Impact of Carbon Taxes - Entrepreneur's View

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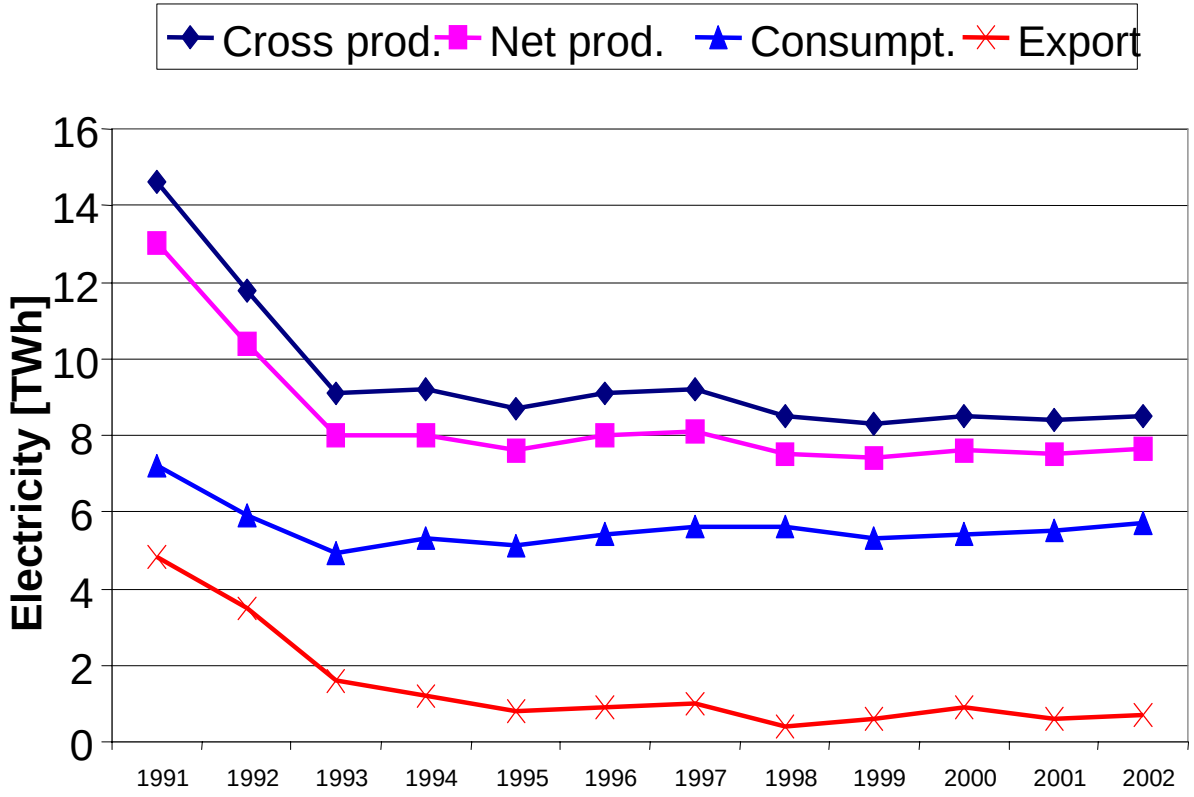
Outline

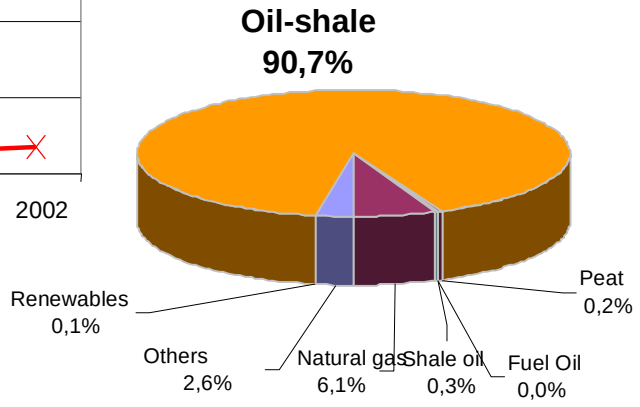
- Estonian electricity production
- Is the electricity import possible in near future?
- CO_2 taxes and EU emission trade impact to electricity sector
- Estonian electricity production scenarios (Max and CO_2-tax scenarios)
- Conclusions

Electricity production in Estonia

Electricity balance 1991-2002:



Share of fuels in electricity balance in 2002:



Basic assumptions for Eesti Energia's electricity production strategy

- EE should **secure supply of national electricity demand on basis of domestic fuels**
- EE should keep **stabilised electricity tariffs** through optimal use of domestic oil-shale
- EE should be in **compliance with coming EU *environmental acquis***
- EE should be in **compliance with environmental commitments** taken by Estonia in International Conventions
- EE should **optimise energy transmission system** taking into account losses from current situation (production in Narva, consumption in Tallinn area)
- **Cooperation with Latvenergo** to use complementary character of production capacities
- **Increase of share of renewables and Co-Generation** in line with National Long-term Development Plan of Energy and Fuels Sector
- **Minimization of risks and multi-firing fuels portfolio**

Is Import of Electricity Possible?

Where?

When?

