/ha	378.0	374.4	384.2	359.9	364.0	352.9

Rape						
Area, thousand ha	66.8	46.7	20.1	60.0	41.9	18.1
Harvest, 1,000 tones	119.5	81.4	38.1	105.6	72.6	33.0
Yield, 100 kg/ha	17.9	17.4	18.9	17.6	17.3	18.2
Potatoes						
Area, thousand ha	93.2	92.5	0.7	99.2	98.6	0.6
Harvest, 1,000 tones	1445.2	1432.5	12.7	1531.3	1521.1	10.2
Yield, 100 kg/ha	155.1	155.0	172.7	154.4	154.3	170.3
Vegetable (field)						
Area, thousand ha	27.6	27.4	0.2	20.7	20.6	0.1
Harvest, 1,000 tones	536.1	528.8	7.3	261.0	259.7	1.3
Yield, 100 kg/ha	194.0	193.1	288.7	126.1	125.9	158.9

Source: The Department of Statistics under the Government of the Republic of Lithuania.

（出典： Agriculture of Lithuania 2004）

Lithuania Production (t)	**Year**				
	2000	**2001**	**2002**	**2003**	**2004**
Potatoes	1,791,600	1,054,400	1,531,300	1,445,200	1,600,000
Rye	311,400	231,100	170,200	147,100	200,000
Sugar Beets	881,600	880,400	1,052,400	977,400	940,000
Wheat	1,237,600	1,076,300	1,217,600	1,204,100	1,136,000

（出典： FAOSTAT ）

Average yield of agriculture crops

100 kg per hectare

	1995	1996	1997	1998	1999	2000	2001	2002	2003
Cereals grain	18.6	24.2	25.4	24.5	20.2	27.1	25.6	27.7	30.4
Leguminous crops for grain	18.1	23.8	20.3	15.8	12.9	18.4	15.1	17.4	23.2
Flax fiber	7.1	8.4	8.3	9.0	4.9	8.3	9.7	6.6	11.1
Rape	13.6	19.2	16.8	18.6	13.7	14.6	17.8	17.6	17.9
Sugar beet	284	255	284	316	284	319	332	360	378
Potatoes	128	163	151	136	141	164	103	154	155
Vegetables	140	145	149	145	120	139	141	126	194
Fodder root-crops	339	319	357	348	337	358	371	316	349

Document updated: 2004 06 22

Lithuania - Statistics on cereals – Yield (hg / ha)

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Barley	NA	NA	15622	20560	17592	16373	24833	23728	23856	17607	24337
Buckwheat	NA	NA	3333	5417	1667	6000	7895	7955	9639	5695	8916
Mixed Grain	11603	16875	14246	15312	19773	20043	20566	12308	18393	NA	NA
Oats	NA	NA	8250	17986	12661	14072	19690	19911	19597	13105	18713
Rye	NA	NA	20916	18776	15381	17765	18844	21941	20006	19355	23396
Triticale	NA	NA	0	24873	18400	20711	22757	28103	25718	18911	25768
Wheat	NA	NA	29411	23718	20348	24455	26926	30016	28671	26098	33413
Cereals,Total	11603	16875	91778	126642	105822	119419	141511	143962	145880	100771	134543

NA: not available

穀類の生産量は比較的安定しているが、2003 年は収穫量が多く、過去最大の 427.620 トンの穀類が輸出された。この内訳は、小麦 402,900 トン、大麦 22,400 トン、そば 2,320 トンで、主な輸出先はウクライナである。2004 年初時点で 496 000 トン以上の穀物（うち、小麦は 152000 トン）がリトアニアの穀類生産者の倉庫に保管されている。

2003年にthreshed grainの生産量は 100,000トン増加し、平均収量は 2.7 t/ha から 3.07 t/ha に増加した。2003 年は食用穀物に余剰が生じたため、604 578 トンの小麦、大麦及びそばが食用として 38 ヶ国(主にウクライナ)に、また飼料用穀物 45645 トンが 15 ヶ国 (主にポーランド)に輸出された。 保存倉庫を持たない農民は収穫穀物をすぐに売るしかないが、企業農業生産者は高値になるまで穀物を保管している。

一方で穀物の栽培面積は年々減少しており、2000 年には 1,019,400 ha であったものが、2002 年には 954,200 ha、2003 年には 885,200 ha となっている。しかし、小麦の栽培面積は過去十数年間ほとんど変化していない。冬期栽培の小麦は 253,700 ha、同じく冬期栽培の大麦は 204,200 ha であり、穀類全体では約 100 万 ha の栽培面積を占めている。

小麦は政府が買い取り補償をしており、政府買い取り価格は 350 LTL/ton でこれが最低市場価格となっている。一方、ライ麦の場合は政府買取補償がなく、調査時点での市場価格は 330 LTL/ton であった。

リトアニア農業における肥料の使用量(2002 年)は下表の通りである。

肥料	生産高（トン）
窒素肥料	591,004
リン酸肥料	359,700
カリウム肥料	64,200
全肥料	1,014,904

（出典： FAOSTAT）

耕地単位面積あたりの施肥量（栄養素 kg / ha）	66

（出典： FAOSTAT）

2.7 地球温暖化対策に係るホスト国の政策・方針等

2.7.1 JI に関する政策･方針等

リトアニアの地球温暖化対策はＥＵの指針に左右されており、ＥＵから温暖化ガス排出削減の要請があり、リトアニアもこれに応じる形で実施されつつある。

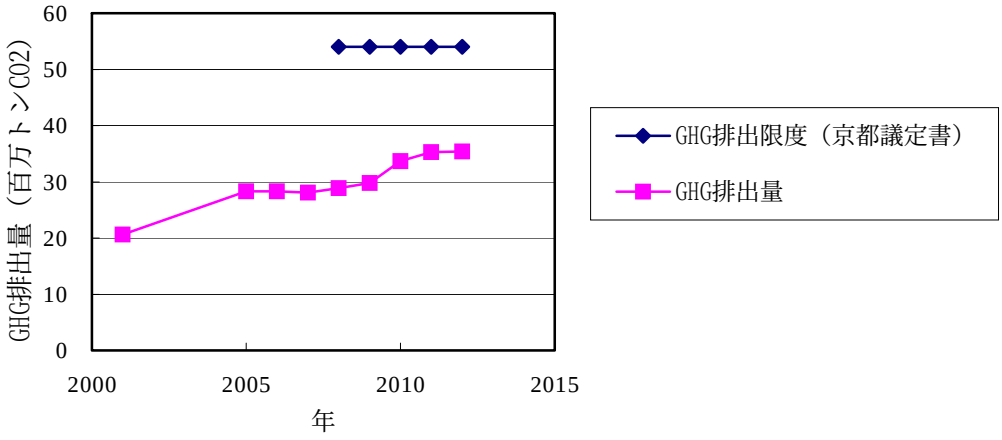
しかしＪＩに関する取り組みはまだ始まったばかりと言ってよい状況である。ＪＩプロジェクトの認定基準も具体的でなく、再生可能エネルギー導入の積極姿勢が JI プロジェクトの具体化に

どのように反映されるのか明確でない点もある。現在、JI のパイロットとしての位置付けで、バルト諸国との間で数件のプロジェクトが計画段階あるいは可能性の検討段階にあり、これらの実施を通じて、また他の東欧諸国での先行事例等を参考にして国内体制を整えていきたいとの意向である。

リトアニアは昨年 EU に新規加盟を果たし、今後は EU の指令に沿った政策を実現していくことが求められており、現在、エネルギー分野を中心にその取り組みが進行中である。エネルギー資源に乏しい同国の政策として再生可能燃料による化石燃料の一部代替が位置付けられており、無水バイオエタノールの導入も注目されている施策の一つである。

リトアニアには第一約束期間における GHG 排出削減量として 1990 年比 8%減が課せられているが、リトアニア経済は 1990 年から 2000 年まで概ねマイナス成長を続けてきており、リトアニア政府の GHG 排出量予測でも 2015 年時点でなお 1800 万トンもの削減余地があるとされている。

リトアニアのGHG排出量



ＪＩに対するリトアニアの取り組み体制としては、環境省がその主体的位置付けであり、ＪＩ案件の窓口である。具体的案件の認定にあたっては、環境省、経済省及び大蔵省から構成される運営委員会で審議し、必要に応じて他の省の意見を聞くという体制をとっている。　ＪＩプロジェクトの認定に関するリトアニアの判断基準は、今のところ明確なものはないが、カテゴリーで次のような優先順位を設けている。

① 再生可能エネルギー（バイオマス、太陽光等）利用技術の開発
② 燃料転換（特に再生可能エネルギーへの転換）
③ エネルギー効率向上による省エネルギー
④ メタン排出削減（農業分野）
⑤ 植林

今回調査した限りでは、リトアニアは GHG 排出削減量を厳密に把握する体制の整備が不十分と考えられる。UNFCCC で資格要件として規定している排出削減量の登録管理制度はまだ整備途上であり、GHG についての UNFCCC への毎年の報告義務の履行も不完全である。従って、現段階ではリトアニアはトラック２の位置づけであると推察される。

3 対象地域の状況

3.1 バイオエタノールの原料

カウナス市の周辺は穀類の生産が盛んである。リトアニア統計局の資料によれば、カウナス郡の年間生産量は約 47 万トン、隣郡のマリヤンポール郡は約 43 万トンの生産量である。また休耕値も多く存在するので、エタノール用として需要が顕在化すれば休耕地を使用して穀類が増産される可能性が大きい。

Lithuania Chamber of Agriculture への聴き取り調査の結果によれば、Kaunas 郡における肥料の使用量は、平均で、窒素肥料 150 kg/ha、燐酸肥料 80 kg/ha、カリウム肥料 120 kg/ha であり、Kaunas 郡では大規模農業が主であるため、ほとんどの場合化学肥料が使用されている。有機肥料を使用しているのは小規模農家のみである。

3.2 バイオエタノールの製造

リトアニアのバイオエタノール製造は、飲料用がほとんどであるが、エタノール全体で約 60%のシェアをしめる Stumbras 社は、昨年から燃料用エタノールの製造を開始した。現在の生産能力は約 10,000kl/yr であるが、2006 年には約 20,000kl/yr まで増産を計画している。Stumbras 社以外は比較的小規模な醸造所であり、いまのところ燃料用エタノールの生産計画はない模様である。

今回のプラント予定地である Kaunas あたりには燃料用エタノールの製造工場は存在せず、また現在のところ新たな製造計画もない。

3.3 燃料用バイオエタノールの利用

リトアニアにはガソリンへのエタノール添加に係る法規がない。ガソリンスタンド等の販売にあたって「エタノール混合ガソリン」である旨の表示義務が無いので、既に市販のガソリンに混合されている可能性は無くもないが、燃料用エタノールの製造・利用に係る優遇措置が存在しないため、現在は自動車用燃料として利用されていないと考えられる。

3.4 現地の関心度・積極度

前述の通り、リトアニアは EU 指針に基づいてバイオ燃料に関する法律でバイオ燃料の導入目標を設定している。したがって政府や議員の間でもバイオ燃料の一つであるバイオエタノールについての関心は比較的高い。実際の導入促進に向けて、近々具体的な施行規則が明らかになるものとみられる。

４ プロジェクトの立案

4.1 プロジェクトの具体的内容

4.1.1 事業の概要

本プロジェクトは、小麦を主原料として農産廃棄物も有効利用することにより比較的低エネルギーで製造されるバイオマスエタノールをガソリン混合用燃料として生産し、国内市場及びEU市場に販売するものである。

事業はリトアニアにおけるエタノール製造･販売のために新たに会社を設立し､既存の高効率エタノール発酵技術と三井造船の持つ膜分離技術を中心とした無水化技術を組み合わせたバイオマスエタノール製造プラントを建設して行う計画である。

生産されたエタノールはリトアニアの石油企業等を通じて自動車燃料用としてリトアニア国内で使用されるほか、ドイツ等のEU諸国で販売される予定である。

1) 原料： Kaunas周辺地域で生産される小麦を主原料とする。
2) 原料供給量： 1,320トン/日
   (Lithuanian Chamber of Agriculture を通じて長期買付契約を結ぶことにより確保する。)
3) 製品：燃料用無水エタノール（99.8 Wt%）
4) 生産規模： 年産 161,000 kL
5) プラント稼動率： 年間335日
6) 副生物： 発酵残渣は動物用飼料として販売する。グルテンは食材または動物用飼料添加物として販売する。
7) 設備費： 約200億円

4.1.2 無水エタノール製造プロセスの概要

このプロセスにおける穀類の前処理、発酵等は従来型の技術であるが、発酵菌は遺伝子組み替えにより生産性を高めたものを使用して発酵効率を高める。脱水･無水化プロセスにおいては、従来の共沸蒸留法に替えてセラミック膜による脱水･分離法を採用することにより所要エネルギーの低減を達成する。

主要設備構成

プラントは以下の設備で構成される。

前段処理工程　液化工程　糖化工程　酵母増殖工程　発酵工程
蒸留工程　ユーティリティー設備　･排水処理設備

4.1.3 実施体制

(1) 実施企業の概要

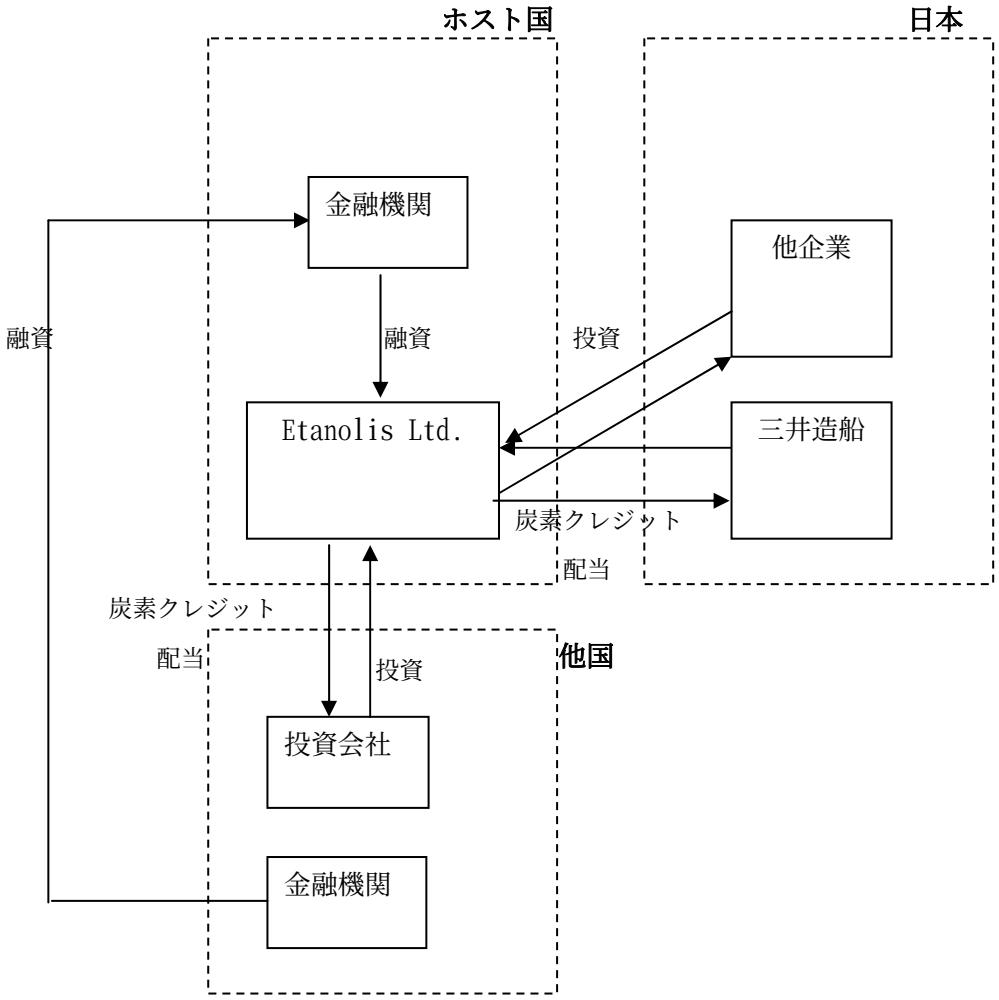
企業名： Kauno NOVA

法的形態：Public Enterprise
住所： Griunvaldo-22,LT-3000, Kaunas, Lithuania
代表取締役： Dr. Gediminas Petrauskas, President

現在同社が事業への資金調達を図っているところである。資金調達の目途が立った段階で事業会社を設立する。

企業名： Etanolis Ltd.
資本金： 未定
株主と保有株数：未定
業務内容： 燃料用エタノール製造
所在地： Kaunas City

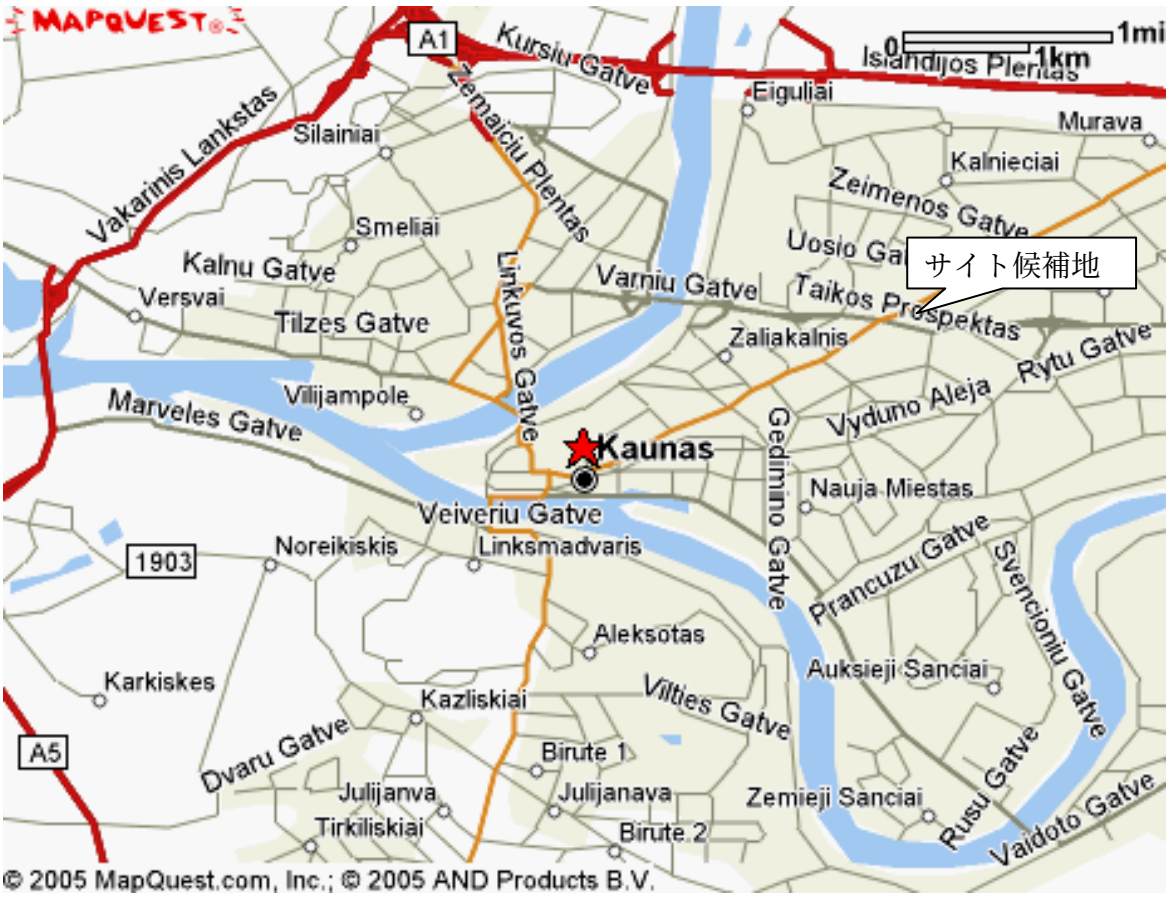
GHG 排出権を含めた事業実施体制は次の通りである。



4.1.4 プラントサイトの選定

プラント建設地の条件は、まず、原料及び製品の輸送コストの面及び安定的な供給の確保が重要である。原料小麦の生産･集荷･貯蔵の地点から近く、低価格で調達できる立地であること。製造したエタノールを出荷するのに好都合な立地であることが要求される。さらには必要エネルギーを比較的安価に利用できることが有利である。このような条件を備えた地点としてKaunasが選定された。

現在のサイト候補地はKaunas市北東部の遊休農地である。この地点は、鉄道、道路、電力、ガスへのアクセスが比較的よく、インフラ整備上の利便性を有する。貨物鉄道の最寄り駅からは約2.4㎞のところにあり､引込み線を自前で建設することによって製品エタノールの鉄道による出荷が可能となる。幹線道路からは約700m離れており、そのアクセス道路の工事が必要となる。天然ガスのパイプラインのタップへは約500m、配電距離は約800mである。



＜写真　１＞

＜写真　2＞

＜写真　3＞

＜写真　４＞

4.1.5 原料供給

収穫された原料は、輸送コスト、安定供給等の観点から、原則としてプラントサイトから約50kmの範囲内から調達する。本プロジェクト実施の際には、Lithuania Chamber of Agriculture との間で原料の長期買付け契約を締結することで調達コストの低減と安定供給を図ることになる。原料は同Chamberに加盟する農業会社あるいは農家の穀物貯蔵所等からプラントサイトに供給される。

4.1.6 資金計画

(1) 総プロジェクトコスト

本プロジェクトにかかる総コストは、カウナスに480,000 L/D生産規模のエタノール製造プラントを新規に建設するのに必要な費用の総額である。プラントの建設費等、投資に係る費用は次のとおり推定される。

プラント規模	480,000 L/D
投資費用	163,300,000 EUR
準備費用	6,000,000 EUR
プラント費用	146,300,000 EUR
土地取得費	2,320,000 EUR
土木工事費	12,000,000 EUR
建設 スタートアップ	14,000,000 EUR
装置･機器費	108,000,000 EUR
ファイナンス	10,000,000 EUR
運転資本（運転員トレーニング、保険等）	8,000,000 EUR
予備費用	3,000,000 EUR
減価償却費 （借入金利:6.5%、その他経費:0.5%、償却期間:10年）	
年間運転費用	55,572,000 EUR
エネルギー費 （電気･スチーム自家供給）	2,730,000 EYR
原料費	40,392,000 EUR
給与（60人）	5,400,000 EUR
メンテナンス	650,000 EUR
酵素、酵母、化学薬品等	3,100,000 EUR
保険	700,000 EUR
管理･サービス費（外注）	1,500,000 EUR

その他（ライセンス料等）　　1,100,000 EUR

資金は、Seabury社等による事業主体への投資、関係各社の出資、及び金融機関からの融資によるものとする。

資金調達の計画内容

調達方法	金額
投資	40,825,000 EUR
融資	81,650,000 EUR
出資	8,165,000 EUR
助成金（EU）	32,660,000 EUR

融資条件

現時点では融資条件を詰めていない。

融資形態：欧州銀行による協調融資を検討

融資銀行： ドイツ銀行、現地銀行(Vilniaus Bankas)等が候補

借入人： Kauno Nova

通貨： ユーロ、リタス、

返済期間： 10年

金利：

５ プロジェクトの効果と評価

5.1 温室効果ガスの排出削減

5.1.1 削減の根拠

バイオマス由来の無水エタノールは再生可能エネルギーであり、その燃焼によって発生する二酸化炭素は生育中のバイオマスによって全量が吸収されるという所謂カーボンニュートラルの推定が適用される。これによって、下記のようにプロジェクトシナリオではベースライン方法論に基づく BAU シナリオの場合に比べて GHG 排出量が低減し、プロジェクト活動は追加的である。

5.1.2 プロジェクト境界

(1) プロジェクトバウンダリー及びリーケージの説明

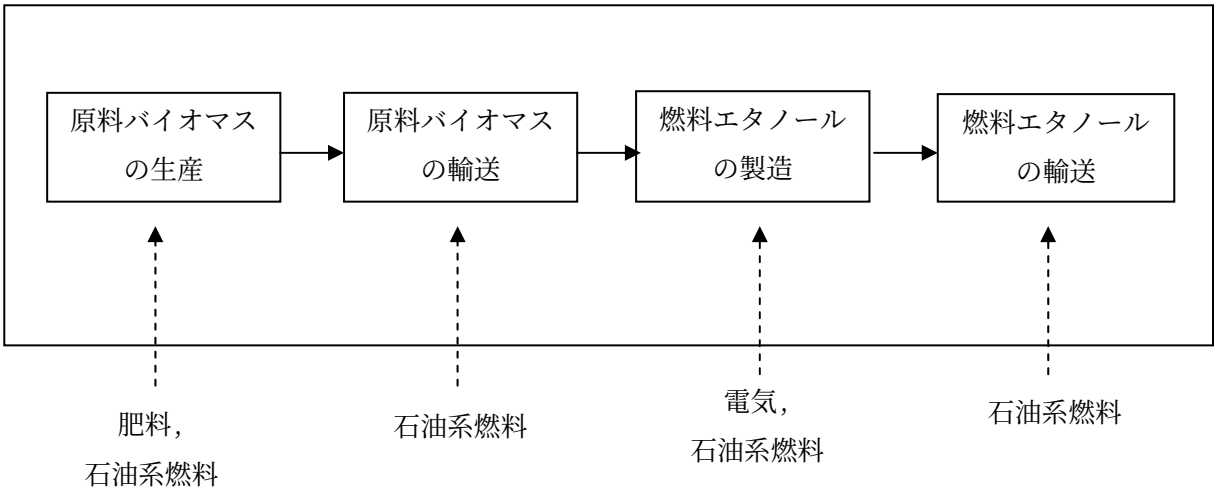
このプロジェクトでは原料バイオマスのプラントへの輸送段階からエタノールの販売までの全プロセスが検討対象であり、プロジェクト境界である。

原料の小麦は、既存の加工場や貯蔵所からディーゼルトラックによりバイオマスエタノール製造設備に供給される。また製造されたエタノールは、国内市場向けには既存のガソリン流通システム中継点となっている油槽所へタンクローリーで移送・搬送される。他のEU諸国向けには、港まで陸上輸送した後、ケミカルタンカーで最寄りの港まで輸送し、タンクローリーで目的地である油槽所あるいは精油所へ輸送される。それ以降は既存のガソリン流通システムによって、流通されることになる。

このプロジェクトの有無によって排出量が異なる主な温室効果ガスは、二酸化炭素のみと考える。

本プロジェクトの実施に伴うリーケージは、小麦等の穀類を燃料用エタノールの原料として使用することにより必要食用分を確保するために増産が行われ、それによって GHG 発生量が増大することが挙げられる。

＜プロジェクトバウンダリー＞



5.1.3 ベースライン

(1) ベースラインの設定

ベースライン方法論で規定した方法に従ってベースラインシナリオを設定した。

ベースラインシナリオの推定には Modalities and Procedures for CDM の paragraph 48 における（b）、すなわち、投資の障害を考慮した上で、経済的に最も魅力的な技術による排出量のアプローチを適用した。

ベースライン設定に当って次のとおり仮定した。

① リトアニアではＥＵ指令に基づきバイオ燃料が導入される。
② 乗用車の燃料としてバイオエタノール混合ガソリンが導入されるが、その混合率はＥＵ指令が定めるとおりに設定される。
③ リトアニアの今後のガソリン消費量は年率 5%で増加し続ける。
④ ＥＵ主要国においても燃料用エタノールの生産キャパシティーは需要規模を大きく下回る。

その上で考えられる複数のシナリオを挙げ、最も可能性の高いと考えられるシナリオとして次を選定した。すなわち、「リトアニアが EU 指令に基づいてエタノール混合ガソリンの市場導入を実施することに対応してリトアニア国内でガソリン混合燃料用エタノールの需要は増加するが、経済合理性の観点から燃料用エタノール製造工場の新設は起こらず、既存のエタノール製造設備に脱水装置を増設することにより飲料用エタノールの製造から燃料用エタノールに転換する程度にとどまる。これらは元々生産規模が小さいため全体としての燃料用エタノール生産量はほとんど増加しない。この結果、生産量は需要量を大きく下回る。他のＥＵ諸国についても同様の状況である。」

一方、プロジェクトシナリオでは燃料用エタノール製造設備が新設され、その稼動によってリトアニアがエタノール混合ガソリンを市場導入した場合に必要となる無水エタノールが全て供給されることになる。このシナリオでは BAU シナリオの場合と比べて設備投資費用が格段に大きく、そのためプロジェクト IRR はより低くなるので、プロジェクト活動は経済的に魅力的な選択肢とは言えない。

仮定により、このプロジェクトの実施により製造される無水バイオエタノールはすべて自動車用燃料として使用されるので、エタノールで代替されるガソリン量に対応するＧＨＧ発生量とプロジェクトの実施に伴って発生するＧＨＧ量との差分が削減量となり、これによって追加性が証明される。

(2) ベースラインシナリオにおける排出量

ベースラインシナリオにおける排出量 BE（単位:[ton-CO2 /yr]）は以下のように表される：

$$BE = (Q_{EtOH} - Q_{non\text{-}transp}) \times H_{EtOH} \times C_{ef\ gasoline} \times C_{ef\ fossil\ fuel}$$

ここで、

Q_{EtOH}：無水バイオエタノールの年間製造･販売量［ton-ethanol/yr］、

$Q_{non\text{-}transp}$：販売された無水バイオエタノールのうち、運輸以外の用途に使われた量［ton-ethanol/yr］、

H_{EtOH}：エタノールの単位容量あたりの発熱量［TJ/ton-ethanol］、

$C_{ef\ fossil\ fuel}$：ライフサイクルにおいてエタノールが代替する石油系燃料によるCO_2 排出係数［ton- CO_2 /TJ］

(3)プロジェクトシナリオにおける排出量

前述の通り、このプロジェクトによって製造されるエタノールは全てガソリン代替として消費されることになる。なお、ガソリン以外に石油由来の添加物であるMTBEをエタノールで代替する可能性も考えられるが、ガソリン代替のほうが排出削減量として保守的なので、ここでは「エタノールが代替するガソリン消費量に対応する二酸化炭素排出量」を求めることにする。従って、代替されたガソリン消費量に対応するＧＨＧ排出量からプロジェクトに係る全てのエネルギー消費に対応するＧＨＧ排出量を差し引いた値が、プロジェクトによる温室効果ガス排出削減量となる。具体的には次のような排出要素が考えられる。

-集荷場からの原料の搬入、および、製造されたエタノールの燃料ステーションブレンド拠点までの移送に伴うCO_2 排出量

-エタノール製造における化石燃料の燃焼にともなうCO_2 排出量

-エタノール製造における電力消費に伴い工場外の発電所で排出されるCO_2 排出量、

-ガソリン精製量の削減による製油所でのCO_2 排出削減量、

-エタノール製造工場から輸送用燃料製造所までの輸送に係るCO_2排出量

-原料の栽培で化学肥料を使用することによるN20排出量

-栽培に際して使用する化石燃料に係るCO_2排出量

プロジェクト境界内における排出量(PE)は次のようになる。

$$PE = \sum Q_{ff\ i} \times C_{ef\ fossil\ fuel} + PE_{f\ transp} + PE_{e\ transp} + PE_{f\ nitro} + PE_{f\ field}$$

ここで、

$Q_{ff\ i}$:：バイオエタノール製造工場内での化石燃料 i の消費量 [ton/yr]

$C_{ef\ fossil\ fuel}$: 化石燃料 i の CO_2排出係数 [ton CO_2 / ton Fossil Fuel i]

$PE_{f\ trans}$：栽培地からエタノール製造工場までの輸送に係る CO_2排出量 [t CO_2/yr]

$PE_{e\ trans}$：エタノール製造工場から輸送用燃料製造所までの輸送に係る CO2 排出量 [t CO_2 /yr]

$PE_{f\ nitro}$：原料の栽培で化学肥料を使用することによる N20 排出量 [t $CO_{2\ (e)}$ /yr]

$PE_{f\ field}$：栽培に際して使用する化石燃料に係る CO_2 排出量 [ton CO_2 /yr]

(4)リーケージ

リーケージはプロジェクト境界の外で直接にプロジェクト活動によって発生する計測可能な温暖化ガス排出量の正味の変化と定義されている。プロジェクトにおけるリーケージの要素は、エタノール製造プラントに供給される電力、スチームの製造、原料の栽培地で使用する肥料の製造に係る CO_2 発生量である。

リーケージ L は次のように表わせる。

$$L = P_{e\ prodtn} \times C_{e\ elec} \times C_{cor\ elec} + PE_{p\ fertilizer}$$

ここで、

$P_{e\ prodtn}$ バイオエタノール製造工場における電力消費量 [MWh/yr]

$C_{ef\ elec}$ 消費電力に係る CO_2 排出係数 [ton CO_2 / MWh]

$C_{cor\ elec}$ 送電ロスに係る補正係数 [-]

$PE_{p\ fertilizer}$ 化学肥料の製造において排出される CO_2 量 [ton $CO_{2(e)}$ /yr]

今回のプロジェクトではエタノールプラントの所要電力は自家発電で供給することにしているため、電力に関するリーケージはゼロとなる。また、化学肥料の製造で排出されるＧＨＧについては、プロジェクトの実施によって影響を受けないと考えられるのでゼロとする。

(5)プロジェクト活動による GHG 排出削減量

上記から、このプロジェクトにおける正味の排出削減量は次式で表わされる。

$$RE = BE - PE - L$$

5.1.4 温室効果ガス排出削減量

(1) ベースライン排出量の算出

次式によりベースライン排出量を算出する。

$$BE = (Q_{EtOH} - Q_{non\text{-}transp}) \times H_{EtOH} \times C_{ef\ gasoline} \times C_{ef\ fossil\ fuel}$$

プラントの年間稼働日数を335日とすると、

Q_{EtOH} = 161,000 [kl-ethanol/yr]　　127,200 [ton ethanol/yr]

販売される無水バイオエタノールは変性されているため燃料用以外の用途には使用できない。従って、運輸以外の用途に使われた量はゼロと推定できる。

$Q_{non\text{-}transp}$ = 0 [ton-ethanol/yr]

エタノールの単位容量あたりの発熱量は、

H_{EtOH} = 1.366 × 10exp(-3) [TJ/mol] × 1/46 [mol/kg] ×1,000 [kg/t]

= 29.7×10exp(-3) [TJ/t-ethanol]

ガソリンの排出係数はIPCCガイドラインにより、

$C_{ef\ gasoline}$ = 18.9 × (44/12) [ton-CO_2 /TJ] = 69.3 [ton-CO_2 /TJ]

従って、

BE = (127,200) (0.0297) (69.3)　　261,800 [ton CO_2 /yr]

バイオエタノールをガソリン混合燃料として使用することによる正味の二酸化炭素排出削減量は、ガソリンの燃焼による二酸化炭素の発生量からバイオマスの生育･収穫･運送等に要するエネルギーやエタノール化に要するエネルギーを差し引いたものとなる。

(2)プロジェクト排出量の算出

プロジェクト排出量は前述の通り次式で表わされる。

$PE = \sum Q_{ff\ i} \times C_{ef\ fossil\ fuel} + PE_{f\ transp} + PE_{e\ transp} + PE_{f\ nitro} + PE_{f\ field}$

プロジェクトシナリオにおける CO_2 排出量：

プラントでのエネルギー消費量は 59MW と見積もられる。

バイオエタノール製造工場で必要となるエネルギーは全て天然ガスで賄われる。

$Q_{ff\ natural\ gas}$ = (59MW) (8040h) (3.6 GJ/MWh) / (0.055 GJ/kg) (1000kg/ton)

天然ガスの CO_2 排出係数 $C_{ef\ natural\ gas}$ は、

$C_{ef\ natural\ gas}$ = (15.3 tC/TJ) (44/12) (0.055 TJ/ton)

プラントでのエネルギー消費に伴って排出される CO_2 量は、

$$GHE_{p} = 59MW \times 8{,}040h/yr \times 0.0036TJ/MWh \times 15.3\ tC/TJ \times 44/12$$
$$= 95{,}802\ t\ CO_2/yr$$

栽培地からエタノール製造工場までの輸送に係る CO_2 排出量 [t CO_2/yr]は、トラックの延べ台数を 28,000、一台あたりの走行距離を 60km、燃費を約 3 km/l とすれば、

原料搬入に消費されるディーゼル油の量 = 28,000 台/年×60km/台×0.3 l/km
= 500 kl/年

ディーゼル油の CO_2 排出係数 = 20.2 × 44/12 t CO_2/TJ × 0.041868 TJ/t × 0.83 t/kl
2.57 t CO_2/kl

$$PE_{f\ trans} = (500\ kl/yr)\ (2.57\ t\ CO_2/kl) = 1{,}285\ ton\ CO_2/yr$$

エタノール製造工場から輸送用燃料製造所までの輸送に係る CO_2 排出量 [t CO_2/yr]は、トラック輸送につき、トラックの延べ台数を 6,800、一台あたりの走行距離を 50km、燃費を約 2 km/l とすれば、

製品エタノールのトラック輸送に消費されるディーゼル油の量
= 6,800 台/年×50km/台×0.5 l/km = 170 kl/年

$$PE_{e\ trans} = (170\ kl/yr)\ (2.57\ ton\ CO_2/kl) = 437\ [ton\ CO_2/yr]$$

栽培に際して耕耘機等で消費される化石燃料に係る CO_2 排出量 $PE_{f\ field}$ は無視しうるとする。

原料の栽培で化学肥料を使用することによる N_2O 排出量 [t N_2O /yr]は、IPCC ガイドラインにより求めることができる。

$$PE_{f\ nitro} = N_2O_{direct} + N_2O_{animals} + N_2O_{indirect}$$

無機窒素肥料からの N20 間接排出量は次式で求めることができる。

$$N_2O_{sn} = 44/28 \times N_{fert} \times (1- Frac\ gasf) \times EF1$$

ここで、

N_2O_{sn} :化学窒素肥料の施肥による N_2O 排出量 [kg N20 / yr]

N_{fert}: 窒素肥料使用量 [kg N / yr]

$Frac_{grasf}$: NOｘ及び NH3 として排出された割合

= 0.1 [kg NH_3-N + NOx-N / kg N synthetic fertilizer applied]

EF1 : 直接土壌排出係数 = 0.0125 [kg N_2O-N / kg N]

Kaunas 地域の窒素肥料使用量 : 150kg/ha/yr

窒素肥料が全量尿素肥料であるとすると、

N_{fert} = (150) (28/60) = 70 [kg N / yr]

買付予定穀類の栽培面積：14,600ha であるから、

N_2O_{sn} = (44/12) (70) (14,600ha) (0.9) (0.0125)

= 42,157 [kg N_2O / yr]

作物残渣の鋤きこみに起因する N_2O 排出の CO_2 換算量は IPCC ガイドラインより次式で求めることができる。

N_2O_{cr} = 44/28×2×(Crop o×Frac ncro×Crop bf×Frac ncrbf)×(1-Frac r)×(1- Frac b) ×EF1

ここで、

N_2O_{cr}：作物残渣からの N_2O 排出量 [kg N20/yr]

$Crop_o$：非窒素固定作物の生産量 [kg dry mass / yr]

$Frac_{ncro}$：非窒素固定作物中の窒素量 [= 0.015 kg N /kg dry mass]

$Crop_{bf}$：豆類の生産量 [kg dry mass / yr]

$Frac_{ncrbf}$ ：窒素固定作物中の窒素量 [= 0.03 kg N / kg dry mass]

$Frac_r$：収穫･除去される作物の割合 [= 0.9 kg N / kg crop-N]

（残渣のほとんどは動物用の敷き藁として利用されており、農地に鋤きこまれる残渣は全体の 10%程度と推測される。）

$Frac_b$：畑で焼却される作物残渣の割合

非窒素固定作物の乾燥重量換算係数を 0.45、窒素固定作物の乾燥重量を 0.8 とすると、

$Crop_{bf}$ = 48,500,000 kg/yr

$Crop_o$ = 5,758,500,000 kg/yr

$Frac_b$ = 0

リトアニア全体の穀物作付面積に対する対象地域の作付面積は約 18.5%であるから、

N_2O_{cr} = 44/28×2×(5,758,500,000×0.45×0.015 + 48,500,000×0.8×0.03) ×0.185
×(1-0.9)×0.0125
= 29,096 [kg N_2O/yr]

N_2O_{bn} = 44/28×2×Crop bf ×0.185×Frac ncrbf ×EF1
= (44/28) (2) (48,500,000) (0.185) (0.03) (0.0125)
= 10,574 [kg N_2O/yr]

N_2O の直接排出量は次式で求められる。

N_2O_{direct} = [N_2O_{sn} + N_2O_{aw} + N_2O_{cr} + N_2O_{bn}] + N_2O_{os}

N_2O_{aw}: 家畜排泄物の施肥による N20 排出量
N_2O_{os} : 有機肥料の施肥による N20 排出量

対象地域の状況から、ここでは N_2O_{aw}、N_2O_{os} とも無視すると、

N_2O_{direct} = N_2O_{sn} + N_2O_{cr} + N_2O_{bn}
= 42,157 + 29,096 + 10,574
= 81,827 [kg N_2O/yr]

次に $N_2O_{indirect}$ を推定する。

$N_2O_{indirect}$ = N_2O (g) + N_2O (l)
ここで、
N_2O (g) =44/28×(N $_{fert}$×Frac $_{gasf}$ + N $_{ex}$×Frac $_{gasm}$)×EF4

= (44/28) {(150kg/ha/yr) (14,600ha) (0.1) +0} (0.01)
= 3,441 [kg N_2O / yr]
N_2O (l) = 44/28×(N f_{ert} + N $_{ex}$)×Frac $_{leach}$ × EF5
= (44/28) (150) (14,600) (0.3) (0.025)
= 25,810 [kg N_2O / yr]

N_2O $i_{ndirect}$ 29,250 [kg N_2O / yr]

PE $_{f\ nitro}$ = N_2O_{direct} + $N_2O_{animals}$ + $N_2O_{indirect}$

$N_2O_{animals}$ はリトアニアの実状から無視できるとして、

$$PE_{f\ fertilizer} = (81.827 + 29.250)\ (310)$$
$$= 34,434\ [tonCO_2/yr]$$

故に、

$$PE = 95,802 + 1,285 + 437 + 34,434 \quad 131,960\ [ton\ CO_2/yr]$$

従って、プロジェクト排出削減量は次のようになる。

$$RE = 261,800 - 131,960 = 129,840\ [ton\ CO_2/yr]$$

5.1.5 モニタリング

モニタリングの項目と方法は次のように考えられる。

Q：無水バイオエタノールの年間製造･販売量［ton-ethanol/yr］
販売時のエタノール重量の計測･記録。

$Q_{ff\ p}$：バイオエタノール製造工場内での石油系燃料使用量 [ton/yr]

$PE_{f\ trans}$ ：栽培地からエタノール製造工場までの輸送に係る CO_2 排出量

$PE_{e\ trans}$ ：エタノール製造工場から輸送用燃料製造所までの輸送に係る CO_2 排出量

$PE_{fertilizer}$ ：原料の栽培で化学肥料を使用することによる N2O 排出量

$PE_{f\ field}$ ：栽培に際して使用する石油系燃料に係る CO_2 排出量

具体的な計測方法は次の通りである。

○バイオエタノール工場で受け入れる原料、副原料等の使用量の帳簿あるいはコンピュータによる記録、保管･管理

○無水バイオエタノールの生産量の帳簿あるいはコンピュータによる記録、保管･管理

○生産した無水バイオエタノールの販売量の記録、保管･管理（無水バイオエタノールは飲料にできないように変性して販売するので、自動車燃料用以外の用途には使用されない。）

○バイオエタノール工場での運転開始、運転停止時及び異常停止等の場合に使用された化石燃料の量の記録、保管･管理

○社会および環境への影響については、リトアニアでのガイドラインに示された評価項目に則る。

5.2 費用対効果

5.2.1 収益性の計算

下記の条件でプロジェクト IRR を算出する。

(1) ケース１(ベースケース)

条件：プラント規模	480,000 L/D
投資費用	163,300,000 EUR
借入金	81,659,000 EUR
（借入金利:6.5%、その他経費:0.5%、返済期間:10年）	
法人税等税率	15%
減価償却率	0.25 / yr（残存価値なしの10年定率法）
年間運転費用	55,572,000 EUR
エタノール販売価格	0.40 EUR /L
政府補助金	0.05 EUR /L
プロジェクト期間	25年
クレジット期間	14年（獲得した翌年に全て売却）
炭素クレジット価格	7 EUR / ton CO_2

採算計算の結果、10年目におけるPIRRは 7.1%であった。

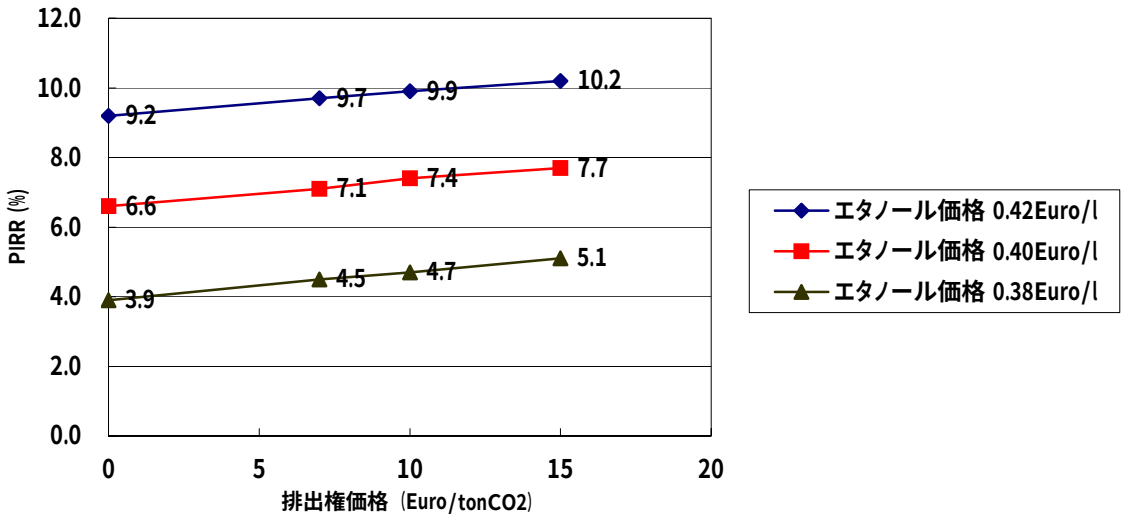
（２）感度分析

さらに次のように条件を設定して、それぞれ操業開始から10年後のPIRRを算出した。

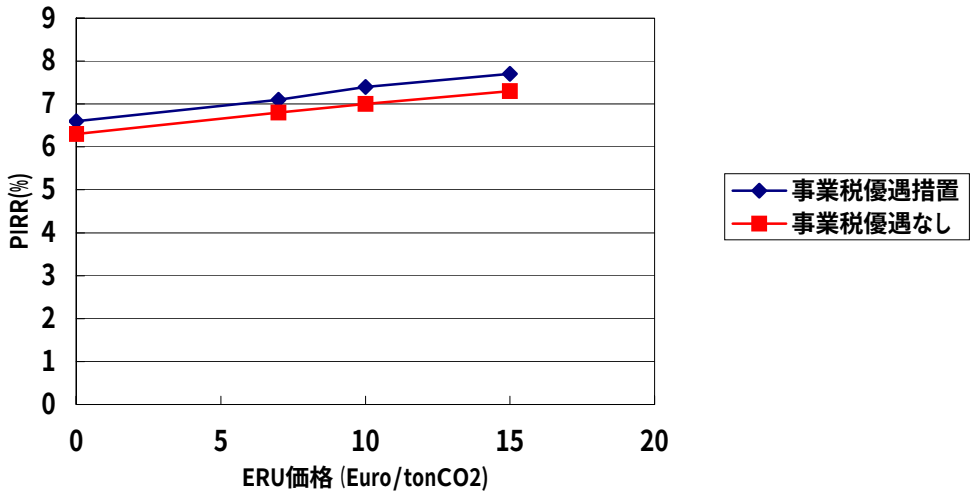
排出権価格（Euro/tonCO2）	0	7	10	15

エタノール販売価格（Euro/l）	0.38	0.40	0.42

その結果は次図の通りで､エタノール販売価格の影響に比べてERU価格の影響が極めて小さいことが分る。



エタノール販売価格0.40Euro/lのケースで操業開始年から５年間事業税を免除するケースを課税のケースと比較すると下図のようになる。



5.3 JIプロジェクトとしての実現可能性･持続可能性

再生可能エネルギーの利用の一環として、バイオエタノールの自動車用燃料への混合がＥＵ各国で重要な政策となっているので、安定した需要が見込まれるが、今回実施した採算計算の結果では製造コストが既存燃料の市場価格を大きく上回った。設定したエタノール販売価格では、例え温室効果ガスクレジットの収益への寄与があっても事業採算が合わないとの結果である。エタノール製造プラントを新設しても採算に乗るようになるかどうかは、エタノールの販売価格および政府による補助金、税額控除といった事業者助成措置によるところが大きい。

5.4 プロジェクトの影響

5.4.1 環境影響

バイオエタノール製造プロセスは化学プロセスに比べて環境調和的であり、環境影響の危険は少ない。しかし、リトアニアの環境影響評価に関する法律(Law of Environmental Impact Assessmentof the Proposed Economic Activity)で事業者に環境影響評価の実施が義務つけられているため、これを履行する必要がある。この中に実施対象となるプロジェクトのカテゴリーが示されており、これによれば本プロジェクトは実施が義務づけられることになる。実施のためのマニュアルが用意されており、実際の環境影響評価はこのマニュアルに沿って実施することになる。

評価対象は、気候、水資源、水質、水量、土壌、地形等への物理的影響のほか、労働市場、雇用、人口、共同体への影響等、社会･経済的影響も含まれている。

なお、原料とする作物は現状生産規模よりも増産が必要となる可能性があるが、現在もカウナス市近郊には遊休農地が多く存在しており、これらを畑に再利用する場合でも環境への悪影響はないものと推定される。

5.4.2 経済的影響

この事業によるバイオエタノール製造設備の新設は結果的に小麦等穀類の増産を促進することになるので、これによってリトアニアの農業振興および雇用機会の増大といった効果がもたらされ、社会の安定に寄与することが期待できる。

5.4.3 その他の間接影響

自動車燃料用エタノールの需要は今後も世界的に増加が見込まれるが、農業基盤のあるリトアニアでは比較的製造原価が低いため、今後バイオエタノールの製造･供給力の増強が予測される。また､同様の事情がＥＵに新規加盟した他の 10 カ国､ロシア及びその他の東欧諸国に当てはまり､将来的にはこれらの諸国にも同様の技術及びプロジェクトが普及していく可能性が大きいと考えられる。

5.5 利害関係者のコメント

現地の農業関係者、カウナス市長、市職員にこのプロジェクトを実施することに関して意見を求めたが、批判的な意見は聞かれなかった。これは次のような理由によると考えられる。

① 農業関係者はこのプロジェクトの実現によって小麦の販売量の増加および長期に亘って安定的な収入増が見込める。

② 市関係者はエタノール製造工場の誘致によって市の収入増となり、かつ直接間接に雇用状況の改善が見込める。

③ 従来の発酵エタノール製造プロセスからは有害物質の発生の可能性がないこと、また工場の設置にあたっては事前に環境影響アセスメントを行うことになっているので、現地関係者は環境問題の発生を懸念していない。

なお、プラント設置予定地周辺の一般住民のコメントも得る必要があるが、今回の調査期間にはヒアリングを実施できなかった。

5.6 具体的事業化の見込みと課題

5.6.1 資金

前述の通り、この事業では比較的大規模な設備投資が必要であるため、投資あるいは融資の獲得が第1の課題である。特に大口投資家の賛同が必須の要件である。しかし、事業採算性はエタノール製造者に対する補助金や税額控除といった優遇措置の内容に大きく左右されるので、投資家の判断もこれら要素の行方を見定めてからとならざるを得ない。

5.6.2 製品の販売

(1) エタノール引取の確度

ホスト国内では現在のところバイオ燃料としてのエタノールの品質、ガソリン等との混合、混合燃料の品質、輸送、保管、供給等に係る具体的な法整備ができていない状況であるが、既にStumbras社においては自動車燃料用の無水アルコールが製造され、EUに輸出されている。またEU市場の需要に対する主な潜在的供給基地として好条件を備える新規EU加盟諸国においても同社と同様の動きが出てくることは十分考えられる。このような状況において、新たにエタノール製造設備を建設して事業を行うには、製品販売に関するリスクを回避する必要があり、事業の実施に当っては取引相手との間で製品引取について長期契約を締結することが必要となる。

(2) エタノール販売価格

現状では国内市場が確立していないのでエタノールの国内販売価格は明らかではない。リトアニア政府はバイオ燃料全般について導入促進の政策実施を表明しているが、具体的な事柄はまだほとんど何も決定していない状況である。近々これらに関して細部まで定めた法律が成立する見込みである。

リトアニアがEU指令に従うとすれば、エタノール混合ガソリン（ガソホール）によるガソリン代替はある程度義務化されるものと思われるが、そのためにはガソホールの消費者価格は政策的にガソリン価格と同程度とされるものと予想できる。

エタノールの販売価格についても製品引取りと同様に、取引相手との間で長期契約を結ぶことが望ましい。

5.6.3 事業者に対するインセンティブ

調査の時点で燃料用エタノール製造事業者に対する優遇措置は未定であるが、製造者に対する優遇措置の内容およびその存続期間がどのように決められるかが事業採算性の上で非常に重要である。

６ 結び

本調査は、リトアニア国カウナス市に新たに建設するエタノール製造工場において、カウナス郡を中心として生産の多い小麦等の穀類を原料としてガソリン添加用の無水エタノールを生産し、国内および EU の市場向けに販売するプロジェクトにつき、京都メカニズムの JI 事業としての可能性について調査したものである。

本文に述べたように、リトアニアは昨年 EU に新規加盟を果たし、今後は EU の指令に沿った政策を実現していくことが求められており、現在、エネルギー分野を中心としてその取り組みが進行中である。エネルギー資源に乏しい同国の政策として再生可能燃料による化石燃料の一部代替が位置付けられており、無水バイオエタノールの導入も注目されている施策の一つである。

リトアニアには京都議定書で第一約束期間における GHG 排出削減量として 1990 年比 8%減が課せられているが、リトアニア経済は 1990 年から今日まで概ねマイナス成長ないし低成長を続けてきており、期限までに削減割当を達成してなお削減余地が大きい。そのため JI プロジェクト実現の可能性が大きいと言えるが、京都議定書に関するリトアニア国の取り組みはまだ始まったばかりの段階と言ってよく、JI プロジェクトの認定基準も明確ではない状況である。

今回の調査ではプロジェクトについてＬＣＡの考え方で温暖化ガス排出削減量の推定を行い、排出量が削減できるとの結果を得た。しかし、製造設備の新築に加えて、候補サイトには多額のインフラ整備費用を必要とするなど所期投資額が多額であるため、GHG 排出削減クレジットは所期投資額の 1%未満に過ぎず、費用対効果の面では不満足な結果となった。

プロジェクト実現のためには投資額の大幅な削減が必要である。リトアニアは小国であるため、ガソリン消費量が比較的少なく、ガソリンへのエタノール混合が制度化されたとしても、燃料用バイオエタノール製造設備を新設する場合は国内需要のみで事業採算を取るのは困難である。事業採算性の面からは、EU 市場等への輸出が大前提であり、その上で、インフラ整備費用を大幅削減できる建設場所の選定等によって初期投資額を大幅に削減することが必要となる。

参考資料リスト

1) 平成 12 年度実施の環境省委託事業「ヴェトナムにおける砂糖キビからのエタノール含有ガソリンの製造に関する調査」
2) 平成 14 年度（財）地球環境センター委託温暖化対策クリーン開発メカニズム事業調査「インドにおける廃糖蜜等からのエタノール燃料の製造に関する事業調査」
3) “LITHUNIA　Report on the in-depth review of the first national communication of Lithuania” FCCC/IDR.1/LTU　10 May 2000
4) “Lithuania’s second national communication under the Framework Convention on Climate Change”
5) “Lithuania’s National Allocation Plan for Greenhouse Gas Emission Allowances for the Period 2005 to 2007”
6) ＦＡＯ　ウェブサイト
7) 「各国･地域情勢」外務省　ウェブサイト
8) 「国別概況･リトアニア」JETRO
9) 在日リトアニア共和国大使館　ウェブサイト
10) 「輸送段階を含めた石油製品のライフサイクルインベントリーの作成に関する調査報告書」石油産業活性化センター（1998 年）
11) “Agriculture of Lithuania 2004”, Ministry of Agriculture of the Republic of Lithuania
12) “ National Report on Sustainable Development”, The Republic of Lithuania (2002)
13) （社）全日本トラック協会　ウェブサイト
14) “World Distilleries Guide 2004/5”, F.O.Licht
15) “Biofuels EU policy and implementation in some EU member states and in Lithuania”, Danish Energy Management A/S
16) “Assessment of greenhouse gas emissions in the production and use of fuel ethanol in Brazil”, Isaias de Carvalho Macedo, Manoel Regis Lima Verde Leal, João Eduardo Ramos da Silva, Government of the State of São Paulo, 2004
17) Macedo, I. D. (1998). Greenhouse gas emissions and energy balances in bio-ethanol production and utilisation in Brazil. *Biomass and bioenergy*, 14, 1, 77-81.
18) “Directive2003/30/EC of the European Parliament and of the Council of 8 May 2003”
19) Republic Lithuania Law on Biofuel, Biofuels for Transport and Bio-oils (2004)
20) Republic of Lithuania Law on Energy
21) Republic of Lithuania Law on Environmental Impact Assessment
22) “Manual for Environmental Impact Assessment in Lithuania”, Ministry of Environment of Republic of Lithuania

添付資料

1. 勤労者の平均所得
2. 改正バイオ燃料法
3. エネルギー法
4. 環境影響評価に関する法
5. PDD 案（英文）
6. PDD ベースライン方法論
7. PDD モニタリング方法論
8. PDD 案概要（和文）

勤労者の平均所得（職種別）

Average monthly gross wages and salaries by major occupation group, economic activity and gender in the whole economy in October, 2000, (in Litas)

Economic activity Major groups of occupations	Average monthly gross wages and salaries		
	total	males	females
TOTAL	1128.6	1259.2	1005.4
1 Legislators and senior officials	2115.7	2303.6	1801.5
2 Professionals	1378.0	1612.5	1281.9
3 Technicians and associate professionals	1071.8	1482.4	902.2
4 Clerks	972.5	1136.4	930.7
5 Service workers and shop and market sales workers	794.3	1029.0	636.3
6 Market-oriented skilled agricultural and fishery workers	627.8	660.5	576.1
7 Craft and building trades workers	1000.9	1072.5	805.5
8 Plant and machine operators and assemblers	988.6	995.6	957.2
9 Elementary occupations	633.21	704.6	576.5
A AGRICULTURE, HUNTING AND FORESTRY	730.6	757.4	661.2
1 Legislators and senior officials	1229.4	1291.5	1020.2
2 Professionals	954.9	1073.8	858.0
3 Technicians and associate professionals	1026.3	1097.5	881.0
4 Clerks	716.5	741.6	703.8
5 Service workers and shop and market sales workers	630.7	/	579.7
6 Market-oriented skilled agricultural and fishery workers	619.7	661.1	548.4
7 Craft and building trades workers	727.8	724.0	754.3
8 Plant and machine operators and assemblers	711.4	711.8	684.0
9 Elementary occupations	531.4	536.0	520.9
B FISHING	632.9	618.6	701.7
1 Legislators and senior officials	1044.8	1052.2	1018.9
2 Professionals	668.3	707.8	645.2

3 Technicians and associate professionals	678.1	684.7	/
4 Clerks	563.6	/	597.8
5 Service workers and shop and market sales workers	515.8	550.8	460.0
6 Market-oriented skilled agricultural and fishery workers	548.3	519.4	888.9
7 Craft and building trades workers	576.0	591.5	/
8 Plant and machine operators and assemblers	634.8	634.8	–
9 Elementary occupations	459.2	457.2	492.6
C MINING AND QUARRYING	1451.0	1489.5	1287.4
1 Legislators and senior officials	3519.6	3664.8	2801.7
2 Professionals	2075.7	2605.8	1652.8
3 Technicians and associate professionals	1776.1	2000.6	1441.9
4 Clerks	1111.9	923.2	1156.2
5 Service workers and shop and market sales workers	/	–	/
6 Market-oriented skilled agricultural and fishery workers	–	–	–
7 Craft and building trades workers	1130.9	1153.8	880.8
8 Plant and machine operators and assemblers	1290.9	1293.6	1226.3
9 Elementary occupations	812.3	847.6	714.2
D MANUFACTURING	1137.4	1279.5	983.7
1 Legislators and senior officials	2314.7	2564.0	1882.7
2 Professionals	1498.6	1734.2	1349.9
3 Technicians and associate professionals	1249.4	1441.5	1120.9
4 Clerks	1011.7	1024.2	1007.8
5 Service workers and shop and market sales workers	754.9	891.9	706.6
6 Market-oriented skilled agricultural and fishery workers	618.1	549.0	656.8
7 Craft and building trades workers	949.4	1077.3	804.0
8 Plant and machine operators and assemblers	1092.0	1170.0	963.6
9 Elementary occupations	790.4	816.7	763.5
E ELECTRICITY, GAS AND WATER SUPPLY	(1393.3)	(1450.5)	(1209.2)

1 Legislators and senior officials	(2345.9)	(2380.7)	2137.7
2 Professionals	(1702.2)	(1831.5)	1539.1
3 Technicians and associate professionals	/	/	(1204.9)
4 Clerks	/	/	1046.0
5 Service workers and shop and market sales workers	(1040.1)	912.6	/
6 Market-oriented skilled agricultural and fishery workers	/	/	/
7 Craft and building trades workers	(1312.1)	(1321.5)	/
8 Plant and machine operators and assemblers	(1209.7)	(1224.7)	(1119.4)
9 Elementary occupations	/	/	697.8
F CONSTRUCTION	1140.4	1168.0	955.7
1 Legislators and senior officials	(1917.7)	(1965.4)	(1620.4)
2 Professionals	1226.4	1338.7	1107.8
3 Technicians and associate professionals	(1421.6)	(1554.5)	(1087.3)
4 Clerks	926.3	1105.4	867.2
5 Service workers and shop and market sales workers	754.4	872.5	/
6 Market-oriented skilled agricultural and fishery workers	/	/	/
7 Craft and building trades workers	(1106.7)	(1119.1)	816.0
8 Plant and machine operators and assemblers	972.0	972.9	740.8
9 Elementary occupations	707.5	757.7	532.7
G WHOLESALE AND RETAIL TRADE; REPAIR OF MOTOR VEHICLES, MOTORCYCLES AND PERSONAL AND HOUSEHOLD GOODS	993.1	1132.7	853.5
1 Legislators and senior officials	1664.6	1822.4	(1399.9)
2 Professionals	1223.8	1354.5	1128.7
3 Technicians and associate professionals	1273.7	(1325.6)	1202.5
4 Clerks	1004.5	1130.7	918.2
5 Service workers and shop and market sales workers	659.7	793.9	605.1
6 Market-oriented skilled agricultural and fishery workers	/	/	/
7 Craft and building trades workers	792.9	835.4	594.0
8 Plant and machine operators and assemblers	849.2	846.7	/

9 Elementary occupations	616.5	666.4	538.7
H HOTELS AND RESTAURANTS	752.0	811.1	722.1
1 Legislators and senior officials	1233.1	1157.0	(1312.8)
2 Professionals	1025.4	(1463.8)	927.1
3 Technicians and associate professionals	(788.0)	/	709.7
4 Clerks	915.7	/	884.6
5 Service workers and shop and market sales workers	613.7	648.5	600.3
6 Market-oriented skilled agricultural and fishery workers	/	–	/
7 Craft and building trades workers	696.7	(716.7)	643.4
8 Plant and machine operators and assemblers	902.8	903.9	/
9 Elementary occupations	615.9	570.7	633.1
I TRANSPORT, STORAGE AND COMMUNICATION	1240.7	1284.7	1151.0
1 Legislators and senior officials	2443.0	2563.8	2165.9
2 Professionals	1790.1	2064.0	1556.4
3 Technicians and associate professionals	1546.5	1734.7	1229.7
4 Clerks	969.1	1198.2	925.3
5 Service workers and shop and market sales workers	1023.5	1061.1	980.7
6 Market-oriented skilled agricultural and fishery workers	/	–	/
7 Craft and building trades workers	1048.7	1048.7	1048.8
8 Plant and machine operators and assemblers	922.1	920.5	940.3
9 Elementary occupations	929.3	1112.6	629.4
J FINANCIAL INTERMEDIATION	2066.4	2703.2	1715.3
1 Legislators and senior officials	3839.3	4599.0	2988.3
2 Professionals	2211.0	2900.5	1920.3
3 Technicians and associate professionals	1542.4	1816.5	1448.1
4 Clerks	1333.1	2011.8	1234.3
5 Service workers and shop and market sales workers	1511.0	1508.5	1641.9
6 Market-oriented skilled agricultural and fishery workers	–	–	–

7 Craft and building trades workers	1834.8	1871.7	1645.8
8 Plant and machine operators and assemblers	1615.3	1615.3	–
9 Elementary occupations	773.7	840.9	753.6
K REAL ESTATE, RENTING AND BUSINESS ACTIVITIES	1205.4	1315.7	1073.9
1 Legislators and senior officials	1952.0	2032.4	1792.2
2 Professionals	1421.9	1664.5	1234.5
3 Technicians and associate professionals	1112.8	(1271.9)	954.3
4 Clerks	973.3	972.8	973.4
5 Service workers and shop and market sales workers	943.6	1000.3	748.4
6 Market-oriented skilled agriculture and fishery workers	631.0	674.1	596.9
7 Craft and building trades workers	915.6	927.5	781.9
8 Plant and machine operators and assemblers	860.8	892.9	519.3
9 Elementary occupations	608.7	612.2	606.2
L PUBLIC ADMINISTRATION AND DEFENCE; COMPULSORY SOCIAL SECURITY	1734.1	1804.2	1639.6
1 Legislators and senior officials	3177.5	3415.7	2784.6
2 Professionals	1977.4	2245.6	1817.8
3 Technicians and associate professionals	1585.7	1661.3	1443.6
4 Clerks	1032.3	1235.7	1009.5
5 Service workers and shop and market sales workers	1214.6	1214.5	1215.7
6 Market-oriented skilled agricultural and fishery workers	–	–	–
7 Craft and building trades workers	891.1	896.6	687.2
8 Plant and machine operators and assemblers	1102.0	1102.0	/
9 Elementary occupations	613.3	626.4	606.1
M EDUCATION	1003.6	1011.2	1001.7
1 Legislators and senior officials	1538.4	1635.5	1487.9
2 Professionals	1235.1	1269.7	1227.8
3 Technicians and associate professionals	864.2	913.9	859.5
4 Clerks	653.2	763.0	646.3

5 Service workers and shop and market sales workers	553.5	775.1	540.0
6 Market-oriented skilled agricultural and fishery workers	898.6	889.4	903.4
7 Craft and building trades workers	623.0	622.0	647.1
8 Plant and machine operators and assemblers	620.4	626.1	/
9 Elementary occupations	500.4	536.1	485.6
N HEALTH AND SOCIAL WORK	838.0	999.5	808.8
1 Legislators and senior officials	1695.1	1865.7	1571.5
2 Professionals	1135.3	1297.4	1093.0
3 Technicians and associate professionals	753.4	799.4	752.3
4 Clerks	722.4	766.9	719.4
5 Service workers and shop and market sales workers	613.5	736.4	602.4
6 Market-oriented skilled agricultural and fishery workers	/	/	/
7 Craft and building trades workers	655.1	666.9	573.4
8 Plant and machine operators and assemblers	710.0	714.7	571.3
9 Elementary occupations	526.4	568.4	516.9
O OTHER COMMUNITY, SOCIAL AND PERSONAL SERVICE ACTIVITIES	983.1	1069.7	903.3
1 Legislators and senior officials	1605.6	1829.4	1364.0
2 Professionals	1073.7	1233.1	1006.9
3 Technicians and associate professionals	1111.4	1253.2	953.9
4 Clerks	871.9	1214.6	823.0
5 Service workers and shop and market sales workers	727.2	823.6	660.3
6 Market-oriented skilled agricultural and fishery workers	841.6	861.4	751.7
7 Craft and building trades workers	888.6	904.1	763.3
8 Plant and machine operators and assemblers	922.2	944.4	779.5
9 Elementary occupations	563.1	607.0	522.9

改正バイオ燃料法

Official translation

REPUBLIC OF LITHUANIA

LAW AMENDING THE LAW ON BIOFUEL

18 July 2000 No. VIII-1875

Vilnius

(New edition by 5 February 2004 No IX-1999)

Article 1. New Version of the Law of the Republic of Lithuania on Biofuel
The Law of the Republic of Lithuania on Biofuel shall be revised and set forth to read as follows:

“REPUBLIC OF LITHUANIA
LAW ON BIOFUEL, BIOFUELS FOR TRANSPORT AND BIO-OILS

Article 1. Purpose of the Law

1. This Law shall regulate legal conditions of the production and use of biofuel, biofuels for transport and bio-oils.

2. The purpose of this Law shall be to ensure the application of the legal act of the European Union specified in the annex to this Law.

Article 2. Objectives of the Law

The objectives of this Law shall be as follows:

1) to promote the production and use of biofuel, biofuels for transport and bio-oils, taking into account the requirements of the legal acts of the European Union and the international commitments of the Republic of Lithuania

2) to reduce the dependence of the national energy sector on fuels produced from mineral resources and imported raw materials;

3) to increase the efficient use of local, renewable and alternative energy resources and the security energy supply;

4) to reduce greenhouse gas emissions levels; and

5) to implement the provisions of the legal act of the European Union, specified in the Annex to the Law.

Article 3. Main Definitions of this Law

1. **“Bio-oils"** means lubricants and oils produced from vegetal or animal substances.

2. **“Biofuels for transport”** means biofuel suitable for use in internal-combustion engines as fuels. At least the products listed below shall be considered biofuels for transport (biofuel):

1) "bioethanol": ethanol (ethyl alcohol) produced from biomass and/or the biodegradable fraction of waste, to be used as biofuel;

2) "biodiesel": a methyl (ethyl)-ester produced from vegetable or animal oil, of diesel quality, to be used as biofuel;

3) "biogas": a fuel gas produced from biomass and/or from the biodegradable fraction of waste, that can be purified to natural gas quality, to be used as biofuel, or woodgas;

4) "biomethanol": methanol produced from biomass, to be used as biofuel;

5) "biodimethylether": dimethylether produced from biomass, to be used as biofuel;

6) "bio-ETBE (ethyl-tertio-butyl-ether)": ETBE produced on the basis of bioethanol. The percentage by volume of bio-ETBE that is calculated as biofuel is 47 %;

7) "bio-MTBE (methyl-tertio-butyl-ether)": a fuel produced on the basis of biomethanol. The percentage by volume of bio-MTBE that is calculated as biofuel is 36 %;

8) "synthetic biofuels for transport (biofuel)": synthetic hydrocarbons or mixtures of synthetic hydrocarbons, which have been produced from biomass;

9) "biohydrogen": hydrogen produced from biomass, and/or from the biodegradable fraction of waste, to be used as biofuel;

10) "pure vegetable oil": oil produced from oil plants through pressing, extraction or comparable procedures, crude or refined but chemically unmodified, when compatible with the type of engines involved and the corresponding emission requirements.

3. **"Biofuel"** means flammable gaseous, liquid and solid products produced from biomass and used to produce energy.

4. "**Biomass"** means products and waste from agriculture (including vegetal and animal substances), forestry and related industries or the biodegradable fraction of such products and waste, as well as the biodegradable fraction of industrial and municipal waste.

5. **"Energy content"** means the lower calorific value of a fuel or fuels for transport.

6. **"Producer"** means a natural or legal person producing biofuel, biofuels for transport or bio-oils.

7. **"User"** means a natural or legal person using biofuel or energy converted from biofuel.

8. "**Pilot project**" means a pilot project, prepared by legal and/or natural persons and approved by a resolution of the Government of the Republic of Lithuania, for the promotion of the production, technological development and use of biofuel or a blend of biofuel and mineral fuels; such project shall meet the conditions laid down in paragraph 1 (a) of Article 15 of Council Directive 2003/96/EC.

Article 4. Promotion of the Production and Use of Biofuel, Biofuels for Transport and Bio-oils

1. Production of biofuel, biofuels for transport and bio-oils from the raw material originating in the Republic of Lithuania shall be promoted through programmes approved by the Government and financed from the state budget.

2. Tax exemption established by law shall apply to producers and users of biofuel, biofuels for transport and bio-oils.

3. Production and processing of agricultural products as the raw material for the production of biofuel, biofuels for transport and bio-oils shall be promoted.

4. Production of biofuel shall be assimilated to the development of new, environmentally friendly technologies by using renewable energy sources. The status of a pilot project may be accorded to such activities by a resolution of the Government.

Article 5. Competence of State Institutions

1. The Government shall:

1) approve measures and programmes designated to promote the production and use of biofuel, biofuels for transport and bio-oils; such measures and programmes shall be financed from the state budget;

2) in the national investment programme provide for support for pilot projects relating to the production of biofuel;

3) set a permitted or compulsory share of biofuel or biofuels for transport blended in fuels produced from oil.

2. The Ministry of the Environment shall:

1) carry out monitoring of the pollution of biofuel, biofuels for transport and bio-oils as compared to that of mineral fuel;

2) set down pollution requirements for the equipment using biofuel or biofules for trapsort;

3) evaluate the potential of products and waste from forestry and related industries, from which biofuel is produced;

4) together with municipalities promote the use of biofuel, biofuels for transport and bio-oils in protected territories;

5) in conjuction with the Ministry of Science and Education support research and educational programmes relating to the production and use of biofuel, biofuels for transport and bio-oils.

3. The Ministry of Economy shall:

1) be responsible for the development of production and use of flammable gaseous products (biogas), waste from forestry and wood wastes, straw, peat, other types of fuel of biological origin (waste from agriculture and plants used to produce energy);

2) lay down rules concerning the trade in biofuel, biofuels for transport and bio-oils;

3) be responsible for the implementation of this Law, the co-ordination of the approved support programmes, and furnish to the Government the summarised information about the state of the use of biofuel, biofuels for transport and bio-oils originating in the Republic of Lithuania.

4. The Ministry of Agriculture shall:

1) be responsible for the development of the production of flammable liquid products received from biomass;

2) taking into account the common agricultural policy and international obligations of the Republic of Lithuania, support the growing of plants from which biofuel, biofuels for transport and bio-oils are produced;

3) evaluate the potential of biomass from which biofuel, biofuels for transport and bio-oils are produced, by developing the co-ordinated use of crop areas;

4) draw up programmes for the support of producers of agricultural production whose production is used to produce biofuel, biofuels for transport and bio-oils originating in the Republic of Lithuania, and submit the said programmes to the Government for approval.

5. Organisers of the measures designated to promote the production and use of biofuel, biofuels for transport and bio-oils shall evaluate economic efficiency of the prepared measures.

Article 6. Competence of Municipalities

1. Municipalities shall prepare and implement measures designated to promote the use of biofuel, biofuels for transport and bio-oils.

2. Municipalities shall promote the use of biofuel, biofuels for transport and bio-oils for public transport and the transport used in national parks, reserves and other protected and environmentally sensitive areas.

Article 7. Informing

1. By co-ordinating their actions and with the participation of municipalities and scientific and educational institutions, the Ministries of the Environment, Transport and Communications, Education and Science, Economy, and Agriculture shall prepare public education and informing measures promoting the use of biofuel, biofuels for transport and bio-oils.

2. The Government or an institution authorised by it shall lay down the procedure for reporting to the European Commission on the use of biofuel.

3. For the fulfilment of the assigned functions, state institutions and agencies shall have the right to obtain from municipalities, agencies and enterprises the necessary information about the production and use of biofuel, biofuels for transport and bio-oils. Enterprises shall furnish information about the production and use of biofuel, biofuels for transport and bio-oils to municipal institutions and agencies for the fulfilment of the functions assigned to them.

Article 8. Quality and Placing on the Market of Biofuel, Biofuels for Transport and Bio-oils

1. Biofuel, biofuels for transport and bio-oils sold in the Republic of Lithuania must comply with the mandatory quality requirements and other set requirements, standards and European norms.

2. For percentages of biofuels for transport, blended in oil derivatives, when the amount of biofuels for transport exceeds the limit value of 5 %, a specific labelling at the sales points shall be imposed. The procedure for labelling shall be established in the rules concerning the trade in oil products, biofuel, biofuels for transport and bio-oils.

3. The Government or an institution authorised by it shall prepare the measures to ensure that by 31 December 2005 the proportion of biofuels for transport shall amount to at least 2 %, calculated on the basis of energy content, of all petrol and diesel for transport purposes placed on the national markets, and by 31 December 2010 – at least 5,75 %.

4. Confiscated alcohol products may be used in the production of biofuels for transport. The Government or institutions authorised by it shall lay down the procedure for the use of confiscated alcohol products in the production of biofuels for transport.

Article 9. Liability

Persons who have violated this Law shall be held liable in accordance with the procedure established by law.

Annex to the Law of the Republic of Lithuania on Biofuel, Biofuels for Transport and Bio-oils

THE LEGAL ACT OF THE EUROPEAN UNION
WHICH IS BEING IMPLEMENTED

Directive 2003/30/EC of the European Parliament and of the Council of 8 May 2003 on the promotion of the use of biofuels or other renewable fuels for transport."

I promulgate this Law passed by the Seimas of the Republic of Lithuania.

PRESIDENT OF THE REPUBLIC ROLANDAS PAKSAS

エネルギー法

Official translation

REPUBLIC OF LITHUANIA

LAW ON ENERGY

16 May 2002 No. IX-884

Vilnius

CHAPTER ONE

GENERAL PROVISIONS

Article 1. Purpose of the Law

1. The Law on Energy regulates general energy activities, the basic principles of energy development and management, energy and energy resources efficiency. Peculiarities of activities of individual energy systems and of relations between energy enterprises and consumers shall be established by other laws.

2. Provisions of other laws regulating energy activities shall be applicable to the extent they are not contrary to this Law.

Article 2. Terms and Definitions

As used in this Law:

1. "**Energy sector**" means a section of the economy embracing the energy sector activities.

2. "**Energy sector activities**" means economic activities embracing prospecting for, extraction, processing, production, storage, transportation, transmission, distribution, supply of, trade in and marketing of energy resources and energy, operation of energy facilities and installations.

3. **"Energy"** means electricity and thermal energy. Energy shall be regarded as a good. For the purposes of this Law, natural gas shall also be treated as energy.

4. "**Energy systems"** means energy areas directly connected with any type of energy resources or energy: electricity, heat, nuclear energy, natural gas, solid fuel, oil, petroleum products, renewable energy resources.

5. "**Energy resources**" means natural resources and products of their processing used for energy production.

6. "**Renewable energy resources**" means natural resources: potential hydro energy, solar energy, wind energy, biomass energy and energy which flows out from the centre to the surface of the earth (geothermal energy). The origin and renewal of this type of energy is conditioned by processes created by nature or human activity; it may be consumed or used for energy production.

7. "**Indigenous energy resources**" means energy resources available in the country, except for imported resources and their products.

8. "**Efficiency**" means the rate of efficient use of energy resources and energy.

9. "**Security of supply**" means reliability and technical safety of energy resources or energy supply.

10. "**Energy enterprise**" means an enterprise engaged in energy activities.

11. "**Operation of energy equipment**" means technological management of energy equipment, its technical maintenance, repairs, measurement, testing, work related to putting it into operation and adjustment.

12. "**Energy facilities**" means power plants and boiler houses; electricity networks and associated equipment; natural gas systems; natural gas storage facilities; liquefied natural gas import, export terminals and storage facilities; main oil pipelines, networks for the transport of energy products; oil refining facilities; oil and oil product terminals and storage facilities; heat supply networks and the associated equipment.

13. "**Energy facilities of national importance**" means power plants and boiler houses with a capacity of 50 MW or more; electricity transmission networks of 110 kV voltage or more and associated equipment; main oil pipelines; natural gas storage facilities with a capacity of 25 000 000 m3 or more; liquefied natural gas import terminals and storage facilities; main oil pipelines; networks for the transport of energy products; oil refineries with the annual crude oil refining capacity amounting to 20 000 tons and over; crude oil, oil product terminals and storage facilities for 10 000 m3 and more; nuclear energy facilities; energy facilities the national importance whereof is recognised by the Government.

14. "**Energy equipment**" means a technical construction (mechanism, machine, apparatus, line, the accessories thereof) designed for the prospecting, extraction, processing/refining, generation/production, storage, transport, transmission, and distribution of energy resources and/or energy.

15. "**Emergency in the energy sector**" means a period of disruption of normal supply of energy resources or energy to energy enterprises and customers, where the supply is disrupted to the extent that energy enterprises prove unable to timely forecast and manage the disruptions by economic methods and the supply of energy resources or energy to energy enterprises and customers has to be regulated by the Government, its authorised institution or a municipal institution.

16. "**Energy transmission"** means transport of energy via transmission networks or main oil pipelines.

17. "**Energy distribution**" means transport of energy via the distribution networks.

18. "**Energy supply**" means energy delivery and/or sale to the customers.

19. "**Public service obligations**" means imposition in the cases prescribed by law, upon the decision of the Government or its authorised institution, of obligations relating to security of energy supply.

20. "**Main oil pipeline, networks for the transport of energy products** " means high-pressure pipelines, connected constructions and installations for transmitting oil to oil terminals and storage facilities or to oil refineries and for transmitting petroleum products to export, import terminals and storage facilities.

21. "**Main gas pipeline**" means high-pressure pipelines, connected constructions and equipment for transmitting natural gas from undertakings to natural gas storage facilities and distribution networks of towns and settlements or to gas-consuming installation up to the natural gas distribution stations inclusive.

22. "**Energy customer**" means a legal or natural person who purchases energy.

23. "**Regulated customer**" means a customer having no right to choose the energy supplier.

24. "**State control of the energy sector**" means control of safety of energy facilities, operation of energy equipment, security and efficiency of supplies.

25. "**Audit of the energy sector**" means inspection and evaluation of the state of energy equipment, technological equipment and processes in terms of energy efficiency as well as the choice of energy resources or energy saving means.

26. "**Technical safety**" means the entirety of requirements prescribed under this Law and other legal acts for energy facilities and equipment ensuring their reliability and safety.

CHAPTER TWO

ENERGY SECTOR ACTIVITIES AND MANAGEMENT

Article 3. Objectives of Regulation of Energy Activities

The principal objectives of regulation of state energy sector activities shall be as follows:

1) security of energy supplies;

2) energy resources and energy efficiency;

3) reduction of adverse effects of energy activities on the environment;

4) promotion of fair competition;

5) promotion of consumption of indigenous and renewable energy resources.

Article 4. Institutions Managing the Energy Sector

1. In the Republic of Lithuania State management of the energy sector shall be carried out according to the procedure established by this Law by:

1) the Government or its authorised institution;

2) the Ministry of Economy;

3) the Ministry of the Environment;

4) municipalities.

2. The main tasks of the State and municipal institutions, managing the energy sector, regulating and controlling the energy sector activities shall be as follows:

1) ensuring optimum structure of the state energy sector;

2) creating preconditions for efficient energy sector activities;

3) ensuring uninterrupted energy supply and stability of the established quality parameters;

4) promoting energy and energy resources efficiency;

5) promoting consumption of indigenous and renewable energy resources;

6) encouraging enterprises to carry out energy audits.

Article 5. Competence of the Government

1. When carrying out State management of the energy sector, the Government shall:

1) formulate and implement State policy in the energy sector;

2) submit the National Energy Strategy to the Seimas for approval;

3) approve the plan and programmes for the implementation of the National Energy Strategy;

4) declare an emergency in the energy sector;

5) have the right to regulate the principles of price setting when the prices are subject to state regulation.

2. When carrying out State management of the energy sector, the Government or its authorised institution shall:

1) establish the procedure for supplying the customers with energy and/or energy resources in case of an emergency in the energy sector;

2) make a decision regarding construction of energy sector facilities crossing the state borders;

3) approve the rules for licensing activities in the energy sector;

4) establish the procedure for licensing trade in unprepacked petroleum products;

5) establish the procedure of supply, export and import of energy and energy resources;

6) draw up the list of activities in the energy sector subject to authorisation as well as rules and terms of issuing the said authorisations;

7) establish the procedure of installation and maintenance of energy accounting and metering devices;

8) in the cases prescribed by law shall have the right to impose public service obligations on enterprises engaged in energy activities;

9) establish the procedure of purchasing the electricity generated from renewable energy resources and at CHP power plants;

10) approve the mandatory standard terms of energy transmission, distribution and supply contracts for the regulated customers and natural persons;

11) approve the rules of protection of energy facilities, electricity supply lines and pipelines ;

12) fulfil other functions established by this and other laws.

Article 6. Competence of the Ministry of Economy

The Ministry of Economy shall:

1) implement the State policy in the energy sector;

2) develop international cooperation in the energy sector;

3) draft and approve legal acts regulating the issues of security of supply, installation, operation, technical safety, efficiency of energy facilities and equipment as well as other technical issues;

4) draft, revise the draft National Energy Strategy (hereinafter referred to as the Strategy) and submit it to the Government;

5) draft the Strategy implementation plan and programmes, coordinate their implementation;

6) approve the rules for the transmission, distribution, supply and consumption of energy and energy resources;

7) establish the procedure for building up, maintenance, accumulation and use of stocks of energy resources;

8) lay down quality requirements for energy consumed in the country;

9) establish the procedure and terms for the connection of energy facilities (networks, equipment, systems) of the customers and producers to the operating facilities of energy enterprises (networks, equipment, systems);

10) in conjunction with the Ministry of the Environment establish the procedure and terms for the planning of construction of energy facilities of national importance;

11) establish the procedure of state control of the energy sector and control of the customers' energy equipment;

12) establish the procedure, volume and terms of furnishing of the information relating to the energy activities to state institutions, agencies and third parties;

13) approve the list of positions and professions of the employees listed in Article 21(1) of this Law, establish the qualification requirements for the said employees, approve the list of the employees engaged in the operation of energy facilities, construction and operation of energy installations who are subject to performance evaluation and establish the procedure for conducting the evaluation;

14) have the right to lay down efficiency requirements for the equipment in Article 20 of this Law and the efficiency control procedure;

15) fulfil other functions established by this Law and other laws or assigned by the Government.

Article 7. Competence of the Ministry of the Environment

The Ministry of the Environment shall:

1) decide issues relating to environmental protection, construction and fulfil functions within its competence;

2) organise and carry out monitoring of environmental effects in increased pollution areas of energy sector activities;

3) in conjunction with the Ministry of Economy lay down quality requirements for the energy resources used and intended to be used in the country and submit recommendations for the use thereof;

4) take part in the drawing up of renewable energy resources programmes.

Article 8. Competence of Municipalities

Within its territory a municipality shall:

1) regulate the supply of customers with heat within the competence laid down by laws;

2) make arrangements for the lighting of the territories used for public needs;

3) grant, according to the nomenclature approved by the Government, licences for retail trade in unprepacked petroleum products;

4) grant, according to the procedure approved by the Ministry of Economy, authorisations for trade in liquefied petroleum gas;

5) upon the declaration of an emergency in the energy sector, implement the plan approved by the Government or its authorised institution for the supply of customers with energy and/or energy resources, ensure the implementation of other decisions of the Government;

6) take part in the preparation of educational public information tools promoting energy and energy resources efficiency.

CHAPTER THREE

DEVELOPMENT OF THE ENERGY SECTOR

Article 9. National Energy Strategy

1. The Strategy shall determine energy development trends for a twenty year period.

2. The Strategy shall be approved by the Seimas upon the recommendation of the Government.

3. The Strategy shall cover all energy systems, it shall be subject to revision at least every 5 years. The Strategy shall be prepared, revised and implemented with State budget and other funds.

4. The Strategy shall provide for:

1) the safety of the national energy sector;

2) forecasts of demand, import and export of energy resources;

3) forecast of energy production demand;

4) improvement of the energy sector structure;

5) structure of energy resources consumption and its forecasts;

6) forecasts and means of reduction of the energy sector's adverse effect upon the environment;

7) development of consumption of renewable and indigenous resources;

8) energy efficiency;

9) necessary investment;

10) evaluation and building up of reserves of energy resources;

11) energy market development;

12) directions of improvement of energy sector management;

13) improvement of pricing;

14) other issues relating to energy sector development.

5. The Government shall approve a five-year strategy implementation plan and programmes of action.

6. The Strategy shall be implemented according to their respective competence by the State and/or municipal institutions, agencies, the Energy Agency and other enterprises.

Article 10. Energy Agency

1. The Energy Agency is a State enterprise. Its founder is the Ministry of Economy.

2. Upon the assignment of the Ministry of Economy, the Energy Agency shall fulfil the following main functions:

1) carry out the measures of the Strategy implementation plan;

2) implement the programme for the improvement of energy efficiency and its action plan;

3) carry out the supervision and monitoring of the implementation of foreign assistance programmes and projects in the energy sector;

4) promote efficiency of energy resources and energy efficiency as well as the use renewable energy resources and provide information relating thereto.

3. The Energy Agency shall also fulfil the functions prescribed by this Law and other laws or assigned by the Ministry of the Economy.

Article 11. Construction of Energy Facilities

1. Energy facilities shall be constructed in accordance with the procedure laid down in the Law on Construction, Law on Territorial Planning, Law on Environmental Protection and other legal acts. Energy facilities of national importance shall be developed according to the provisions of the Strategy. General or special plans for the supply of customers with energy and energy resources shall be drafted on the basis of the Strategy.

2. Energy enterprises shall take part in drafting and developing plans of balanced and efficient supply, distribution, transmission of energy and shall plan the development of energy facilities of national importance. The energy enterprises engaged in energy transmission, distribution shall develop energy transmission, distribution facilities within the territory of their operation.

3. Energy enterprises engaged in the activities the prices whereof are regulated shall co-ordinate prospective investment with the State Prices and Energy Control Commission (hereinafter - the Commission). Where such investment of the energy enterprises is not co-ordinated with the Commission, it may not be recognised as reasonable for revising the State-regulated prices.

4. The energy facilities belonging to energy enterprises but located on the land or in the buildings of other owners may, where possible, be reconstructed or relocated by agreement between the owner of the land or buildings and the energy enterprise. In such case the owner of the land or building shall defray the reconstruction or relocation costs incurred by the energy enterprises. The ownership of the reconstructed or relocated energy facilities shall remain unchanged.

Article 12. Energy Sector Activities

1. Energy enterprises shall carry out their activities in such a manner as to ensure safe, efficient and environment friendly energy production, supply, transmission, distribution up to the connection point of the supplied energy metering equipment to the customer's system, not exceeding the set State-regulated prices. Energy enterprises which supply heat to multi-family apartment houses shall supply heat to the apartments, unless the consumers request otherwise.

2. An energy enterprise shall transmit, distribute, supply energy to the customers in accordance with the rules for the transmission, distribution, supply and consumption of energy. An energy enterprise shall have the right according to the procedure established by legal acts to suspend the supply of customers with energy only in the cases prescribed by law.

3. Within the territory of their operation the energy enterprises shall connect, according to the established procedure, the energy generating and/or consuming equipment of the energy generators, customers to the operating energy transmission or distribution networks. The connection costs shall be covered by the appropriate generators or customers according to the set tariffs. The connection work shall be carried out under a mandatory contract between the energy enterprise and energy generator or customer.

4. The energy enterprises which own or in any other lawful way control energy transmission or distribution networks and systems shall provide transmission or distribution services to a third party under objective, non-discriminatory conditions, taking account of the technical possibilities of the networks and systems.

5. The energy enterprises which own or in any other lawful way control energy facilities operating in the common energy system shall cooperate and operate in the common operating mode as well as fulfil instructions given by the networks or system operator. The operator shall be appointed by granting the licences according to the established procedure.

6. Interrelations among the energy enterprises as well as their relations with the customers of energy resources or energy shall be based on contracts. Contracts for the supply, transmission and distribution of energy shall be public. Energy shall be supplied, transmitted or distributed to the regulated customers and natural persons upon conclusion of a contract in accordance with the mandatory standards.

7. Energy enterprises transmitting, distributing energy shall be entitled to inspect, according to the established procedure, conformity of the customers' energy equipment with technical safety requirements.

8. Following the close of the year, the costs of the licensed activities of energy enterprises operating in the electricity, heat, natural gas systems shall be audited within a four month period and the auditor's report shall be submitted to the Commission.

9. Energy enterprises shall participate in the drafting of the methods of setting regulated prices, methods of calculating connection charges for energy facilities, rules for energy transmission, distribution, other legal acts regulating the installation, operation, safety of energy equipment and other technical issues.

Article 13. Peculiarities of Activities in the Energy Sector, Quality of Energy and Energy Resources

1. The territory of activities of energy transmission, distribution enterprises shall be defined in the licences.

2. The energy or energy resources consumed in the country must meet the set energy and energy resources quality and composition requirements.

Article 14. Transfer of Immovable Property for Use

1. Land for the construction of energy facilities shall be leased or otherwise transferred for use according to the procedure established by laws. For the construction of energy production, transmission and distribution facilities State-owned land shall be sold or leased according to the procedure established by the Government without holding an auction.

2. Private land may be used for the construction of energy facilities by agreement between the energy enterprise and the land owner. Where an agreement is not reached, land may be taken for public needs in accordance with the procedure and under the conditions established by laws.

3. Protection zones shall be established for the purpose of ensuring protection and operation of energy facilities. Construction, planting of greenery and land works shall be restricted in the zones.

Easements benefiting land and other immovable property located in the protection zone shall be established by the energy facilities protection rules, other legal acts. Owners or users of the immovable property located in the protection zone must grant the energy enterprises access to the energy facilities owned or operated by them in order to perform modernisation or maintenance works. Losses inflicted in protection zones by the activities of the energy enterprises shall be covered by the energy enterprise which owns the energy facility in the immovable property located in the protection zone.

CHAPTER FOUR

REGULATION OF THE ENERGY SECTOR

Article 15. Prices

1. Prices in the energy sector shall be contract and state regulated prices. Prices shall be regulated by setting prices for services or energy, establishing their price caps or the procedure of regulation. The tariffs and principles of regulation of state regulated prices shall be laid down in the laws of appropriate energy systems.

2. When setting the state regulated prices, provisions have to be made for obligatory expenses for extraction of energy resources, energy production, purchasing, transmission, distribution and supply as well as for the development of the energy sector and energy efficiency, the use of local and renewable resources, implementation of public service obligations and the set profit rate.

3. State regulated prices must be announced publicly, not later than one month before the of their introduction unless other laws provide otherwise, and shall be applied from the 1st day of the month.

Article 16. Licences and Authorisations

1. Activities in the energy sector shall be subject to licences or authorisations. The types of licences activities shall be set out in the laws on the energy sector and other laws. A list of activities subject to licensing shall be approved by the Government.

2. Activities in the energy sector without a licence or an authorisation where these are required shall be unlawful.

Article 17. The State Control Commission for Prices and Energy

1. The Commission is a state institution financed with the state budget of Lithuania. Its regulations shall be approved, on the recommendation of the Ministry of Economy, by the Government . The Commission shall be a legal person.

2. The Commission shall be composed of five members. Its Chairman and four members shall be appointed by the President of the Republic, on the recommendation of the Prime Minister, for a period of 5 years.

3. Persons of high moral character who are nationals of the Republic of Lithuania, having a university degree or its equivalent, shall be eligible to serve as members of the Commission.

4. The Chairman and members of the Commission shall be dismissed from office:

1) upon expiry of their term of office;

2) upon their resignation;

3) when elected or appointed to another position;

4) when a conviction rendered against them becomes effective;

5) when it transpires that they have committed a grave breach of the requirements for the position held;

6) for violation of official ethics;

7) when for health reasons they are no longer able to hold the position ;

8) upon loss of the nationality of the Republic of Lithuania.

5. The Commission shall perform the following functions:

1) approve the methodology for setting state regulated prices;

2) set state regulated price caps;

3) control the application of state regulated prices and tariffs;

4) approve charges for connection of energy facilities (networks, systems and equipment);

5) have the right to introduce unilaterally state regulated prices where energy enterprises are not in compliance with the requirements for setting of these prices;

6) when setting the state regulated prices shall take account of the return on investment and justification for operating expenditure;

7) approve the purchase price for electricity generated from renewable energy resources;

8) grant, suspend and revoke licences for transmission, distribution, storage and supply of energy, and check the licensed activities of energy enterprises;

9) have the right to submit proposals to the Government, the Ministry of Economy and municipalities in respect of the licensed activities of energy enterprises;

10) have the right to obligate energy enterprises to conclude contracts for transmission, distribution or supply of energy where energy enterprises refuse to a third party to provide services or to supply energy to customers;

11) perform other functions provided for in legal acts.

6. The Commission shall be responsible for the decisions taken. The decisions of the Commission shall be adopted by a roll-call vote. The decisions of the Commission may be appealed following the procedure prescribed by law.

7. At the close of a calendar year, the Commission shall, within four months, draft its annual report, make it public and submit it to the President of the Republic, the Seimas and the Government.

8. The Commission Administration shall be formed for the performance of the functions of the Commission. The functions of the Administration of the Commission and its employees shall be defined in the regulations of the Commission.

9. Unless this Law provides otherwise, the Law on Budgetary Institutions shall apply to the activities of the Commission.

Article 18. State Control of the Energy Sector

1. State control of energy facilities and equipment shall be exercised within the whole territory of the Republic of Lithuania irrespective of their form of ownership.

2. State control of energy shall be exercised, in accordance with the prescribed procedure, by the State Energy Inspectorate under the Ministry of Economy (hereinafter "the State Energy Inspectorate").

3. The State Energy Inspectorate shall be a state institution. Its founder is be the Ministry of Economy. The regulations of the State Energy Inspectorate shall be approved by the Ministry of Economy.

4. The State Energy Inspectorate:

1) shall grant, suspend and revoke, following the established procedure, authorisations for energy activities and control compliance with the terms and conditions of the activities specified in the authorisations;

2) shall check, following the established procedure, technical safety and maintenance of energy facilities and equipment, reliability of production, transmission, distribution and supply of energy and energy resources and their efficiency;.

3) shall carry out inquiries into accidents of energy facilities and equipment and disruptions of their functioning, take part in inquiries into accidents at work, conduct inquiries into domestic accidents related to the use of energy;

4) shall monitor compliance with special requirements during installation and reconstruction of energy equipment as well as their conformity and suitability for use;

5) shall organise performance evaluation of energy specialists and managers referred to in Article 21(2);

6) shall monitor compliance with the prescribed energy quality requirements;

7) shall monitor state and reserve stocks of energy resources;

8) shall have a right to verify the information supplied by energy enterprises to state institutions;

9) shall perform the functions set out in this Law and other legislation.

5. The State Energy Inspectorate shall be responsible for the decisions taken. The decisions of the State Energy Inspectorate may be appealed following the procedure established by law.

6. Monitoring and state supervision of physical safety of nuclear facilities and accounting of nuclear materials shall be carried out by the State Nuclear Safety Inspectorate. The competence of the State Nuclear Safety Inspectorate shall be established by the Law on Nuclear Energy.

7. The State Energy Inspectorate shall not monitor compliance of the employees with the requirements prescribed by legal acts on safety and health.

Article 19. Provision of Information

1. The state institutions and agencies, for the performance of the functions assigned to them, shall have a right to obtain the relevant information from energy enterprises. Energy enterprises shall provide, in accordance with the established procedure, information to state and municipal institutions, agencies, appropriate associations and third parties.

2. The Government or institutions authorised by it shall provide information relating to energy to the European Commission, other countries and international organisations.

3. Energy enterprises owning or otherwise controlling energy facilities of national importance must inform the Ministry of Economy about the beginning of construction or commissioning of these facilities.

4. Energy enterprises shall, within the limits of their competence, provide energy consumers within the territory of their operation, information about efficiency of energy resources and energy, safe and effective use of energy facilities and equipment, about energy facilities and installations under construction or reconstruction, about energy tariffs and the services provided to energy consumers.

Article 20. Efficiency of Energy Resources and Energy

1. The major guidelines for efficiency of energy resources and energy shall be set out in the Strategy, while measures for the implementation of the guidelines shall be defined in the increased energy efficiency and other programmes.

2. The imported, manufactured and sold hot-water boilers with the nominal heating power in the range of 4 to 400 kW, fired with liquid fuel or gas, must conform to the prescribed efficiency requirements.

3. The imported, manufactured and sold heat generators for heating premises and/or water in the new or existing buildings used for non-industrial purposes must conform to the prescribed efficiency requirements.

4. The imported, manufactured and sold domestic appliances which use electricity and other types of energy must have appropriate energy efficiency labelling.

5. Enterprises having boilers and equipment using other energy resources with the nominal heating power of more than 0.4 MW shall check efficiency of energy resources of these equipment in accordance with the established procedure.

Article 21. Qualifications and Performance Evaluation of the Staff

1. The employees engaged in the construction and operation of energy facilities and equipment must have adequate qualifications and training. Their training programmes must include questions relating to efficiency of energy and energy resources.

2. The employees engaged in the construction and operation of energy facilities and equipment must undergo performance evaluation following the procedure specified in Article 6(13) and subparagraph 5 of Article 18(4) of this Law.

Article 22. Reserve Stocks of Energy

Energy enterprises having heat or electricity facilities with the heating power of more than 5MW and producing heat and electricity for sale must maintain reserve energy stocks. Reserve energy stocks shall be built, maintained and renewed with the funds of energy enterprises and other funds. Energy reserve stocks must be at a level corresponding to at least one month's consumption.

Article 23. Energy Accounting

1. The produced, transmitted, distributed, sold, exported and exported or transmitted by transit energy must be accounted.

2. Energy must be accounted by energy measuring instruments registered with the Register of Measuring Instruments of the Republic of Lithuania. Newly installed energy measuring instruments must conform with the specifications of measuring instruments used in the Member States of the European Union.

3. Energy measuring instruments shall be installed and operated by energy enterprises owning or otherwise controlling energy facilities of transmission, distribution or storage with their own funds.

4. Energy measuring instruments between energy facilities shall be installed and maintained by energy enterprises owning or otherwise controlling energy facilities of transmission with their own funds.

Article 24. Energy Transit

1. Transit of energy or energy resources (hereinafter "transit") shall be carried out under contracts concluded between the energy enterprises controlling energy facilities of origin, final destination and transmission of energy or energy supply in accordance with the provisions of the Energy Charter Treaty and taking account of the capacities of the transmission facilities and priorities of national needs.

2. Enterprises controlling energy transmission facilities shall supply information to the Commission and the Ministry of Economy about each request for transit, the concluded transit contracts and refusals to conclude them. A refusal to conclude a transit contract must be duly substantiated.

CHAPTER FIVE

EMERGENCY IN THE ENERGY SECTOR

Article 25. Emergency in the Energy Sector

1. A state of emergency in the energy sector shall be declared where electricity, natural gas or petroleum products are in short supply affecting the security and health of the population or the functioning of economy of the country.

2. A state of emergency in the energy sector shall be declared by a resolution of the Government. After a state of emergency or war has been declared in accordance with the procedure prescribed by law, a state of emergency in the energy sector shall be declared without a special resolution of the Government.

3. Energy enterprises must inform, in accordance with the established procedure, the municipalities and the Ministry of Economy about shortages in energy supply and about the measures for restoring the supply.

4. After an emergency in the energy sector has been declared, supply of energy and energy resources to the customers may be restricted or suspended by the Government or an institution authorised by it in accordance with the prescribed procedure. In the event of an emergency in the energy sector energy enterprises acting in accordance with the instructions of the Government, the institutions authorised by it, and of the mayors of regional/city municipalities shall not be liable for the losses caused to the customers by reason of the restrictions in the supply or suspension of energy or energy resources.

5. To provide energy supplies to the consumers in the event of an emergency in the energy sector, state stocks of petroleum products shall be built in accordance with the procedure provided by law.

6. After an emergency in the energy sector has been declared, enterprises producing, transmitting, transporting, loading and unloading crude oil or petroleum products, natural gas, fuel oil and electricity must first satisfy the needs of domestic consumers.

7. After an emergency in the energy sector has been declared, legal and natural persons must act in accordance with the instructions of the Government, institutions authorised by it and the mayors of regional/city municipalities. Where, in the event of an emergency in the energy sector, energy enterprises fail to act in accordance with the instructions, the Government or a municipality council shall have a right, while the emergency in the energy sector lasts, to remove the governing bodies of

these enterprises and appoint temporarily their own representatives to act as administrators. Representatives of the Government or a municipal institution, while performing the functions of the heads of the boards or the administration of the enterprises, shall act in accordance with the laws of the Republic of Lithuania and the powers vested in them by the Government.

8 After an emergency in the energy sector has been declared the Government or institutions authorised by it shall have a right to regulate export, import of and trade in crude oil, petroleum products, energy and energy resources as well as to control and restrict, taking account of the market conditions, the unreasonably high prices of petroleum products, energy and resources of energy sold and services provided.

CHAPTER SIX

HEARING OF COMPLAINTS. LIABILITY

Article 26. Hearing of Complaints

1. The National Council for Consumer Protection under the Ministry of Justice shall hold a preliminary extra-judicial hearing of complaints by natural persons concerning application of unfair conditions in the sale or service agreements.

2. The State Energy Inspectorate shall hold a preliminary extra-judicial hearing of complaints concerning malfunctioning of energy facilities and breakdowns of equipment and metering instruments, breaches of the requirements of maintenance, energy quality, accounting of and payment for energy, accidents, interruption, suspension or restriction of energy supply.

3. The Commission shall hold a preliminary extra-judicial hearing of complaints concerning acts or omissions of energy enterprises in supply, distribution, transmission, storing of energy, failure to grant them a right to use networks and systems, connection, balancing of energy supply flows, application of prices and tariffs.

Article 27. Liability

Persons shall be held liable under law for violations of this Law.

CHAPTER SEVEN

FINAL PROVISIONS

Article 28. Procedure of Enforcement of this Law

1. Energy enterprises shall buy out or operate, following the procedure prescribed by the Government or an institution authorised by it, energy facilities acquired at the expense of the customers (legal and natural persons), installed for common use prior to the entry of this Law into force and intended for transmission and/or distribution of energy.

2. Energy enterprises shall provide information to the State Tax Inspectorate under the Ministry of Finance or to the municipalities about energy facilities which, though in use, are not recorded and

have no owners or whose owners are unknown (hereinafter "derelict energy facilities"). The State Tax Inspectorate under the Ministry of Finance or the municipalities shall, following the procedure established by the Government, include the derelict energy facilities in the records and take measures to find the owners of these facilities. The State Tax Inspectorate under the Ministry of Finance or a municipal institution, at the close of four months from the day when the facility was included in the register, shall file an application with court to transfer the derelict energy facility into the ownership of the state or a municipality. The derelict energy facilities which have been transferred by a court decision into the ownership of the state or a municipality, shall, by a decision of the State or the municipality council, be sold, leased or given into any other form of use to an energy transmission or energy distribution enterprise operating within their territory.

3. The provisions of paragraph 2 of this Article shall not apply to energy facilities which have been acquired in good faith and are in lawful control even where their administrators have not yet acquired the right of ownership to these facilities by prescription.

4. After entry of this Law into force, when appointing members of the Commission for the first time, two members of the Commission shall be appointed for a term of three years.

Article 29. Entry into Force

1. With the exception of paragraphs 2, 3 and 4 of Article 20, this Law shall enter into force on July 1, 2002.

2. Paragraphs 2, 3, and 4 of Article 20 shall enter into force on 1 January 2004.

Article 30. Laws Repealed

1. Upon entry into force of this Law the following laws shall be repealed:

1) Law of the Republic of Lithuania on Energy (*Official Gazette* 1995, No. 32-743);

2) Law Amending Article 20 of the Law on Energy (*Official Gazette* 1996, No.32-791);

3) Law of the Republic of Lithuania on Securing the Interests of the State by Providing Lithuanian Economy with Crude Oil and Petroleum Products in an Emergency (*Official Gazette* 1997, No. 53-1227);

4) Law of the Republic of Lithuania Amending Article 15 of the Law on Energy (*Official Gazette* 1997, No. 64-1494);

5) Law of the Republic of Lithuania Amending Articles 1, 9, 11, 12, 16, 17, 19, 20 and 22 (*Official Gazette* 1997; No. 96-2425);

6) Law of the Republic of Lithuania Amending Articles 1, 3, 4, 5, 6, 8, 9, 11, 12, 13, 14, 15 and 17 of the Law on Energy (*Official Gazette* 1998, No. 34-899);

7) Law of the Republic of Lithuania Amending Article 1 of the Law on Energy (*Official Gazette* 1998, No. 103-2837);

8) Law of the Republic of Lithuania Amending Article 15 of the Law on Energy (*Official Gazette* 1998, No. 105-2899);

9) Law of the Republic of Lithuania Amending Articles 10 and 14 of the Law on Energy (*Official Gazette* 1999, No. 86-2563);

10) Law of the Republic of Lithuania Amending Article 17 of the Law on Energy (*Official Gazette* 2000, No. 28-757);

11) 10) Law of the Republic of Lithuania Amending Article 14 of the Law on Energy (*Official Gazette* 2000, No. 58-1709).

I promulgate this Law passed by the Seimas

PRESIDENT OF THE REPUBLIC VALDAS ADAMKUS

環境影響評価に関する法

Official translation

REPUBLIC OF LITHUANIA
Law on Environmental Impact Assessment
of the Proposed Economic Activity

18 April 2000 No. VIII – 1636

Vilnius

Article 1. Revised Version of the Law of the Republic of Lithuania on Environmental Impact Assessment of the Proposed Economic Activity

The Law of the Republic of Lithuania on Environmental Impact Assessment of the Proposed Economic Activity shall be amended and set forth to read as follows:

"REPUBLIC OF LITHUANIA
Law on Environmental Impact Assessment
of the Proposed Economic Activity

CHAPTER I
GENERAL PROVISIONS

Article 1. Purpose of the Law

This Law shall regulate the environmental impact assessment process and relationships between parties involved in such process.

Article 2. Principal Definitions of this Law

1. "Proposed economic activity" means building of new construction works, reconstruction of the existing construction works, implementation of new technologies, modernisation or change of the production process and technologies, change of the mode of production, the production output or type, exploitation of entrails of the earth and other natural resources, as well as the economic activity provided for in land survey, forest and water management projects.

2. "Organiser (developer) of the proposed economic activity" means a natural or legal person, or a person without the rights of a legal person that intends to start the proposed economic activity and is responsible for performing the procedures of environmental impact assessment, established by this Law.

3. "Preparer of the environmental impact assessment documentation, obligated by the organiser (developer) of the proposed economic activity" means a natural or legal person, or a person without the rights of a legal person, that is obligated by the organiser (developer) of the proposed economic activity to identify, characterise and evaluate potential environmental impacts of the proposed economic activity, to prepare the program and report of the environmental impact assessment, and to perform the relevant procedures of environmental impact assessment, established by this Law.

4. "Environmental impact assessment" means the process of identifying, characterising and assessing the potential environmental impacts of the proposed economic activity.

5. "Relevant parties of the environmental impact assessment" mean governmental institutions and municipal administrations that examine environmental impact assessment programs and environmental impact assessment reports, and provide conclusions in accordance with their competence.

6. "Environmental impact" means anticipated change in the environment caused by a proposed economic activity.

Article 3. Object of the Environmental Impact Assessment

1. Object of the environmental impact assessment shall be the proposed economic activity which might have significant effects on the environment by virtue of their nature, size or characteristics of proposed location. Such activities shall be included in:

1) List of the Types of Proposed Economic Activities that Shall Be Subject to the Environmental Impact Assessment (Annex I); and

2) List of the Types of Proposed Economic Activities that Shall Be Subject to the Screening for Obligatory Environmental Impact Assessment (Annex II).

2. Environmental impact assessment shall be performed when the proposed economic activity is included in the List of the Types of Proposed Economic Activities that Shall Be Subject to the Environmental Impact Assessment, or if during the screening of the proposed economic activity (hereinafter referred to as "screening") it is determined that the environmental impact assessment is obligatory for the proposed economic activity.

3. All participants of the environmental impact assessment process shall be entitled to require, and the competent authority, taking into account the nature, size or characteristics of location of the proposed economic activity - to decide that screening for obligatory environmental impact assessment would be performed also for the proposed activity not included in the Lists referred to in paragraph 1 of this Article.

4. Environmental impact assessment shall be performed before preparing the project documents of the proposed economic activity, i.e. when preparing the documents which substantiate the building of a construction works or other documents which substantiate feasibility of the economic activity, and while performing investigation activities.

Article 4. Objectives of the Environmental Impact Assessment

The objectives of the environmental impact assessment shall be as follows:

1) to identify, characterise and assess potential direct and indirect impacts of the proposed economic activity on human beings, fauna and flora; soil, surface and entrails of the earth; air, water, climate, landscape and biodiversity; material assets and the immovable cultural heritage, and interaction among these factors;

2) to reduce or avoid negative impacts of the proposed economic activity on human beings and other components of the environment, referred to in paragraph 1 of this Article; and

3) to determine if the proposed economic activity, by virtue of its nature and environmental impacts, may be allowed to be carried out in the chosen site.

Article 5. Participants of the Environmental Impact Assessment Process

1. Participants of the environmental impact assessment process shall be as follows:

1) competent authority - Ministry of the Environment or another institution authorised by the Government;

2) relevant parties of the environmental impact assessment: State institutions responsible for health protection, fire-prevention, protection of cultural assets, development of economy and agriculture, and institutions of local self-government;

3) organiser (developer) of the proposed economic activity;

4) preparer of the environmental impact assessment documentation, obligated by the organiser (developer) of the proposed economic activity; and

5) the public.

2. State institutions not referred to in paragraph 1 (2) of this Article, may also act as relevant parties of the environmental impact assessment, if they are interested in the participation in the environmental impact assessment process and if the competent authority, taking into account the nature, size or characteristics proposed location of the proposed economic activity, approves it. In such cases, the competent authority shall inform in writing all relevant parties of the environmental impact assessment as well as the organiser (developer) of the proposed economic activity or the preparer of the environmental impact assessment documentation, obligated by him, about other State institutions that shall participate in the environmental impact assessment process.

Article 6. Functions of the Participants of the Environmental Impact Assessment Process

1. The competent authority shall:

1) co-ordinate the environmental impact assessment process;

2) perform screening, ratify the programs of environmental impact assessment, examine proposals of the public, reports of environmental impact assessment and conclusions issued by relevant parties of the environment impact assessment regarding environmental impact assessment programs, reports and the feasibility of the proposed economic activity, and make justified decisions if the proposed economic activity, taking into account its nature and size, may be carried out in the chosen site; and 3) when necessary, request assistance of consultants. Participation of the consultants in the environmental impact assessment process shall be financed by the competent authority.

2. Organiser (developer) of the proposed economic activity shall at his own expense perform the relevant procedures of environmental impact assessment established by this Law.

3. Preparer of the environmental impact assessment documentation, obligated by the organiser (developer) of the proposed economic activity, shall identify, characterise and assess potential environmental impacts of the proposed economic activity, prepare the programs and reports of the environmental impact assessment, and perform the relevant procedures of environmental impact assessment established by this Law.

4. Relevant parties of the environmental impact assessment shall within the range of their competence, examine the environmental impact assessment programs and reports, and provide conclusions regarding the environmental impact assessment programs, reports and the feasibility of the proposed economic activity.

5. The public shall provide substantiated proposals regarding the environmental impact assessment and potential environmental impacts of the proposed economic activity in the manner prescribed by the Ministry of the Environment.

CHAPTER II
ENVIRONMENTAL IMPACT ASSESSMENT

Article 7. Screening and Obligatory Environmental Impact Assessment

1. Environmental impact assessment shall be performed when proposed economic activities are included in the List of the Types of Proposed Economic Activities that Shall Be Subject to the Environmental Impact Assessment, or when during the screening it is determined that environmental impact assessment is obligatory for the proposed economic activity.

2. Screening shall be performed for the proposed economic activities that are included in the List of Proposed Economic Activities that Shall Be Subject to the Screening for Obligatory Environmental Impact Assessment.

3. The aim of screening shall be to determine if environmental impact assessment is obligatory for a concrete proposed economic activity.

4. Screening shall be performed by the competent authority in accordance with the methodological guidelines of the proposed economic activity, that are prepared and approved by the Ministry of the Environment.

5. Screening shall be based on the information, provided by the organiser (developer) of the proposed economic activity or the preparer of the environmental impact assessment documentation, obligated by him, regarding the characteristics of the chosen site for the proposed economic activity, and characteristics of the proposed economic activity (size, technologies and materials used, use of natural resources, dangerous substances, production, usage and processing of waste and other substances, pollution and nuisances, potential interaction with other proposed economic activities, probability and prevention of accidents).

6. The competent authority, taking into account the nature and size of the proposed economic activity, and the characteristics of the proposed location, may request from the organiser (developer) of the proposed economic activity or the preparer of the environmental impact activity documentation, obligated by him, to provide additional information necessary for the screening.

7. The competent authority shall perform screening and reach a conclusion regarding obligatory environmental impact assessment, taking into account the information referred to in paragraph 5 of this Article and having regard to:

1) the environmental sensitivity of the area likely to be affected by the proposed economic activity, the features of ecosystem, landscape, the existing land use, infrastructure of the said area, density of the industrial objects, relative abundance, quality and regenerative capacity of natural resources in the area, the resistance capacity of the natural environment, paying particular attention to the protected areas, densely populated areas, wetlands, protection zones, forests, and areas in which the environmental quality standards have already been exceeded or that are of historical, cultural or archaeological value;

2) characteristics of the potential environment impact of the proposed economic activity, paying particular attention to the transboundary nature of the impact, complexity of the impact, the probability of the impact, the duration, frequency and reversibility of the impact as well as the size of the territory and the amount of the population.

8. The competent authority shall, within 20 working days from receipt of the information for the performance of the screening, present to the organiser (developer) of the proposed economic activity and relevant parties of the environmental impact assessment, written conclusions regarding the obligatory environmental impact assessment.

9. The organiser (developer) of the proposed economic activity shall, in the manner prescribed by the Ministry of the Environment, inform the public about the obligation to perform the environmental impact assessment as referred to in the provisions of paragraph 1 of this Article or about the screening conclusion in accordance.

10. The public shall, within 10 working days from the publication of the screening conclusion, have the right to present justified proposals to the competent authority to reconsider the screening conclusion.

11. The organiser (developer) of the proposed economic activity shall have the right to present within 10 working days from the receipt of the screening conclusion, a justified request to the competent authority to reconsider the screening conclusion.

12. After receiving a justified request of the organiser (developer) of the proposed economic activity or justified proposals of the public to reconsider the screening conclusion, the competent authority shall invite interested relevant parties of environmental impact assessment to participate in the adoption of the final conclusion regarding the obligatory environmental impact assessment.

13. If the final screening conclusion conflicts with the conclusion made in accordance with the provisions of paragraph 7 of this Article, the organiser (developer) of the proposed economic activity shall inform the public about this in the manner prescribed by the Ministry of the Environment.

Article 8. Program of the Environmental Impact Assessment

1. The environmental impact assessment program (hereinafter referred to as "program") shall be prepared

whenever environmental impact assessment is obligatory in accordance with the provisions of paragraph 1 of Article 7.

2. The environmental impact assessment program shall be prepared by the organiser (developer) of the proposed economic activity or the preparer of the environmental impact assessment documentation, obligated by him, in compliance with the regulations on preparation of the environmental impact assessment program and report, approved by the Ministry of the Environment.

3. The program shall define the contents of the report on the environmental impact assessment of the proposed economic activity (hereinafter referred to as "report"), issues considered therein and the amount of required information.

4. The program shall include at least the following information:

1) an outline of the main alternatives studied by the organiser (developer) of the proposed economic activity or the preparer of the environment impact assessment documentation, obligated by him, and an indication of the reasons for their choice, taking into account the best available modes of production and potential environmental impact;

2) a description of the technical characteristics, technological process and materials planned to be used, as well as needed amount of natural resources and land use (during the construction and operation phases); a description of expected pollutants; a description of production, usage and processing of waste and other substances; a description of the components of the environment likely to be affected by the proposed economic activity; a short description of the likely environmental effects of the proposed economic activity taking into account potential interaction with other economic activities; a description of measures envisaged to avoid, reduce or offset negative environmental effects or to alleviate their consequences; identification of possible emergencies (accidents) and accident-avoidance and emergency measures;

3) methods that will be used to predict and assess the effects on the environment.

5. The organiser (developer) of the proposed economic activity or the preparer of the environment impact assessment documentation, obligated by him, shall submit the prepared program to the relevant parties of environmental impact assessment.

6. The relevant parties of environmental impact assessment shall examine the program and within 10 working days from the receipt thereof provide conclusions to the organiser (developer) of the proposed economic activity or the preparer of the environment impact assessment documentation, obligated by him.

7. The relevant parties of environmental impact assessment shall have the right to present justified requirements that the organiser (developer) of the proposed economic activity or the preparer of the environment impact assessment documentation amend or correct the environment impact assessment program. In such cases the organiser (developer) of the proposed economic activity or the preparer of the environment impact assessment documentation shall amend or correct the program and repeatedly present it to the relevant parties of environmental impact assessment, which shall examine the program and, within 5 working days form the receipt thereof, submit conclusions to the organiser (developer) of the proposed economic activity or the preparer of the environment impact assessment documentation, obligated by him.

8. The organiser (developer) of the proposed economic activity or the preparer of the environment impact assessment documentation, obligated by him, shall submit the program and the conclusions of the relevant parties of environmental impact assessment to the competent authority.

9. Upon the examination of the conclusions of the relevant parties of environmental impact assessment, the competent authority shall approve the program within 10 working days from the receipt thereof.

10. When the conclusions of the relevant parties of environmental impact assessment conflict with each other, the competent authority shall, before approving the programme, invite the relevant parties of environmental impact assessment to participate in the consideration of their conclusions.

Article 9. Report of the Environmental Impact Assessment

1. The report of the environmental impact assessment shall be prepared by the organiser (developer) of the proposed economic activity or the preparer of the environment impact assessment documentation, obligated by him, in accordance with the program approved by the competent authority. The report shall include exhaustive examination of all the issues provided for in the program, an analysis of the alternatives that have been examined by the preparer of the environment impact assessment documentation, a plan for environmental monitoring, information about the problems of technical or practical character encountered by the organiser (developer) of the proposed economic activity or the preparer of the environment impact assessment documentation when performing the environmental impact assessment, as well as a summary of all information considered in the report.

2. Organiser (developer) of the proposed economic activity shall, in a prescribed manner, organise public presentation of the report.

3. Organiser (developer) of the proposed economic activity or the preparer of the environment impact assessment documentation shall submit the report amended according to justified proposals of the public, to the relevant parties of environmental impact assessment, who check whether the issues which fall within their competence and are provided for in the program are sufficiently examined in the report.

4. Relevant parties of environmental impact assessment shall examine the report and, within 20 working days from the receipt thereof, forward their conclusions to the organiser (developer) of the proposed economic activity or the preparer of the environment impact assessment documentation, obligated by him, together with the conclusions designated for the competent authority regarding the possibilities to carry out the proposed economic activity.

5. The relevant parties of environmental impact assessment shall have the right to present justified requirements that the organiser (developer) of the proposed economic activity or the preparer of the environment impact assessment documentation, obligated by him, amend or correct the environment impact assessment report. In such cases the organiser (developer) of the proposed economic activity or the preparer of the environment impact assessment documentation, obligated by him, shall amend or correct the program and repeatedly present it to the relevant parties of environmental impact assessment, who examine the report and within 10 working days from the receipt thereof submit their conclusions to the organiser (developer) of the proposed economic activity or the preparer of the environment impact assessment documentation, obligated by him, together with the conclusions designated for the competent authority regarding the possibilities to carry out the proposed economic activity.

6. The organiser (developer) of the proposed economic activity or the preparer of the environment impact assessment documentation shall submit to the competent authority the report, the conclusions of relevant parties of environmental impact assessment regarding the report and the possibilities to carry out the proposed economic activity as well as a substantiated evaluation of the proposals of the public.

Article 10. Decision Regarding the Proposed Economic Activity

1. Upon the examination of the report, the conclusions of relevant parties of environmental impact assessment regarding the report and the possibilities to carry out the proposed economic activity as well as justified evaluation of the public proposals, the competent authority shall, within 25 working days from the receipt of the report, make a justified decision if the proposed economic activity by virtue of its nature and environmental impacts, may be carried out in the chosen site. The competent authority shall in written form forward its justified decision to the organiser (developer) of the proposed economic activity and the relevant parties of environmental impact assessment.

2. When the conclusions of the relevant parties of environmental impact assessment regarding the possibilities to carry out the proposed economic activity conflict with each other, the competent authority shall, before making the final decision, invite the relevant parties of environmental impact assessment to participate in the consideration of their conclusions.

3. A positive decision adopted by the competent authority regarding the possibilities of carrying out the proposed economic activity shall be valid for 5 years following its adoption.

4. If the competent authority decides that the proposed economic activity cannot be carried out in the chosen site because of its potential negative environmental impacts, the proposed economic activity may not be carried out

5. The competent authority and the organiser (developer) of the proposed economic activity shall, in a prescribed manner, inform the public about the justified decision whether the proposed economic activity by virtue of its nature and environmental impacts may be carried out in the chosen site, and shall make it possible for the public to get access to the text of the decision.

CHAPTER III
FINAL PROVISIONS

Article 11. Environmental Impact Assessment in a Transboundary Context

1. In the cases when an economic activity that is proposed to be carried out in the territory of the Republic of Lithuania may cause a significant negative impact on the environment of any foreign State which is a party to the 1991 United Nations Convention on Environmental Impact Assessment in a Transboundary Context, or upon request of such State, the environmental impact assessment process shall be performed in compliance with the Convention, international agreements between the Republic of Lithuania and relevant States, this Law and other legal acts.

2. If the Convention on Environmental Impact Assessment in a Transboundary Context or an international agreement of the Republic of Lithuania provides for environmental impact assessment procedures different than those of this Law, the provisions of the Convention or the international agreements of the Republic of Lithuania shall apply.

Article 12. Access to Information, Relevant for Performing Environmental Impact Assessment

State or local self-government institutions holding information about the environment that is necessary for performing environmental impact assessment, must provide the organiser (developer) of the proposed economic activity or the preparer of the environment impact assessment documentation, obligated by him, with a possibility to make use of such information in the manner prescribed by the Government.

Article 13. Publicity of the Environmental Impact Assessment Process

1. The public shall have the right to obtain in accordance with the procedure established by the law, information from other participants of the environmental impact assessment of the proposed economic activity, about potential environmental effects of the proposed economic activity.

2. Informing and participation of the public in the process of environmental impact assessment of the proposed economic activity shall, in a prescribed manner, be organised and financed by the organiser (developer) of the proposed economic activity.

3. The procedure of informing and participation of the public in the process of the environmental impact assessment of the proposed economic activity shall be set by the Ministry of The Environment.

Article 14. Liability of the Participants of the Environmental Impact Assessment Process

Participants of the environmental impact assessment process shall, in the manner prescribed by the law, be responsible for implementing the provisions of this Law, furnishing accurate information and for the decisions and conclusions made within the range of their competence.

Article 15. Investigation of Disputes

1. Disputes concerning the application of the provisions of this Law and the decisions of the competent authority shall, in the manner prescribed by the law, be considered by the courts of the Republic of Lithuania.

2. Disputes between the Republic of Lithuania and legal and natural persons of other States shall be settled according to the procedure established by the laws of the Republic of Lithuania, unless the international agreements of the Republic of Lithuania provide for a different procedure of the consideration and settlement of disputes."

Article 2. Coming into Force of this Law

The Law of the Republic of Lithuania on the Amendment of the Law on Environmental Impact Assessment of Proposed Economic Activities shall come into force on 1 June 2000, except Article 11 of the Law on Environmental Impact Assessment of Proposed Economic Activity which shall come into force after the Republic of Lithuania becomes a party to the Convention on Environmental Impact Assessment in a Transboundary Context.

Article 3. Proposals to the Government

The Government shall, within one month from the coming into force of the Law of the Republic of Lithuania on the Amendment of the Law on Environmental Impact Assessment of Proposed Economic Activities, prepare the legal acts which are necessary for the implementation of the Law on Environmental Impact Assessment of Proposed Economic Activities.

I promulgate this Law passed by the Seimas of the Republic of Lithuania.

PRESIDENT OF THE REPUBLIC VALDAS ADAMKUS

Republic of Lithuania Law No. VIII-1636 of
18 April 2000

LIST OF THE TYPES OF PROPOSED ECONOMIC ACTIVITIES THAT SHALL BE SUBJECT TO THE ENVIRONMENTAL IMPACT ASSESSMENT

1. Agriculture and aquaculture
1.1. Rearing of pigs (900 or more places for sows , 3 000 or more places for other pigs)
1.2. Rearing of poultry (85 000 or more places for broilers, 60 000 or more places for hens)
1.3. Dams and ponds (when the amount of water held back or stored is 5 million m3 or more)

2. Extractive and processing industry
2.1. Extraction and processing of oil of (excluding undertakings manufacturing only lubricants from crude oil)
2.2. Extraction of natural gas (when the amount extracted exceeds 500 000 m3 per day)
2.3. Peat extraction (with the surface of the site of 150 ha or more)
2.4. Quarrying and extraction of other mineral resources (when the surface of the site is 25 ha or more)

3. Energy industry
3.1. Thermal power stations and other combustion installations, including industrial installations for producing electricity, heat, steam or hot water (with an output of 300 MW or more)
3.2. Nuclear power stations and other nuclear reactors including decommissioning of such power stations or reactors (*)
3.3. Production, processing, enrichment, storage and disposal of nuclear fuel
3.4. Gasification or liquefaction of coal or bituminous shale (with a capacity of 500 tonnes/day or more)

4. Production and processing of metals
4.1. Initial smelting of cast-iron and steel
4.2. Production of non-ferrous metals from ore, concentrates or secondary raw materials by chemical, metallurgical or electrolytic processes

5. Industry of mineral construction materials
5.1. Extraction of asbestos and processing and transformation of asbestos and products containing asbestos: for asbestos products - annual production is 20 000 tonnes or more of finished products, for friction material -annual production is 50 tonnes or more of finished products, and for other uses of asbestos - utilisation is 200 tonnes per year or more.

6. Chemical industry
6.1. Manufacture on an industrial scale of the following chemical substances:
- organic chemicals;
- inorganic chemicals;
- phosphorous-, nitrogen- or potassium- based fertilisers (including compound fertilisers);
- other agrochemicals, including biocides
- pharmaceutical products.
6.2. Installations for storage (warehouses and storage grounds) of petroleum, petrochemical, or chemical products with a capacity of 200 000 tonnes or more
6.3. Production of explosives

7. Wood and paper industry
7.1. Production of paper and board (with a production capacity of 200 tonnes / day or more)
7.2. Production of cellulose and pulp from timber or similar fibrous materials

8. Objects of infrastructure
8.1. Construction of sea ports, piers or terminals (for loading and unloading) which can take vessels of 1350 tonnes or larger
8.2. Construction of inland waterways, ports, piers or terminals (for loading and unloading) which can take vessels of 1350 tonnes or larger
8.3. Construction of express motorways and country level roads
8.4. Construction of a new road of four or more lanes, or reconstruction of an existing road as to provide four or more lanes (where such new road, or reconstructed section of road would be 10 km or more in a continuous length)

8.5. Construction of lines for the main public railway traffic
8.6. Construction of airports and airfields with a basic runway length of 2100 m or more
8.7. Construction of pipelines for the transport of gas, oil or chemicals with a diameter of 800 mm or more and a length of 40 km or more
8.8. Construction of overhead electrical power lines with a voltage of 110 kV or more and a length of 15 km or more

9. Other types of proposed economic activity
9.1. Groundwater abstraction (where the annual volume of water abstracted is equivalent to or exceeds 10 million cubic metres)
9.2. Artificial groundwater recharge schemes (where the annual volume of water recharged is equivalent to or exceeds 10 million cubic metres)
9.3. Transfer of water resources between river basins where the amount of water transferred is equivalent to or exceeds 100 million cubic metres/year or where the multi-annual average flow of the basin of abstraction is equivalent to or exceeds 2 000 million cubic metres/year and where the amount of water transferred is equivalent to or exceeds 5 % of this flow
9.4. Waste water treatment plants of cities, towns and villages with a capacity equivalent to or exceeding 50000 population equivalent
9.5. Installations for processing, usage, storage and disposal of radioactive waste, including the decommissioning of such installations
9.6. Installations for disposal or usage of hazardous waste
9.7. Installations for disposal or usage of non-hazardous waste via incineration or chemical treatment (with a capacity equivalent to or exceeding 100 tonnes per day)

Annex II of
Republic of Lithuania Law No. VIII-1636 of
18 April 2000

LIST OF THE TYPES OF PROPOSED ECONOMIC ACTIVITIES THAT SHALL BE SUBJECT TO THE SCREENING FOR OBLIGATORY ENVIRONMENTAL IMPACT ASSESSMENT

1. Agriculture, silviculture and aquaculture
1.1. Rearing of pigs (less than 900 but more than 200 places for sows, less than 3 000 but more than 700 places for other pigs)
1.2. Livestock installations (more than 200 places for the animals)
1.3. Rearing of poultry (less than 85 000 but more than 10 000 places for broilers, less than 60 000 but more than 10 000 places for hens)
1.4. Rearing of other poultry (more than 10 000 places for other birds)
1.5. Fish farming (in the sea or in the ponds with an area of the site of more than 5 ha)
1.6. Water management projects for agriculture including irrigation and land drainage projects (with an area of more than 5 ha)
1.7. Installation of ponds (amount of water held back or stored is less than 5 million m3 but more than 200000 m3, or the area is less than 250 ha but more than 10 ha)
1.8. Projects for the use of uncultivated land for intensive agricultural purposes (with an area of more than 0,5 ha)
1.9. Implementation of combined projects for the restructuring of rural land holdings
1.10. Initial afforestation and deforestation for the purposes of conversion to another type of land use (with an area of more than 1 ha in the urban areas, and more than 10 ha in the rural areas)
1.11. Reclamation of land from the sea

2. Extractive and processing industry
2.1. Peat extraction (when the surface of the site is less than 150 ha but more than 0, 5 ha)
2.2. Extraction or processing of natural gas (when the amount extracted or processed is less than 500000 m3 per day)
2.3. Quarrying and extraction of other mineral resources (when the surface of the site is less than 25 ha but more than 0,5 ha)
2.4. Extraction of mineral or organic substances from the bottom of the sea, lake or rivers
2.5. Deep drillings (geothermal drilling, drilling for water supplies, mineral water extraction, etc., except drillings for investigating the stability of the soil)
2.6. Underground mining

3. Energy industry
3.1. Thermal power stations and other combustion installations, including industrial installations for producing electricity, heat, steam or hot water (with an output of less than 300 MW, but more than 20 MW)
3.2. Installations for pipelines carrying steam or hot water (with a length over 2 km)
3.3. Installations for gas storage (with a capacity of more than 10 000 m3)
3.4. Installations for storage (warehouses and storage grounds) of other types of fossil fuel (with a capacity of more than 1 000 t)
3.5. Briquetting of coal and lignite
3.6. Installations for hydroelectric energy production or installations that use the hydroelectric energy (hydroelectric power stations, mills, sawmills) (with a maximum power of more than 0,1 MW)
3.7. Installations for the harnessing of wind power for energy production (wind farms) with a height of more than 10 m, (including vane length) or having 2 or more turbines

4. Production and processing of metals
4.1. Processing of metallic ores
4.2. Installations for the production of ferrous metals (including pig iron and steel), (primary or secondary fusion and continuous casting)
4.3. Installations for the processing of ferrous metals, including hot-rolling, forging, pressing, stamping, profiling and application of protective fused metal coats
4.4. Installations for the smelting or alloyage of non-ferrous metals (excluding precious metals), including recovered products (refining, foundry casting, etc.) with a daily capacity exceeding 30 tonnes
4.5. Installations for surface treatment of metals and plastic materials using an electrolytic or chemical process (with annual capacity exceeding 50 000 m2)
4.6. Manufacture and assembly of motor vehicles and manufacture of motor-vehicle engines (when the main installation area exceeds 1 000 m2)
4.7. Installations for the construction and repair of ships (shipyards)
4.8. Installations for the construction and repair of aircraft
4.9. Installations for manufacture or repair of railway equipment (when the main installation area exceeds 1000 m2)
4.10. Forging, pressing or swaging of metals by explosives

5. Industry of mineral construction materials
5.1. Coke ovens (dry coal distillation)
5.2. Extraction of asbestos and processing and transformation of asbestos and products containing asbestos: for asbestos products - annual production is less than 20 000 tonnes of finished products, for friction material -annual production is less than 50 tonnes of finished products, and for other uses of asbestos - utilisation is less than 200 tonnes per year.
5.3. Installations for the manufacture of glass or glass fibre
5.4. Installations for smelting mineral substances including the production of mineral fibres (with a daily capacity exceeding 10 tonnes)
5.5. Installations for manufacture of ceramics products (with a daily capacity exceeding 3 tonnes)
5.6. Installations for the manufacture of cement
5.7. Manufacture of concrete construction materials (with annual capacity exceeding 5000 m3)

6. Chemical industry
6.1. Manufacturing of lubricants from crude oil
6.2. Manufacturing or treatment of the following chemicals:
- pharmaceutical products (daily capacity exceeds 1 tonne)
- pesticides (daily capacity exceeds 5 tonnes)
- paint and varnishes (daily capacity exceeds 10 tonnes)
- elastomers (daily capacity exceeds 10 tonnes)
- peroxides (daily capacity exceeds 5 tonnes)
- intermediate products (daily capacity exceeds 10 tonnes)
6.3. Building of storage facilities (warehouses and storage grounds) for petroleum, petrochemical and chemical products with a capacity of less than 200 000 tonnes but more than 5000 tonnes)
6.4. Manufacture of artificial leather or fibre

7. Food industry
7.1. Manufacture of vegetable and animal oils and fats (with a daily capacity exceeding 5 tonnes)
7.2. Packing and canning of animal and vegetable products (with a daily capacity exceeding 5 tonnes)
7.3. Manufacture of dairy products, milk processing (with a daily capacity exceeding 50 tonnes)
7.4. Malting and beer manufacture (with a daily capacity exceeding 10 tonnes of malt or 10000 l of beer)
7.5. Manufacture of bread products (with a daily capacity exceeding 10 tonnes)

7.6. Confectionery and syrup manufacture (with a daily capacity exceeding 5 tonnes)
7.7. Sugar manufacture
7.8. Installations for the slaughter of animals (with a daily capacity exceeding 10 tonnes of carcasses)
7.9. Starch or starch products manufacturing (with a daily capacity exceeding 5 tonnes)
7.10. Meat and fish processing (with a daily capacity exceeding 5 tonnes)
7.11. Manufacturing of yeast (with a daily capacity exceeding 2 tonnes)
7.12. Production of alcohol (with a daily capacity exceeding 1000 l)

8. Textile, leather, wood and paper industries
8.1. Manufacturing of pulp
8.2. Production of paper and board (with a daily production capacity of less than 200 tonnes but more than 20 tonnes)
8.3. Treatment of fibres or textiles (with annual capacity exceeding 200 000 m2)
8.4. Tanning of hides and skins (with a daily capacity exceeding 500 m2)
8.5. Production of wood fibre board (with a daily capacity exceeding 5 000 m2), production of wood shavings board (with a daily capacity exceeding 100 m3), production of plywood (with a daily capacity exceeding 50 m3)

9. Rubber industry
9.1. Manufacture and treatment of elastomer-based products (with a daily capacity exceeding 15 tonnes)

10. Civil engineering works
10.1. Construction of overhead electrical power lines (with a voltage of less than 110 kV and a length of less than 15 km but more than 3 km)
10.2. Urban development projects, including the construction of shopping centres and complexes of car or trolley-bus parks and garages (with a construction area exceeding 0,5 ha)
10.3. Construction of elevated or underground railways (except lines for the main public railway traffic) (with a length of more than 2 km)
10.4. Construction of railway, motor, air or sea transport freight distribution or transshipment facilities or terminals (with an area of more than 0,5 ha)
10.5. Construction of airports and airfields (with a basic runway length of less than 2100 m)
10.6. Construction of district level roads (with a length of more than 2 km)
10.7. Construction of a new road of four or more lanes, or reconstruction of an existing road as to provide four or more lanes (where such new road, or reconstructed section of road would be less than 10 km, but more than 2 km in a continuous length)
10.8. Construction of sea ports, piers or terminals which can take vessels of less than 1350 tonnes but with an area of more than 1 ha
10.9. Construction of inland waterways, ports, piers or terminals which can take vessels of less than 1350 tonnes but with an area of more than 1 ha
10.10. Deepening of the entrance channels and water space of sea ports
10.11. Hydrotechnical flood-relief installations (with an area of more than 1 ha)
10.12. Installation of tramways, underground railways or other types of lines used exclusively or mainly for passenger transport (with a length of more than 2 km)
10.13. Installation of suspended lines (e.g. for cable-cars or funiculars) used exclusively or mainly for passenger transport (with a length of more than 500 m)
10.14. Construction of pipelines for the transport of gas, oil or chemicals with a diameter of less than 800 mm and a length of less than 40 km but more than 2 km
10.15. Installations of long-distance aqueducts (with a length of more than 1 km)
10.16. Coastal installations for combating erosion or other types of coastal works capable of altering the coast such as dykes, moles, etc.
10.17. Groundwater abstraction (where the annual volume of water abstracted is less than 10 million cubic metres but more than 350 000 cubic metres)
10.18. Construction of bridges (with a length of more than 250 m)

11. Other types of proposed economic activity
11.1. Permanent racing or test tracks for motorised vehicles (with an area of more than 1 ha)
11.2. Installations for disposal or usage of non-hazardous waste
11.3. Waste-water treatment plants:
- of cities, towns and villages with a capacity of less than 50 000 population equivalent but more than 2 000 population equivalent
- surface waste water (rainwater) treatment plants (with waste water collected via canalisation network from an area of 50 ha or more)
- industrial waste water treatment plant

11.4 Installations for deposition or utilisation of sludge from the waste water treatment plants or for other types of contaminated sludge or site-selection for the utilisation (deposition) of such sludge
11.5. Selection of the dumping sites for extracted soil
11.6. Artificial groundwater recharge schemes (where the annual volume of water recharged is less than 10 million cubic metres)
11.7. Transfer of water resources between river basins where the amount of water transferred is less than 100 million cubic metres/year or where the multi-annual average flow of the basin of abstraction is less than 2 000 million cubic metres/year and where the amount of water transferred is less than 5 % of this flow
11.8. Installations for the storage of scrap iron, including scrap vehicles (with an area of more than 0,5 ha)
11.9. Test benches for engines, turbines or reactors (with an area of more than 500 m2)
11.10. Installations for the recovery or destruction of explosive substances, or selection of the sites for such recovery or destruction
11.11. Knackers' yards (with daily capacity of more than 10 animals)
11.12. Production of galvanic batteries (with annual capacity of over 5 000 units)
11.13. Lake purification and regulation of lake water level (when purified of regulated water area exceeds 0,5 ha)
11.14. Extraction of sediments from the bottom of the sea or inner water bodies for such purposes as construction, "beach-feeding" or industry.
11.15. Industrial estate development projects with an expansion area of more than 0,5 ha).
11.16. Production of ammunition
11.17. Installation of television / radio transmitters and radars with a combined transmitting capacity of 20 kW and more
11.18. Crematoria installations

12. Tourism and leisure
12.1. Yacht or boat marinas (with an area of more than 0,2 ha)
12.2. Holiday villages and hotel complexes outside urban areas (with an area of more than 0,5 ha)
12.3. Permanent camp site installations (with an area of more than 1 ha)
12.4. Theme parks (with an area of more than 0,5 ha)

13. A proposed economic activity included in the List of the Types of Proposed Economic Activities that Shall be Subject to the Environmental Impact Assessment, which is undertaken for the development or testing of new methods or products and not used for more than two years
14. Changing or extending the proposed economic activity (including reconstruction of existing construction works, change or modernisation of production process or technologies, change of the mode of production, production type or capacities, implementation of new technologies and other changes which may have adverse effects on the environment) included in the List of The Types of Proposed Economic Activities that Shall be Subject to the Environmental Impact Assessment or in the List of the Types of Proposed Economic Activities that Shall be Subject to the Screening for Obligatory Environmental Impact Assessment.

* Nuclear power stations and other nuclear reactors cease to be such an installation when all nuclear fuel and other radioactively contaminated elements have been removed permanently from the installation site

Joint Implementation Project Design Document (Draft)

The Kaunas Anhydrous Fuel Ethanol Production Project

CONTENTS

C.2.1. Renewable crediting period:
C.2.1.1. Starting date of the first crediting period:
C.2.1.2. Length of the first crediting period:
C.2.2. Fixed crediting period:
C.2.2.1. Starting date:
C.2.2.2. Length:

D. Application of a monitoring methodology and plan:
D.1. Name and reference of approved monitoring methodology applied to the project activity:
D.2. Justification of the choice of the methodology and why it is applicable to the project activity:
D.2.1. Option 1: Monitoring of the emissions in the project scenario and the baseline scenario:
D. 2.1.1. Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:
D.2.1.2. Description of formulae used to estimate project emissions (for each gas, source, formulae/algorithm, emissions units of CO2 equ.):
D.2.1.3. Relevant data necessary for determining the baseline of anthropogenic emissions by sources of GHGs within the project boundary and how such data will be collected and archived:
D.2.1.4. Description of formulae used to estimate baseline emissions (for each gas, source, formulae/algorithm, emissions units of CO2 equ.):
D.2.2. Option 2: Direct monitoring of emission reductions from the project activity:
D.2.2.1. Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:
D.2.2.2. Description of formulae used to calculate project emissions (for each gas, source, formulae/algorithm, emissions units of CO2 equ.):
D.2.3. Treatment of leakage in the monitoring plan:
D.2.3.1. Description of the data and information that will be collected in order to monitor leakage effects of the project activity:
D.2.3.2. Description of formulae used to estimate leakage (for each gas, source, formulae / algorithm, emissions units of CO2 equ.):
D.2.4. Description of formulae used to estimate emission reductions for the project activity (for each gas, source, formulae/algorithm, emissions units of CO2 equ.):
D.3. Quality control (QC) and quality assurance (QA) procedures undertaken for data monitored:
D.4. Description of the operational and management structure that the project operator will implement in order to monitor emission reductions and any leakage effects generated by the project activity:
D.5. Name of person/entity determining the monitoring methodology:

E.: Estimation of GHG emissions by sources:

E.1. Estimate of GHG emissions by sources:
E.2. Estimated leakage:
E.3. The sum of E.1 and E.2 representing the project activity emissions:
E.4. Estimated anthropogenic emissions by sources of greenhouse gases of the baseline:
E.5. Difference between E.4 and E.3 representing the emission reductions of the project activity:
E.6. Table providing values obtained when applying formulae above:

F.: Environmental impacts:
F.1. Documentation on the analysis of the environmental impacts, including transboundary impacts:
F.2. In case environmental impacts are considered significant by the project participants or the host Party, provision of conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party.

G. Stakeholders' comments:
G.1. Brief description of how comments by local stakeholders have been invited and compiled:
G.2. Summary of the comments received:
G.3. Report on how due account was taken of any comments received:

Annex 1
CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Annex 2
INFORMATION REGARDING PUBLIC FUNDING

Annex 3
BASELINE INFORMATION

Annex 4
MONITORING PLAN

A. General description of project activity

A.1. Title of the project activity:

The Kaunas Anhydrous Fuel Ethanol Production Project

A.2. Description of the project activity:

The project is taking into account all political, economical and environmental aspects in the EU, of which Lithuania will be a member starting 1st of May, 2004. Lithuanian government has established already on 18th of July, 2000 the Biofuel Law No VIII - 1875, which is specifying the legal conditions for the use of biofuel and biofuel additives based on Lithuanian raw materials. This law shall also improve the social and economic situation in the country side and provide assistance for the survival of the Lithuanian agriculture in the EU.

An additional Lithuanian directive can be expected in the near future providing tax-incentives for bio-ethanol containing fuels.

As the Lithuanian agriculture is actually the main source of income for about 20% of the population the restructuring of the agricultural sector is of highest strategic importance.

There are a number of small scale ethanol plants installed in Lithuania, most of them are for the production of beverage alcohol from grains. The majority of the plants are over 50 years old and not fulfilling the basic environmental and economic conditions for surviving after joining the EU.

The government of Lithuania is in need of utilizing more renewable energy in compliance with EU directives. Furthermore, it intends to consider a modern, economically, self supporting new agricultural concept (green chemistry, bio-refinery) and is providing its full political assistance for projects of that sort.

In this project, a new ethanol plant is planned to be located in central south of Lithuania and involves the production of anhydrous ethanol from grains. The bio-ethanol will be blended with gasoline and used for transportation. The proportion of bio-ethanol in the final blend will be as indicated in EU directive, or starts from 2% in 2005 with annual increase by 0.75% . The bio-ethanol will act as a substitute of gasoline .The plant has a capacity of 480,000 liters of anhydrous ethanol production per day. Now contractors are identified and financing is being sought.

The project will contribute significantly to sustainable development of Lithuania not only through the production of a renewable fuel but also other mechanisms. It will reduce Lithuania’s dependence on imports of crude oil and thus have a positive effect on the trade balance and exchange rate. Also, the plant will contribute to further development of the area in which it is located. The plant will be located in Kaunas County in the central south of Lithuania. The location of the plant will provide valuable direct employment to those in rural areas and provide a further indirect stimulus to economic activity in the area.

The plant will also vitalize the agriculture in the region and indirectly support farmers who grow grains, potatoes, etc.

A.3. Project participants:

Host party: Lithuanian Ministry of Environment

Investor party: Designated National Authority of Japan

Project host company: Etanolis Ltd.
Project developer: Public Enterprise Kauno Nova,
Griunvaldo 22, Kaunas, Lithuania
TEL: 8-699-25967
e-mail : nova@org.ktu.lt

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

A.4.1.1. Host Party(ies):

Lithuania

A.4.1.2. Region/State/Province etc.:

Kaunas county

A.4.1.3. City/Town/Community etc:

Kaunas City

A.4.1.4. Detail of physical location, including information allowing the unique identification of this project activity:

Taikos, LT51142, Kaunas, Lithuania

A.4.2. Category(ies) of project activity:

Transport

A.4.3. Technology to be employed by the project activity:

The bio-ethanol production process is mainly composed of raw material saccharification stage, fermentation-to-ethanol stage, and then dehydration of ethanol. The technology involved in the first and second stage of the process is readily available and well known. The dehydration technology is more diverse. In the case of the project activity the dehydration technology of zeolite membrane will be utilized. The technology will be transferred to the host country by newly installing and operating the dehydration facility.

A.4.4. Brief explanation of how the anthropogenic emissions of anthropogenic greenhouse gas (GHGs) by sources are to be reduced by the proposed JI project activity, including why the emission reductions would not occur in the absence of the proposed project activity, taking into account national and/or sectoral policies and circumstances:

In the absence of the proposed JI project, the most likely scenario will be as follows:

①Because demand for fuel bio-ethanol will increase, the production of fuel bio-ethanol will increase. However only minor renovation of existing ethanol production facilities adding dehydration facilities to existing ethanol production facilities in Lithuania because the business of fuel ethanol production and sales will not profitable enough to make the investment, and as a result, bio-ethanol production capacity will not increase

significantly.
② The volume of ethanol to meet the growing demand would not be produced and therefore gasoline and MTBE would be kept combusted at almost the current rate.

In the project scenario, all the produced fuel bio-ethanol will be used to replace gasoline in Lithuania and other countries in EU. The GHG emission corresponding to the replaced gasoline is the primary cause of the GHG emission reduction. In addition, further reduction is attainable by utilizing less energy consuming technology in fuel ethanol production process.

The project's difference from the baseline is demonstrated by the economic barriers facing the project activity. It is obvious that the IRR for the project scenario will be lower than that for the baseline scenario because of the investment cost. Therefore, the project activity is not economically attractive.

The estimated amount of emission reductions caused by this project activity calculated on a lifecycle basis is 129,600 tons of $CO_{2\ (e)}$ per annum.

A.4.4.1 Estimated amount of emission reductions over the chosen crediting period:

Over the crediting period of 14 years the project is expected to reduce emissions of 1,814,400 tons of $CO_{2\ (e)}$.

A.4.5. Public funding of the project activity:

The project is not funded by the Government of Lithuania.

B. Application of a baseline methodology:

B.1. Title and reference of the approved baseline methodology applied to the project activity:

Because no baseline methodology suitable for the proposed project activity has been approved .by the time of this writing, a new baseline methodology is proposed. The title of the new methodology is: Production of bio-ethanol for transportation use.

B.1.1 Justification of the choice of the methodology and why it is applicable to the project activity:

As the project activity is an investment in a fuel bio-ethanol production facility, the methodology is directly related to the project activity.

The criteria for the applicability of methodology are as follows:

1. There will be no shortage in the supply of feedstock.
2. Production of feedstock for the project does not cause negative effect on environmental conditions.
3. Produced anhydrous bio-ethanol is used to replace some of the gasoline and petroleum-derived additives currently used in transportation fuel.
4. Produced bio-ethanol can be sold to countries other than the host country.
5. Demand for fuel bio-ethanol is larger than production.
6. Other fuel bio-ethanol production plants will not be newly constructed.

The feedstock production capacity of Lithuania will be large enough for providing feedstock to the project activity. In addition to the existing fields, there is a

large area of unused fields suitable for production of wheat and other grains. The large area of unused fields suitable for cultivation also ensures the second condition, because there is no need to cut forests to enlarge cultivation fields.

It is EU's policy to use bio fuel to replace some of the gasoline and petroleum-derived additives currently used in transportation fuel. And for the passenger vehicle the bio fuel will be bio-ethanol. Therefore, the third condition is applicable for the project.

Fuel bio-ethanol is used in major EU countries and the production capacity is not enough to meet the demand. Therefore fuel bio-ethanol produced in Lithuania can be exported to those countries.

Although there is large demand for fuel bio-ethanol, it is not likely that production capacity increases because fuel ethanol production and sales is not very profitable business.

B.2. Description of how the methodology is applied in the context of the project activity:

The methodology uses approach 48(b) in Modalities and Procedures to determine baseline emissions. Under this approach, the economically attractive course of action, taking into account barriers to investment, is the non-project option and the investment in construction of new fuel ethanol production facility hardly occurs. Under this baseline scenario, it is very likely that additional fuel ethanol will be produced by installation of dehydration facilities to existing ethanol production facilities

Bio-ethanol may be used as an oxygenate as well as an extender, and in this case will displace MTBE. Because MTBE has higher lifecycle emissions than gasoline, the use of gasoline as the basis for baseline emissions is conservative.

The following are the alternative scenarios under the conditions that the proposed project is not implemented.

① Supply of fuel bio-ethanol is far too short to meet the demand as a whole.
② Other fuel bio-ethanol production plants will be newly constructed.
③ The current situation continues as is.
④ Not enough biomass for the feedstock is available.
⑤ Plants other than bio-fuel production which cause increase in GHG emission are constructed.
⑥ The GHG emissions from automobile increases at the similar rate as expected GDP increase rate.

Alternative① and ⑥ above are most likely to occur under the situation. Alternatives②～④ are rejected based on the applicability conditions. Alternative⑤is discarded to be on the conservation side of GHG emissions.

Alternative ① is likely because demand for fuel bio-ethanol is larger than production capacity as indicated as an applicability condition and some incentives are likely to be given to fuel bio-ethanol producers and distributors.

Alternative ⑥ is also likely to occur because the use of automobile is closely related to economic activities.

Through the above selection process, the baseline scenario determined is that fuel bio-ethanol production plants will not be newly constructed and the supply of fuel

bio-ethanol is far too short to meet the demand as a whole. The criteria used in assessing the baseline scenario options are plausibility in the existence of economical barriers, and other circumstantial phenomena.

B.3. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity:

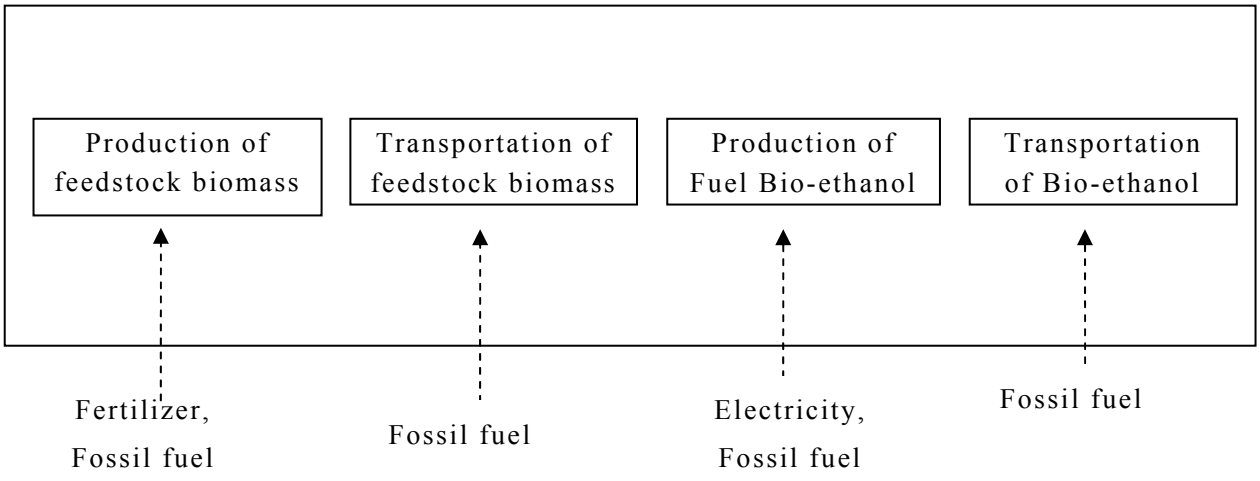
The determination of additionality is by following the consolidated tools for demonstrating additionality outlined by the 10th CDM executive meeting.

In screening the alternative scenarios, the baseline scenario determined is as shown in B2 above; new fuel bio-ethanol production plants will not be constructed and the supply of fuel bio-ethanol is far too short to meet the demand as a whole. In the situation that the use of ethanol blended gasoline is not mandatory and the supply of ethanol-blended gasoline is in short supply, most of the auto fuel actually used will remain to be gasoline.

On the other hand, in project scenario, all the fuel ethanol will be used in bio-ethanol blended gasoline. As a result, the gasoline replaced by fuel bio-ethanol which would have been used as automobile fuel is not used, which proves the additionarily

B.4. Description of how the definition of the project boundary related to the baseline methodology selected is applied to the project activity:

Because the proposed baseline methodology is based on a lifecycle approach, the project boundary covers all emissions related to the project activity which is under the control of the project participants.



B.5. Detailed baseline information, including the date of completion of the baseline study and the name of person(s)/entity(ies) determining the baseline:

C. Duration of the project activity / Crediting period:

C.1. Duration of the project activity:

C.1.1. Starting date of the project activity:

2007

C.1.2. Expected operational lifetime of the project activity:

25 years

C.2. Choice of crediting period and related information:

C.2.1 Renewable crediting period:

14 years

C.2.1.1. Starting date of the first crediting period:

2008

C.2.1.2. Length of the first crediting period:

7 years

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

C.2.2.2. Length:

D. Application of a monitoring methodology and plan:

D.1. Name and reference of approved monitoring methodology applied to the project activity:

A new methodology titled “Baseline methodology for the production of bio-ethanol for transportation use” has been proposed for the project activity.

D.2. Justification of the choice of the methodology and why it is applicable to the project activity:

Because there has not been any approved methodology, a new methodology has been proposed.

D.2.1. Option 1: Monitoring of the emissions in the project scenario and the baseline scenario:

D. 2.1.1. Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:								
ID number	Data variable	Source of data	Data unit	Measured(m), calculated(c), estimated(e)	Recording frequency	Proportion of data to be monitored	How will the data be archived?(electronic/paper)	Comment
D21-1 Q_{EtOH}	Fuel ethanol sold	meter	kl	m	daily	100%	electronic	
D21-2 $Q_{non-transp}$	Produced bio-ethanol used for purposes other than transportation	meter	kl	m	When necessity arises	100%	electronic	
D21-3 H_{EtOH}	Thermal content of ethanol	meter	kl	m	daily	100%	electronic	
D21-4 $C_{ef\ fossil\ fuel}$	Emission coefficient for fossil fuel to be substituted by ethanol	meter	kl	m	daily	100%	electronic	
D21-5 $Q_{ff\ i}$:	Consumption of fossil fuel i at a bio-ethanol production plant	meter	kl	m	daily	100%	electronic	
D21-6 $Q_{bEtOH\ transp}$	Bio-ethanol consumed for transporting bio-ethanol	meter	kl	m	daily	100%	electronic	
D21-7 $PE_{f\ transp}$	CO_2 emission concerning transportation from ethanol production plant to gasohol supply facilities		Number of trucks and other transportation media	m and c	daily	100%	electronic	

D21-8 $C_{eff\ gasohol}$	CO_2 emission coefficient for fossil fuel contained in gasohol	meter	kl	m	daily	100%	electronic	
D21-9 $PE_{e\ transp}$	CO2 emissions concerning transportation from ethanol production plant to gasohol supply facilities	meter		m	daily	100%	electronic	
D21-10 $PE_{f\ nitro}$	N2O emissions concerning the use of chemical fertilizer in cultivating the feedstock	meter	kl	m	daily	100%	electronic	
D21-11 $PE_{f\ field}$	CO2 emissions concerning the fossil fuel consumed in cultivating feedstock materials	meter	kl	m	daily	100%	electronic	
D21-12 $P_{e\ prodtn}$	Consumption of electricity at a bio-ethanol production plant	meter	kl	m	daily	100%	electronic	

D21-13 $C_{ef\ elec}$	CO2emission coefficient relating to consumed electricity	meter	kl	m	daily	100%	electronic	
D21-14 $C_{cor\ elec}$	Correction factor relating to electricity transmission loss	meter	kl	m	daily	100%	electronic	
d21-15 $PE_{p\ fertilizer}$	CO2 emission at chemical fertilizer production.	meter	kl	m	daily	100%	electronic	

D.2.1.2. Description of formulae used to estimate project emissions (for each gas, source, formulae/algorithm, emissions units of CO2 equ.):

Emission reduction of the project activity is calculated by the following formula.

$$ER = BE - PE + L$$

where,

ER: Emission reduction

BE: Baseline lifecycle emission [ton-CO2 /y]

PE: Project lifecycle emission

L: Leakage

GHG emission related to the project within the boundary is given by the following formula:

$$PE = \sum Q_{ff\,i} \times C_{ef\,fossil\,fuel} + PE_{f\,transp} + PE_{e\,transp} + PE_{f\,nitro} + PE_{f\,field}$$

where,

$Q_{ff\,i}$: *Consumption of fossil fuel i at a bio-ethanol production plant [ton/yr]*

$C_{ef\,fossil\,fuel}$: *CO_2 emission coefficient for fossil fuel i [ton CO_2 / ton fossil fuel i]*

$PE_{f\,trans}$：*CO_2 emissions concerning transportation from cultivation field to ethanol production plant [ton CO_2 /yr]*

$PE_{e\,trans}$：*CO_2 emissions concerning transportation from ethanol production plant to gasohol supply facilities* [*ton CO_2 /yr*]

$PE_{f\,nitro}$：*N2O emissions concerning the use of chemical fertilizer in cultivating the feedstock [t $CO_{2\,(e)}$ /yr]*

$PE_{f\,field}$：*CO_2 emissions concerning the fossil fuel consumed in cultivating feedstock materials [t CO_2 /yr]*

Leakage is given by the following formula.

$$L = P_{e\,prodtn} \times C_{e\,elec} \times C_{cor\,elec} + PE_{p\,fertilizer}$$

where,

$P_{e\,prodtn}$: *Consumption of electricity at a bio-ethanol production plant.[MWh/yr]*

$C_{ef\,elec}$: *CO_2 emission coefficient relating to consumed electricity [ton CO_2 / MWh]*

$C_{cor\,elec}$: *Correction factor for electricity lifecycle CO_2 emission [-]*

$PE_{p\,fertilizer}$: *CO_2 emission at chemical fertilizer production.[ton $CO_{2\,(e)}$ /yr]*

L: Leakage

D.2.1.3. Relevant data necessary for determining the baseline of anthropogenic emissions by sources of GHGs within the project boundary and how such data will be collected and archived:

D.2.1.3. Relevant data necessary for determining the baseline of anthropogenic emissions by sources of GHGs within the project boundary and how such data will be collected and archived :								
ID number	Data variable	Source of data	Data unit	Measured(m), calculated(c), estimated(e)	Recording frequency	Proportion of data to be monitored	How will the data be archived?(electronic/paper)	Comment
B23-1. Q_{EtOH}^{vol}	Bio-ethanol sold (in volume)	Volume meter	liter	m	daily	100%	electronic	
B23-2 ρ	Density of ethanol	Density meter	k g/l	m	Seasonally	sample	electronic	
B23-3. H_{EtOH}	Thermal content of ethanol	Analysis	kJ/l	m	As necessity arises	sample	electronic	
B23-4. $Q_{non\text{-}transp}$	Bio-ethanol used for purposes other than transportation	meter	kl	m	daily	100%	electronic	

D 2.1.4. Description of formulae used to estimate baseline emissions (for each gas, source, formulae/algorithm, emissions units of CO2 equ.):

The annual baseline lifecycle emission, *BE*, within the boundary is calculated by the following formula.

$$BE = (Q_{EtOH} - Q_{non\text{-}transp}) \times H_{EtOH} \times C_{ef\ gasoline} \times C_{ef\ fossil\ fuel}$$

where:

Q_{EtOH}：*Amount of fuel ethanol produced or sold per year*［*ton-ethanol/yr*］
$Q_{non\text{-}transp}$：*Amount of produced bio-ethanol used for purposes other than transportation*［ton-ethanol/yr］
H_{EtOH}：*Thermal content of ethanol per unit mass*［*TJ/ton-ethanol*］
$C_{ef\ fossil\ fuel}$：*Lifecycle CO_2 equivalent emission coefficient for fossil fuel to be substituted by ethanol*［*ton-CO_2/TJ*］

D.2.2. Option 2: Direct monitoring of emission reductions from the project activity (values should be consistent with those in section E):

D.2.2.1. Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:

D.2.2.1. Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:								
ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data variable	Source of data	Data unit	Measured(m), calculated(c), estimated(e)	Recording frequency	Proportion of data to be monitored	How will the data be archived?(electronic/paper)	Comment

D.2.2.2. Description of formulae used to calculate project emissions (for each gas, source, formulae/algorithm, emissions units of CO2 equ.):

D.2.3. Treatment of leakage in the monitoring plan:

D.2.3.1. If applicable, please describe the data and information that will be collected in order to monitor leakage effects of the project activity

D.2.3.1. If applicable, please describe the data and information that will be collected in order to monitor leakage effects of the project activity								
ID number	Data variable	Source of data	Data unit	Measured(m), calculated(c), estimated(e)	Recording frequency	Proportion of data to be monitored	How will the data be archived?(electronic/paper)	Comment
D23-1. Q_{EtOH}^{vol}	Bio-ethanol sold (in volume)	Volume meter	liter	m	daily	100%	electronic	
D23-2 ρ	Density of ethanol	Density meter	k g/l	m	Seasonally	sample	electronic	
D23-3. H_{EtOH}	Thermal content of ethanol	Analysis	kJ/l	m	Once at the beginning	sample	electronic	
D23-4. $Q_{non\text{-}transp}$	Bio-ethanol used for purposes other than transportation	meter	kl	m	daily	100%	electronic	

D.2.3.2. Description of formulae used to estimate leakage (for each gas, source, formulae / algorithm, emissions units of CO2 equ.):

D.2.4. Description of formulae used to estimate emission reductions for the project activity (for each gas, source, formulae/algorithm, emissions units of CO2 equ.):

D.3. Quality control (QC) and quality assurance (QA) procedures undertaken for data monitored:

Data items in tables contained in sections D.2.1 or D.2.2, as applicable.

D.3. Quality control (QC) and quality assurance (QA) procedures are being undertaken for data monitored		
Data	Uncertainty level of data (High/Medium/Low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.

D.4. Please describe the operational and management structure that the project operator will implement in order to monitor emission reductions and any leakage effects generated by the project activity:

D.5. Name of person/entity determining the monitoring methodology:

E.: Estimation of GHG emissions by sources:

E.1. Estimate of GHG emissions by sources:

GHG emission related to the project within the boundary is given by the following formula:

$$PE = \sum Q_{ff\,i} \times C_{ef\,fossil\,fuel} + PE_{f\,transp} + PE_{e\,transp} + PE_{f\,nitro} + PE_{f\,field}$$

where,

$Q_{ff\,i}$: *Consumption of fossil fuel i at a bio-ethanol production plant [ton/yr]*

$C_{ef\,fossil\,fuel}$: *CO_2 emission coefficient for fossil fuel i [ton CO_2 / ton fossil fuel i]*

$PE_{f\,trans}$: *CO_2 emissions concerning transportation from cultivation field to ethanol production plant [ton CO_2/yr]*

$PE_{e\,trans}$: *CO_2 emissions concerning transportation from ethanol production plant to gasohol supply facilities* [*ton CO_2/yr*]

$PE_{f\,nitro}$: *N2O emissions concerning the use of chemical fertilizer in cultivating the feedstock [t $CO_{2\,(e)}$/yr]*

$PE_{f\,field}$: *CO_2 emissions concerning the fossil fuel consumed in cultivating feedstock materials [t CO_2/yr]*

By calculating the formula,

Estimated PE 131,960 [ton CO_2/yr]

E.2. Estimated leakage:

Leakage is given by the following formula.

$$L = P_{e\,prodtn} \times C_{e\,elec} \times C_{cor\,elec} + PE_{p\,fertilizer}$$

where,

$P_{e\,prodtn}$: *Consumption of electricity at a bio-ethanol production plant. [MWh/yr]*

$C_{ef\,elec}$: *CO_2 emission coefficient relating to consumed electricity [ton CO_2 / MWh]*

$C_{cor\,elec}$: *Correction factor for electricity lifecycle CO_2 emission [-]*

$PE_{p\,fertilizer}$: *CO_2 emission at chemical fertilizer production.[ton $CO_{2\,(e)}$/yr]*

However, because electricity is not bought from outside and $PE_{p\,fertilizer}$ is regarded as not caused by the project. Therefore Leakage is taken as zero.

E.3. The sum of E.1 and E.2 representing the project activity emissions:

The project emission is 131,960 [ton CO_2 /yr].

E.4. Estimated anthropogenic emissions by sources of greenhouse gases of the baseline:

The annual baseline lifecycle emission, *BE*, within the boundary is calculated by the following formula.

$$BE = (Q_{EtOH} - Q_{non\text{-}transp}) \times H_{EtOH} \times C_{ef\ gasoline} \times C_{ef\ fossil\ fuel}$$

where:

Q_{EtOH} : *Amount of fuel ethanol produced or sold per year* [*ton-ethanol/yr*]

$Q_{non\text{-}transp}$: *Amount of produced bio-ethanol used for purposes other than transportation* [ton-ethanol/yr]

H_{EtOH} : *Thermal content of ethanol per unit mass* [*TJ/ton-ethanol*]

$C_{ef\ fossil\ fuel}$: *Lifecycle CO_2 equivalent emission coefficient for fossil fuel to be substituted by ethanol* [*ton-CO_2/TJ*]

By calculating the formula,

Estimated BE 261,800 [ton CO_2 /yr]

E.5. Difference between E.4 and E.3 representing the emission reductions of the project activity:

The amount of emission reductions caused by this project activity calculated on a lifecycle basis is 129,600 tons of $CO_{2\,(e)}$ per annum.

E.6. Table providing values obtained when applying formulae above:

F.: Environmental impacts:

F.1. Documentation on the analysis of the environmental impacts, including transboundary impacts:

Although bio-ethanol production process is comparatively environmental friendly, the Lithuanian law on environmental impact assessment requires business participants to conduct the assessment.

F.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party.

G. Stakeholders' comments:

G.1. Brief description of how comments by local stakeholders have been invited and compiled:

Local stake holders' comments have been gathered on the occasion of visiting them.

G.2. Summary of the comments received:

Staff of the Lithuanian chamber of Agriculture commented that this project would be taken affirmatively by farmers and others concerned with Lithuanian agriculture, especially agriculture people in the Kaunas region because the project would assure them stable income for a long time to come. Besides no harmful effect substance will be emitted into the environment throughout the operation of ethanol production.

Mayor and others at Kaunas Municipality were also very affirmative for the project expecting increase in revenue through ethanol production and employment increase in the region.

G.3. Report on how due account was taken of any comments received:

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Public Enterprise “Kauno NOVA”
Street/P.O.Box:	Griunvaldo 22
Building:	
City:	Kaunas
State/Region:	Kaunas
Postfix/ZIP:	LT-3000
Country:	Lithuania
Telephone:	8-699-25967
FAX:	8-699-25967
E-Mail:	nova@org.ktu.lt
URL:	
Represented by:	
Title:	Dr.
Salutation:	
Last Name:	Petrauskas
Middle Name:	
First Name:	Gediminas
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	

Organization:	Mitsui Engineering & Shipbuilding Co., Ltd.
Street/P.O.Box:	6-4, Tsukiji 5-chome, Chuo-ku
Building:	
City:	Tokyo
State/Region:	Tokyo
Postfix/ZIP:	104-8439
Country:	Japan
Telephone:	+81-3-3544-3147
FAX:	+81-3-3544-3050
E-Mail:	prdept@mes.co.jp
URL:	www.mes.co.jp/
Represented by:	Takao Motoyama
Title:	
Salutation:	
Last Name:	
Middle Name:	
First Name:	
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding is received.

Annex 3

BASELINE INFORMATION

Item	Source of data	Remarks
Amount of fuel ethanol produced or sold per year	Estimation	
Thermal content of ethanol per unit mass	Published material	
Lifecycle CO_2 equivalent emission coefficient for fossil fuel to be substituted by ethanol	IPCC GHG Inventory	

Annex 4

MONITORING PLAN

The following is the prime items to be monitored.

1. Feedstock and other materials received and used at the ethanol production facility.
2. Anhydrous ethanol produced at the facility.
3. Anhydrous ethanol delivered to buyers.
4. Operation history of the ethanol production plant. (Date and time of each start up and shutdown, etc.)
5. Fossil fuels used for operation of the ethanol production plant.
6. Fossil fuels used for transportation.
7. Fossil fuels used for cultivation of feedstock
8. Fertilizers used for cultivation of feedstock.

CLEAN DEVELOPMENT MECHANISM

PROPOSED NEW METHODOLOGY: BASELINE (CDM-NMB)

Version 01 - in effect as of: 1 July 2004

CONTENTS

PROPOSED NEW METHODOLOGY: BASELINE (CDM-NMB) - Version 01 CDM – Executive Board

SECTION A. Identification of methodology

A.1. Proposed methodology title:

Baseline methodology for the production of bio-ethanol for transportation use

A.2. List of category(ies) of project activity to which the methodology may apply:

Transportation

A.3. Conditions under which the methodology is applicable to CDM project activities:

The methodology is applicable to project activities that reduce emissions through the production and sale of fuel bio-ethanol for transportation use. The following are the conditions for the methodology to be applicable to the project:

1. There will be no shortage in the supply of feedstock.
2. Production of feedstock for the project does not cause negative effect on environmental conditions
3. Produced anhydrous bio-ethanol is used to replace some of the gasoline and petroleum-derived additives currently used in transportation fuel.
4. Produced bio-ethanol can be sold to countries other than the host country.
5. Demand for fuel bio-ethanol is larger than production.
6. Other fuel bio-ethanol production plants will not be newly constructed.

A.4. What are the potential strengths and weaknesses of this proposed new methodology?

The methodology is based on consideration of lifecycle GHG emission, which enables more thorough calculation of GHG emission.

SECTION B. Overall summary description:

The baseline methodology is composed of ①determination of applicability conditions, and ② baseline scenario determination:

(1) Applicability conditions

The methodology is for project activities that cause to reduce GHG emissions through the production and sale of fuel bio-ethanol for transportation use. The following are the conditions for the methodology to be applicable to the project:

1. There will be no shortage in the supply of feedstock.
2. Production of feedstock for the project does not cause negative effect on environmental conditions
3. Produced anhydrous bio-ethanol is used to replace some of the gasoline and petroleum-derived additives currently used in transportation fuel.
4. Produced bio-ethanol can be sold to countries other than the host country.
5. Demand for fuel bio-ethanol is larger than production.
6. Other fuel bio-ethanol production plants will not be newly constructed.

(2) Characteristics of the methodology

The characteristic of the methodology is that it incorporates feedstock biomass production and bio-ethanol consumption as well as ethanol production.

(3). Baseline scenario and additionality

The baseline scenario will be the situation in which the-project is not implemented. The methodology follows the guidance provided by the Methodology Panel at its 11th meeting to determine whether the project is different from the baseline and is additional.

A life-cycle emission approach is utilized in determining baseline emissions and project emissions. Baseline emissions are defined as the emissions that would result from the production and combustion of the substituted non-renewable fuel, and project emissions are defined as net emissions from the production and consumption of the bio-ethanol. CO2 uptake during the growth of the bio-ethanol feedstock will be regarded as equal to the CO2 emissions from its combustion, and hence project emissions are restricted to those related to the cultivation of feedstock biomass, transportation of the biomass, production of bio-ethanol, and distribution of the bio-ethanol. In this calculation, leakage is also taken into consideration.

SECTION C. Choice of and justification as to why one of the baseline approaches listed in paragraph 48 of CDM modalities and procedures is considered to be the most appropriate:

C.1. General baseline approach:

As indicated in CDM modalities and procedures, in choosing a baseline methodology for a project activity, project participants shall select from among the following approaches the one deemed most appropriate for the project activity, taking into account any guidance by the executive board, and justify the appropriateness of their choice:

(a) Existing actual or historical emissions, as applicable;

(b) Emissions from a technology that represents an economically attractive course of action, taking into account barriers to investment;

(c) The average emissions of similar project activities undertaken in the previous five years, in similar social, economic, environmental and technological circumstances, and whose performance is among the top 20 per cent of their category.

In this baseline methodology, approach (b) above is considered to be most appropriate.

C.2. Justification of why the approach chosen in C.1 above is considered the most appropriate:

Approach (b) is selected because it is likely that the profit out of producing and selling fuel bio-ethanol would be small in comparison to the investment of an anhydrous ethanol production plant as a whole.

SECTION D. Explanation and justification of the proposed new baseline methodology:

D.1. Explanation of how the methodology determines the baseline scenario:

The following are the alternative scenarios under the conditions that the proposed project is not implemented.

⑦ Supply of fuel bio-ethanol is far too short to meet the demand as a whole.

⑧ Other fuel bio-ethanol production plants will be newly constructed.

⑨ The current situation continues as is.

⑩ Not enough biomass for the feedstock is available.

⑪ Plants other than bio-fuel production which cause increase in GHG emission are constructed.

⑫ The GHG emissions from automobile increases at the similar rate as expected GDP increase rate.

Alternative① and ⑥ above are most likely to occur under the situation. Alternatives②～④ are rejected based on the applicability conditions. Alternative⑤is discarded to be on the conservation side of GHG emissions.

Alternative ① is likely because demand for fuel bio-ethanol is larger than production capacity as indicated as an applicability condition and some incentives are likely to be given to fuel bio-ethanol producers and distributors.

Alternative ⑥ is also likely to occur because the use of automobile is closely related to economic activities.

Therefore the baseline scenario will be: Other fuel bio-ethanol production plants will not be newly constructed and the supply of fuel bio-ethanol is far too short to meet the demand as a whole.

D.2. Criteria used in developing the proposed baseline methodology:

The criteria used in assessing the baseline scenario options are plausibility in the existence of economical barriers, and other circumstantial phenomena.

D.3. Explanation of how, through the methodology, it can be demonstrated that a project activity is additional and therefore not the baseline scenario (section B.3 of the CDM-PDD):

As mentioned in D.1, the baseline scenario will be that other fuel bio-ethanol production plants will not be newly constructed and the supply of fuel bio-ethanol is far too short to meet the demand as a whole. Therefore it is obvious that the baseline scenario differs from project scenario and that the GHG emission amount for the baseline scenario is larger than that for the baseline scenario, which demonstrates itself that the project activity is additional.

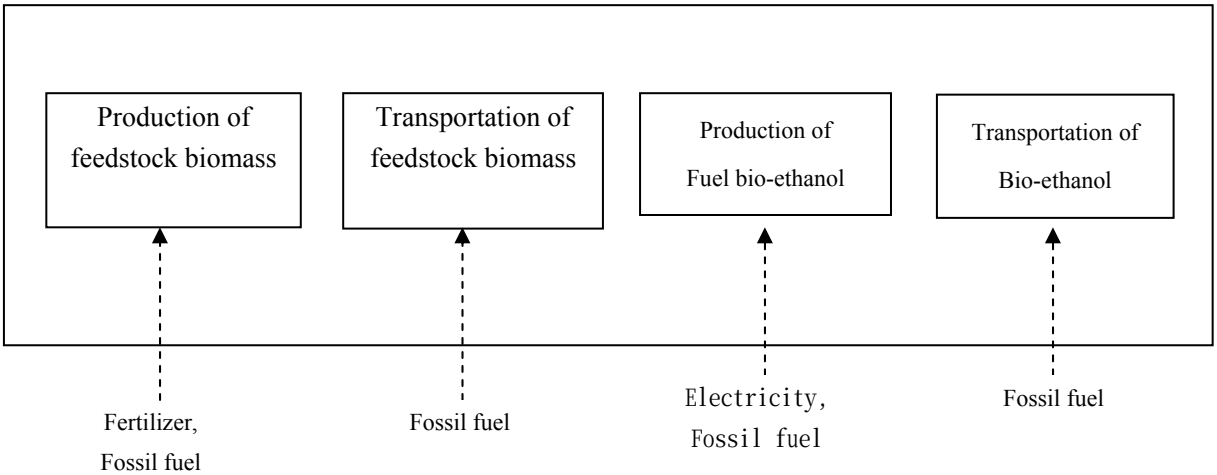
D.4. How national and/or sectoral policies and circumstances can be taken into account by the methodology:

Host country's policies and circumstances concerning renewable energy utilization can be taken into account under some of the applicability conditions

D.5. Project boundary (gases and sources included, physical delineation):

The methodology follows a life cycle approach and therefore the project boundary encapsulates the cultivation of raw materials, the production and consumption of bio-ethanol fuel, and bio-ethanol-related transportation. GHG to be taken into consideration in calculating the emission amount include CO2, N2O and CH4.

In case the project participants control preparation and supply of feedstock biomass as well as ethanol production and delivery, the project boundary will be as follows.



D.6. Elaborate and justify formulae/algorithms used to determine the baseline scenario. Variables, fixed parameters and values have to be reported (e.g. fuel(s) used, fuel consumption rates):

In determining the baseline scenario and associated emissions, the fossil fuel to be replaced by bio-ethanol is identified as gasoline. Although MTBE could also be replaced by bio-ethanol, it is omitted because MTBE has higher CO_2 emissions than gasoline, and it is conservative to take only gasoline as the basis for baseline emissions.

The annual baseline lifecycle emission, *BE*, within the boundary is calculated by the following formula.

$$BE = (Q_{EtOH} - Q_{non\text{-}transp}) \times H_{EtOH} \times C_{ef\ gasoline} \times C_{ef\ fossil\ fuel}$$

where:

Q_{EtOH}：*Amount of fuel ethanol produced or sold per year* 〔*ton-ethanol/yr*〕

$Q_{non\text{-}transp}$：*Amount of produced bio-ethanol used for purposes other than transportation* 〔*ton-ethanol/yr*〕

H_{EtOH}：*Thermal content of ethanol per unit mass* 〔*TJ/ton-ethanol*〕

$C_{ef\ fossil\ fuel}$：*Lifecycle CO_2 equivalent emission coefficient for fossil fuel to be substituted by ethanol* 〔*ton-CO_2/TJ*〕

D.7. Elaborate and justify formulae/algorithms used to determine the emissions from the project activity. Variables, fixed parameters and values have to be reported (e.g. fuel(s) used, fuel consumption rates):

GHG emissions related to the project within the boundary are described by the following formula:

$$PE = \sum Q_{ff\ i} \times C_{ef\ fossil\ fuel} + PE_{f\ transp} + PE_{e\ transp} + PE_{f\ nitro} + PE_{f\ field}$$

where,

$Q_{ff\ i}$: *Consumption of fossil fuel i at a bio-ethanol production plant [ton/yr]*

$C_{ef\ fossil\ fuel}$: *CO_2 emission coefficient for fossil fuel i [ton CO_2 / ton fossil fuel i]*

$PE_{f\ trans}$：*CO_2 emission concerning transportation from cultivation field to ethanol production plant [ton CO_2/yr]*

$PE_{e\ trans}$：*CO_2 emission concerning transportation from ethanol production plant to gasohol supply facilities* [*ton CO_2/yr*]

$PE_{f\ nitro}$： *N_2O emission concerning the use of chemical fertilizer in cultivating the feedstock [t $CO_{2\ (e)}$/yr]*

$PE_{f\ field}$：*CO_2 emission concerning the fossil fuel consumed in cultivating feedstock materials [t CO_2/yr]*

D.8. Description of how the baseline methodology addresses any potential leakage of the project activity:

Leakage is defined as the net change of anthropogenic emissions by sources of greenhouse gases (GHG) which occurs outside the project boundary, and which is measurable and attributable to the CDM project activity. When generation of electricity consumed at an ethanol production plant and production of chemical fertilizer required for cultivation of feedstock for the ethanol plant is out of the set project boundary, leakage is described as follows:

$$L = P_{e\ prodtn} \times C_{e\ elec} \times C_{cor\ elec} + PE_{p\ fertilizer}$$

where,

$P_{e\ prodtn}$: *Consumption of electricity at a bio-ethanol production plant .[MWh/yr]*

$C_{ef\ elec}$: *CO_2 emission coefficient relating to consumed electricity [ton CO_2 / MWh]*

$C_{cor\ elec}$: *Correction factor for electricity lifecycle CO_2 emission [-]*

$PE_{p\ fertilizer}$: *CO_2 emission at chemical fertilizer production.[ton $CO_{2\ (e)}$/yr]*

If project boundary is set as including the above, there will be no leakage.

D.9. Elaborate and justify formulae/algorithms used to determine the emissions reductions from the project activity. Variables, fixed parameters and values have to be reported (e.g. fuel(s) used, fuel consumption rates):

The annual lifecycle GHG emission reduction is given by the following formula:

$$ER = BE - PE - L$$

Where,

BE: The annual baseline lifecycle GHG emission [t $CO_{2\ (e)}$/yr]

PE: The annual project lifecycle GHG emission. [t $CO_{2\ (e)}$/yr]

L:.Leakage [t $CO_{2\ (e)}$ /yr]

SECTION E. Data sources and assumptions:

E.1. Describe parameters and or assumptions (including emission factors and activity levels):

The following are the parameters used in the methodology:

GHG emission caused by the project within the boundary is described by the following formula:

Parameter	Description	Assumptions	
Q_{EtOH}	Fuel ethanol sold	Shall be monitored.	
$Q_{non\text{-}transp}$	Produced bio-ethanol used for purposes other than transportation		
H_{EtOH}	Thermal content of ethanol	Shall be derived from literature.	

$C_{ef\ fossil\ fuel}$	Emission coefficient for fossil fuel to be substituted by ethanol	Shall be derived from literature.	
Q_{FF}	Consumption of fossil fuel at a bio-ethanol production plant	Shall be monitored.	
$PE_{f\ transp}$	CO_2 emissions concerning transportation from ethanol production plant to gasohol supply facilities		
$C_{ef\ ff\ gasohol}$	CO_2 emission coefficient for fossil fuel contained in gasohol		
$PE_{e\ transp}$	CO_2 emission concerning transportation from ethanol production plant to gasohol supply facilities		
$PE_{f\ nitro}$	N2O emission concerning the use of chemical fertilizer in cultivating the feedstock	IPCC default value is applicable.	
$PE_{f\ field}$	CO_2 emission concerning the fossil fuel consumed in cultivating feedstock materials	IPCC default value is applicable.	
$P_{e\ prodtn}$	Consumption of electricity at a bio-ethanol production plant	Electricity is purchased from outside the boundary.	
$C_{ef\ elec}$	CO_2 emission coefficient relating to consumed electricity		
$C_{cor\ elec}$	Correction factor relating to electricity transmission loss		
$PE_{p\ fertilizer}$	CO_2 emission at chemical fertilizer production.		

E.2. List of data used indicating sources (e.g. official statistics, expert judgement, proprietary data, IPCC, commercial and scientific literature) and precise references and justify the appropriateness of the choice of such data:

Data	Sources	Appropriateness
CO_2 emission coefficient for transportation fuel	IPCC Guidelines for National Greenhouse Gas Inventories: Reference Manual	
Fuel efficiency of trucks	Truck manufacturer's association	
Distance of transportation to distribution site	Proprietary data	
Gasoline lifecycle emissions coefficient	-IPCC Guidelines for National Greenhouse Gas Inventories: Reference Manual	
N_2O emission factors for fertilizer	IPCC Guidelines for National Greenhouse Gas Inventories: Reference Manual	

E.3. Vintage of data (e.g. relative to starting date of the project activity):

Project participants are expected to use the latest data available at the time of implementing the project.

E.4. Spatial level of data (local, regional, national):

Project participants are expected to use local data as much as possible.

SECTION F. Assessment of uncertainties (sensitivity to key factors and assumptions):

SECTION G. Explanation of how the baseline methodology allows for the development of baselines in a transparent and conservative manner:

Supposing that the most probable circumstances foreseeable is taken, and emission coefficients are regarded as appropriate, the baseline methodology allows for the development of baselines in a transparent and conservative manner.

CLEAN DEVELOPMENT MECHANISM

PROPOSED NEW METHODOLOGY: MONITORING (CDM-NMM)

Version 01 - in effect as of: 1 July 2004

CONTENTS

PROPOSED NEW METHODOLOGY: MONITORING (CDM-NMM) - Version 01 CDM – Executive Board

SECTION A. Identification of methodology

A.1. Title of the proposed methodology:

Monitoring methodology for the production of bio-ethanol for transportation use.

A.2. List of category(ies) of project activity to which the methodology may apply:

Transportation

A.3. Conditions under which the methodology is applicable to CDM project activities:

The methodology is applicable to project activities that reduce emissions through the production and sale of fuel bio-ethanol for transportation use. The following are the conditions for the methodology to be applicable to the project:

1. There will be no shortage in the supply of feedstock.
2. Production of feedstock for the project does not cause negative effect on environmental conditions
3. Produced anhydrous bio-ethanol is used to replace some of the gasoline and petroleum-derived additives currently used in transportation fuel.
4. Produced bio-ethanol can be sold to countries other than the host country.
5. Demand for fuel bio-ethanol is larger than production.
6. Other fuel bio-ethanol production plants will not be newly constructed.

A.4. What are the potential strengths and weaknesses of this proposed new methodology?

The strengths of the methodology are its simplicity and coverage of all possible GHG emissions related to bio-ethanol production in a life-cycle assessment approach. Whereas the weaknesses of this methodology are its possible inaccuracy in grasping GHG emissions reductions in life cycle assessment approach particularly concerning N_2O emissions.

SECTION B. Proposed new monitoring methodology

B.1. Brief description of the new methodology:

This methodology is designated for a project of producing bio-ethanol for transportation use. The monitoring methodology covers al the life cycle stages of bio-ethanol; feedstock biomass production stage, Biomass transport stage, ethanol production stage, ethanol transportation stage, and ethanol consumption stage.

B.2. Option 1: Monitoring of the emissions in the project scenario and the baseline scenario:

B.2.1. Data to be collected or used in order to monitor emissions from the project activity, and how this data will be archived:								
ID number	Data variable	Source of data	Data unit	Measured(m), calculated(c), estimated(e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/paper)	Comment
B21-1 Q_{EtOH}	Fuel ethanol sold	meter	kl	m	daily	100%	electronic	
B21-2 ρ	Density of fuel ethanol	meter	ton/m^3	m	daily	100%	electronic	
B21-3 $Q_{non\text{-}transp}$	Produced bio-ethanol used for purposes other than transportation	meter	kl	m	When necessity arises	100%	electronic	
B21-4 H_{EtOH}	Thermal content of ethanol	literature	GJ/ton	e	once	100%	electronic	
B21-5 $C_{eff}i$	Emission coefficient for fossil fuel to be substituted by ethanol	meter	ton CO_2 /kl	c	once	100%	electronic	
B21-6 $Q_{FF\,i}$	Consumption of fossil fuel i at bio-ethanol production plant	meter	kl	m	daily	100%	electronic	
B21-7 $PF_{f\,transp}$	Fuel used for transportation from cultivation site to ethanol plant	meter	kl	m	daily	100%	electronic	
B21-8 $PE_{f\,transp}$	CO_2 emissions concerning transportation from cultivation site to ethanol production plant	—	ton CO_2 /yr	c	daily	100%	electronic	
B21-9 $C_{eff\,gasohol}$	CO_2 emission coefficient for fossil fuel contained in gasohol	meter	kl	m	daily	100%	electronic	
B21-10	Fuel used for transportation from ethanol plant to gasohol supply	meter	kl	m	daily	100%	electronic	

$PF_{e\ transp}$	facilities							
B21-11 $PE_{e\ transp}$	CO_2 emissions concerning transportation from ethanol production plant to gasohol supply facilities	—	ton CO_2 /yr	c	daily	100%	electronic	
B21-12 $Q_{f\ ftilizer}$	fertilizer used in the cultivation fields	meter	ton/yr	m	monthly	100%	electronic	
B21-13 $PE_{f\ nitro}$	N_2O emissions concerning the use of chemical fertilizer in cultivating the feedstock	meter	ton $CO_{2(e)}$/yr	c	daily	100%	electronic	
B21-14 $PE_{f\ field}$	CO_2 emissions concerning the fossil fuel consumed in cultivating feedstock materials	—	ton CO_2/yr	c	monthly	100%	electronic	
B21-15 $P_{e\ prodtn}$	Consumption of electricity at bio-ethanol production plant	meter	kWh	m	daily	100%	electronic	
B21-16 $C_{ef\ elec}$	CO_2 emissions coefficient relating to consumed electricity	—	ton CO_2/yr	c	daily	100%	electronic	

B.2.2. Description of formulae used to estimate project emissions (for each gas, source, formulae/algorithm, emissions units of CO2 equ.):

GHG emissions related to the project within the boundary are described by the following formula:

$$PE = \sum Q_{ff\,i} \times C_{ef\ fossil\ fuel} + PE_{f\ transp} + PE_{e\ transp} + PE_{f\ nitro} + PE_{f\ field}$$

where,

$Q_{ff\,i}$: Consumption of fossil fuel i at a bio-ethanol production plant [ton/yr]

$C_{ef\ fossil\ fuel}$: *CO_2 emission coefficient for fossil fuel i [ton CO_2 / ton fossil fuel i]*

$PE_{f\ trans}$：*CO_2 emissions concerning transportation from cultivation field to ethanol production plant [ton CO_2/yr]*

$PE_{e\ trans}$：*CO_2 emissions concerning transportation from ethanol production plant to gasohol supply facilities* [*ton CO_2/yr*]

$PE_{f\ nitro}$：*N2O emissions concerning the use of chemical fertilizer in cultivating the feedstock [t $CO_{2\ (e)}$/yr]*

$PE_{f\ field}$：*CO_2 emissions concerning the fossil fuel consumed in cultivating feedstock materials [t CO_2/yr]*

B.2.3. Relevant data necessary for determining the baseline of anthropogenic emissions by sources of greenhouse gases (GHG) within the project boundary and how such data will be collected and archived:

ID number	Data variable	Source of data	Data unit	Measured(m), calculated(c), estimated(e)	Recording frequency	Proportion of data to be monitored	How will the data be archived?(electronic/paper)	Comment
B23-1. Q_{EtOH}	Bio-ethanol sold	meter	kl	m	daily	100%	electronic	
B23-2 ρ	Density of ethanol	meter	ton/kl	m	monthly	sample	electronic	
B23-3. H_{EtOH}	Thermal content of ethanol	analysis	TJ/ton	m	once	sample	electronic	
B23-4. $Q_{non\text{-}transp}$	Bio-ethanol used for purposes other than transportation	meter	kl	m	daily	100%	electronic	

B.2.4. Description of formulae used to estimate baseline emissions (for each gas, source, formulae/algorithm, emissions units of CO2 equ.):

The annual baseline lifecycle emission, *BE*, within the boundary is calculated by the following formula.

$$BE = (Q_{EtOH} - Q_{non\text{-}transp}) \times H_{EtOH} \times C_{ef\ gasoline} \times C_{e\ ff}$$

Where:

$Q_{EtOH:}$ *Amount of fuel ethanol sold per year* 〔*kl/yr*〕

$Q_{non\text{-}transp:}$ *Amount of produced bio-ethanol used for purposes other than transportation* 〔*kl-ethanol/yr*〕

$H_{EtOH:}$ *Thernmal content of ethanol per unit mass* 〔*TJ/kl-ethanol*〕

$C_{e\ ff:}$ *Lifecycle emission coefficient of* CO_2 *equivalent for fossil fuel to be substituted by ethanol* 〔*ton-*$CO_{2\ (e)}$ */TJ*〕

B.3. Option 2: Direct monitoring of emission reductions from the project activity:

B.3.1. Data to be collected or used in order to monitor emissions from the project activity, and how this data will be archived:								
ID number	Data variable	Source of data	Data unit	Measured(m), calculated(c), estimated(e)	Recording frequency	Proportion of data to be monitored	How will the data be archived?(electronic/paper)	Comment

B.3.2. Description of formulae used to calculate project emissions (for each gas, source, formulae/algorithm, emissions units of CO2 equ.):

B.4. Treatment of leakage in the monitoring plan:

B.4.1. If applicable, please describe the data and information that will be collected in order to monitor leakage effects of the project activity:								
ID number	Data variable	Source of data	Data unit	Measured(m), calculated(c), estimated(e)	Recording frequency	Proportion of data to be monitored	How will the data be archived?(electronic/paper)	Comment
B41-1 $P_{e\ prodtn}$	Consumption of electricity at a bio-ethanol production plant	meter	MWh	m	monthly	100%	electronic	
B41-2	CO_2 emission	literature	t CO_2/MWh	e	periodically	100%	electronic	

$C_{e\ elec}$	coefficient relating to consumed electricity							
B41-3 $C_{cor\ elec}$	Correction factor relating to electricity transmission loss	literature	t CO_2/MWh	e	periodically	100%	electronic	
B41-4 $PE_{p\ fertilizer}$	CO_2 emission at chemical fertilizer production	literature	ton CO_2(e) / ton fertilizer	e	periodically	100%	electronic	

B.4.2. Description of formulae used to estimate leakage (for each gas, source, formulae/algorithm, emissions units of CO2 equ.):

Leakage *L* is described by the following formula:

$$L = P_{e\ prodtn} \times C_{e\ elec} \times C_{cor\ elec} + PE_{p\ fertilizer}$$

Where,

$P_{e\ prodtn}$: Consumption of electricity at a bio-ethanol production plant. [MWh/yr]
$C_{ef\ elec}$: CO_2 emission coefficient relating to consumed electricity [ton CO_2 / MWh]
$C_{cor\ elec}$: Correction factor for electricity lifecycle CO_2 emission [-]
$PE_{p\ fertilizer}$: CO_2 emission at chemical fertilizer production. [ton $CO_{2(e)}$/yr]

B.5. Description of formulae used to estimate emission reductions for the project activity (for each gas, source, formulae/algorithm, emissions units of CO2 equ.):

Emission reduction of the project activity is calculated by the following formula.

$$ER = BE - PE + L$$

where,

ER: Emission reduction

BE: Baseline lifecycle emission [ton-CO2 /y]

PE: Project lifecycle emission

L: Leakage

B.6. Assumptions used in elaborating the new methodology:

No assumptions are made.

B.7. Please indicate whether quality control (QC) and quality assurance (QA) procedures are being undertaken for the items monitored:		
Data *(Indicate table and ID number e.g. 3.-1.;3.2.)*	Uncertainty level of data (High/Medium/Low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.

B.8. Has the methodology been applied successfully elsewhere and, if so, in which circumstances?

No

ＰＤＤ（案）の概要

A.プロジェクトの全体像

A.1 プロジェクト名

カウナス無水エタノール製造プロジェクト

A.2 プロジェクト活動

本プロジェクトでは新たにエタノール製造設備をカウナスに建設し、その周辺で栽培される小麦を主原料としてガソリン混合用のバイオエタノールを製造し、リトアニア国内及び他の EU 諸国の需要者に販売する。これにより、リトアニアの農業、燃料用エタノール関連産業の振興、化石燃料消費量の削減をもたらし、持続可能な発展に貢献することができる。

A.3 プロジェクト参加者

ホスト国:　環境省（リトアニア）

投資国:　京都メカニズム活用連絡会（日本）

プロジェクトホスト企業:　Etanolis Ltd.

プロジェクトディベロッパー:　Public Enterprise Kauno Nova,
Griunvaldo 22, Kaunas, Lithuania
TEL: 8-699-25967
E-mail : nova@org.ktu.lt

A.4 プロジェクト活動の具体的説明

A.4.1 プロジェクト活動の実施場所

リトアニア共和国カウナス市

A.4.2 プロジェクト活動のカテゴリー

輸送

A.4.3 プロジェクト活動での利用技術

無水エタノール製造における省エネルギー化技術

A.4.4 ＧＨＧ排出削減の概要

バイオマス由来の無水エタノールは再生可能エネルギーであり、その燃焼によって発生する二酸化炭素は生育中のバイオマスによって全量が吸収されるという、所謂カーボンニュートラルの推定が適用される。

本プロジェクトが実現しない場合に最も可能性の高いシナリオは、新規な燃料エタノール製造プラントの建設はなく、既存のアルコール製造設備に無水化設備を設置して燃料用エタノールが生産されるが、それでもリトアニア国内およびEU主要国において燃料用エタノールの供給量は需要量をはるかに下回る状態が続くというものである。この場合の判断基準は、新たなエタノール製造設備の建設には巨額の資金が必要であり、燃料用エタノールの販売価格が低く抑えられざるを得ない状況を想定すれば投資の可能性は極めて低いと考えられる。

A.4.5 プロジェクト活動における公的資金

リトアニア政府あるいはＥＵからの補助金の適用を予定しているが、ＣＤＭプロジェクトとは異なるためＯＤＡ資金の組込みとは無関係である。

B. ベースライン方法論の適用

本プロジェクトに適用すべき承認済みのベースライン方法論が存在しないので、新たに方法論を提案した。

B.1 新方法論の名称

提案した新方法論の題名： 輸送燃料用バイオエタノールの製造に係るベースライン方法論

B.2 新方法論の適用

ベースライン方法論で規定した方法に従ってベースラインシナリオを次の通り設定した。

ベースラインシナリオの推定には Modalities and Procedures for CDM の paragraph 48 における（b）、すなわち、投資の障害を考慮した上で、経済的に最も魅力的な技術による排出量のアプローチを適用した。この際の仮定は次の通りである。

ベースライン設定に当って次のとおり仮定した。

⑤ リトアニアではＥＵ指令に基づきバイオ燃料が導入される。

⑥ 乗用車の燃料としてバイオエタノール混合ガソリンが導入されるが、その混合率はＥＵ指令が定めるとおりに設定される。

⑦ リトアニアの今後のガソリン消費量は年率 5%で増加し続ける。

⑧ ＥＵ主要国においても燃料用エタノールの生産キャパシティーは需要規模を大きく下回る。

その上で考えられる複数のシナリオを挙げ、最も可能性の高いと考えられるシナリオとして次を選定した。すなわち、「リトアニアが EU 指令に基づいてエタノール混合ガソリンの市場導入を実施することに対応してリトアニア国内でガソリン混合燃料用エタノールの需要は増加するが、経済合理性の観点から燃料用エタノール製造工場の新設は起こらず、既存のエタノール製造設備に脱水装置を増設することにより飲料用エタノールの製造から燃料用エタノールに転換する程度にとどまる。これらは元々生産規模が小さいため全体としての燃料用エタノール生産量はほとんど増加しない。この結果、生産量は需要量を大きく下回る。他のＥＵ諸国についても同様の状況である。」

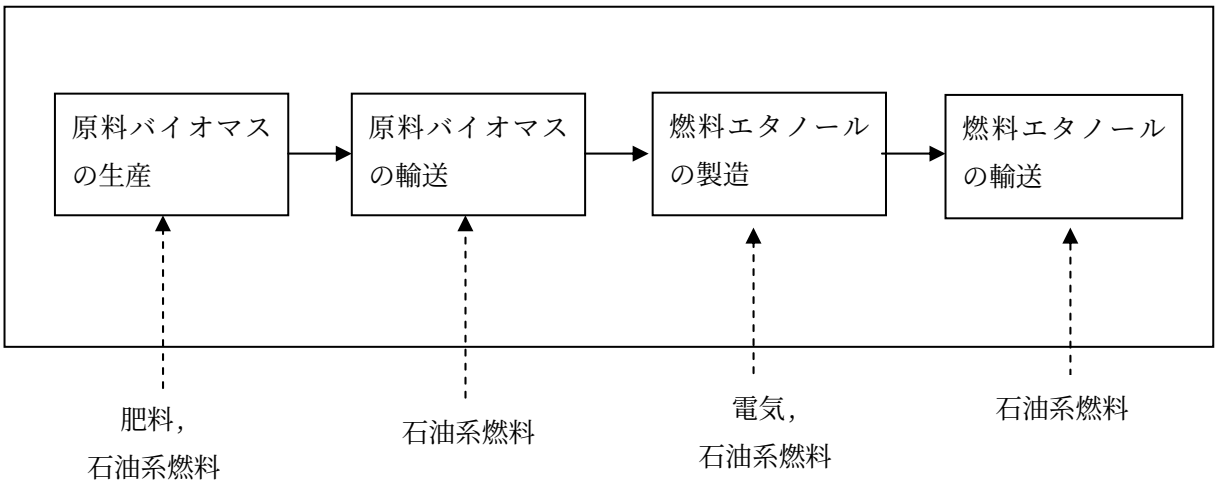
B.3 追加性

プロジェクトシナリオでは燃料用エタノール製造設備が新設され、その稼動によってリトアニアがエタノール混合ガソリンを市場導入した場合に必要となる無水エタノールが全て供給されることになる。このシナリオではベースラインシナリオに比べて設備投資費用が格段に大きく、そのためプロジェクト IRR はより低くなるので、プロジェクト活動は経済的に魅力的な選択肢とは言えない。従ってＢＡＵシナリオではない。

また、仮定により、このプロジェクトの実施により製造される無水バイオエタノールはすべて自動車用燃料として使用されるので、エタノールで代替されるガソリン量に対応するＧＨＧ発生量とプロジェクトの実施に伴って発生するＧＨＧ量との差分が削減量となり、これによって追加性が証明される。

B.４ プロジェクト境界

プロジェクト境界には原料バイオマスの生産、輸送、エタノールの製造及びその輸送にいたるプロセスが含まれる。



C. プロジェクト活動期間及びクレジット期間

C.1 プロジェクト活動期間

製造設備の耐用年数およびエタノール需要の観点から操業開始後 25 年間とする。

C.2 クレジット期間

追加性の観点から操業開始後 14 年間とする。

D. モニタリング方法論

本プロジェクトに適用すべき承認済みのモニタリング方法論が存在しないため、新たに方法論を提案した。

D.1 新方法論の名称

提案した新方法論の題名： 輸送燃料用バイオエタノールの製造に係るモニタリング方法論

D.2 プロジェクトへの新方法論の適用性

モニタリング方法論の適用条件はベースライン方法論のものと同じである。

D.3

E. GHG 排出削減量

E.1 プロジェクトを実施した場合の排出量の推定

プロジェクトを実施した場合のプロジェクト境界内におけるGHG排出量は次式で算出できる。

$$PE = \sum Q_{ff\ i} \times C_{ef\ fossil\ fuel} + PE_{f\ transp} + PE_{e\ transp} + PE_{f\ nitro} + PE_{f\ field}$$

ここで、

$Q_{ff\ i}$: バイオエタノール製造プラントにおける化石燃料 i の消費量 [トン / 年]

$C_{ef\ fossil\ fuel}$: 化石燃料 i の CO_2 排出係数 [トン CO_2 / トン 化石燃料 i]

$PE_{f\ trans}$：耕作地からエタノール製造プラントまでの輸送に係る CO_2 排出量 [トン CO_2 / 年]

$PE_{e\ trans}$：エタノール製造プラントから納入先までの輸送に係る CO_2 排出量
[トン CO_2 / 年]
$PE_{f\ nitro}$：原料バイオマスの栽培における化学肥料の使用に係る N_2O 排出量
[トン $CO_{2\ (e)}$ / 年]
$PE_{f\ field}$：原料バイオマスの栽培における化石燃料の使用に係る CO_2 排出量
[トン CO_2 / 年]

これにより算定したプロジェクト排出量の推定値は 131,960 トン $CO_{2(e)}$ /年である。

E.2 リーケージの推定

リーケージ算出式は次の通りである。

$$L = P_{e\ prodtn} \times C_{e\ elec} \times C_{cor\ elec} + PE_{p\ fertilizer}$$

ここで、
$P_{e\ prodtn}$ バイオエタノール製造工場における電力消費量 [MWh/yr]
$C_{ef\ elec}$ 消費電力に係る CO_2 排出係数 [ton CO_2 / MWh]
$C_{cor\ elec}$ 送電ロスに係る補正係数 [-]
$PE_{p\ fertilizer}$ 化学肥料の製造において排出される CO_2 量 [ton $CO_{2(e)}$ /yr]

今回の計画ではエタノールプラントの所要電力は自家発電で供給することにしているため、電力に関するリーケージはゼロとなる。また、化学肥料の製造で排出される GHG については、プロジェクトの実施によって影響を受けないので非対象とした。

E.3 ベースライン排出量の推定

次式によりベースライン排出量を算出する。

$$BE = (Q_{EtOH} - Q_{non\text{-}transp}) \times H_{EtOH} \times C_{ef\ gasoline} \times C_{ef\ fossil\ fuel}$$

ここで、
Q_{EtOH}：無水バイオエタノールの年間製造･販売量［ton-ethanol/yr］、
$Q_{non\text{-}transp}$：販売された無水バイオエタノールのうち、運輸以外の用途に使われた量［ton-ethanol/yr］、
H_{EtOH}：エタノールの単位容量あたりの発熱量［TJ/ton-ethanol］、
$C_{ef\ fossil\ fuel}$：ライフサイクルにおいてエタノールが代替する石油系燃料による CO_2 排出係数［ton- CO_2 /TJ］

これにより算定したベーライン排出量の推定値は 261,800 トン $CO_{2(e)}$ /年である。

E.4 プロジェクトによる GHG 排出削減量

上記より、プロジェクトによる GHG 排出削減量は 129,840 トン $CO_{2(e)}$ /年となる。

F. 環境影響評価

バイオエタノール製造プロセスは化学プロセスに比べて環境調和的であり、環境影響の危険は

少ない。しかし、リトアニアの環境影響評価に関する法律で事業者に環境影響評価の実施が義務つけられているため、これを履行する必要がある。なお、原料とする作物は現状生産規模よりも増産が必要となる可能性があるが、現在もカウナス市近郊には遊休農地が多く存在しており、これらを畑に再利用する場合でも環境への悪影響はないものと推定される。

G. 利害関係者のコメント

現地の農業関係者、カウナス市長、市職員にこのプロジェクトを実施することに関して意見を求めたが、批判的な意見は聞かれなかった。なお、プラント設置予定地周辺の一般住民のコメントも得る必要があるが、今回の調査期間にはヒアリングを実施できなかった。

以上