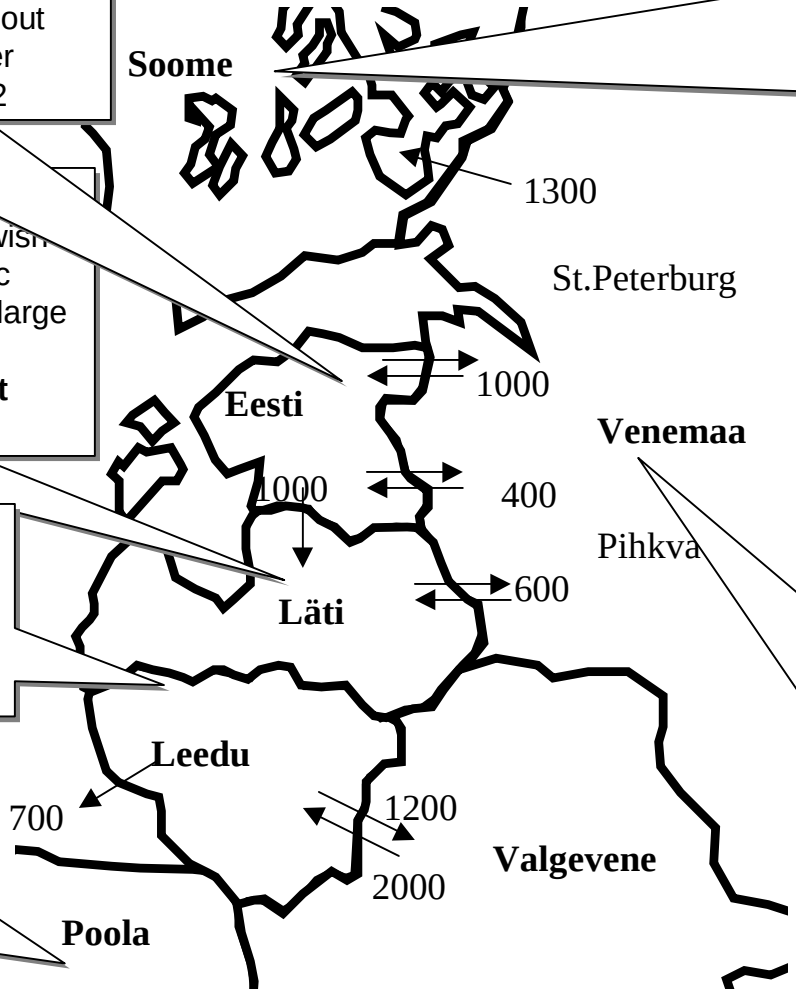
Import from neighbouring Countries?

Estonia has during coming 12 years replace/renovate existing capacities (EU LCP Directive transitional period until 2016), Without renovation there is lack of capacities to cover domestic electricity demand already on 2012

Latvia imports already today about 30% needed electricity. Latvia has declared its wish to cover all domestic demand with domestic capacities. This may mean construction of large CHP based on imported Natural gas. **It is expected that Latvia continues to import electricity at least until 2016**

Lithuania has to close Ignalina 1. and 2. Nuclear reactors by 2005. And by 2009. **After 2010. Lithuania likely become importer of electricity to cover domestic demand.**

Poland has today excess capacities based on domestic coal . **After 2015 they cannot use all the existing capacities without renovation (EU LCP Directive).**

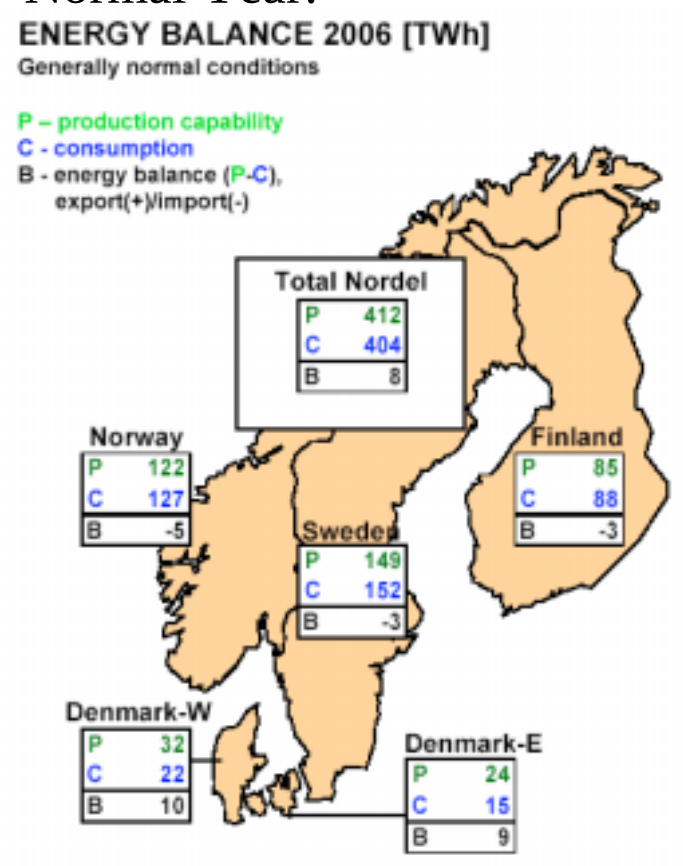


In Nordic Countries there is deficit of production Capacities, because on last 15 years there has not been invested into new capacities. Planned 5th Nuclear Reactor will cover only increased consumption.

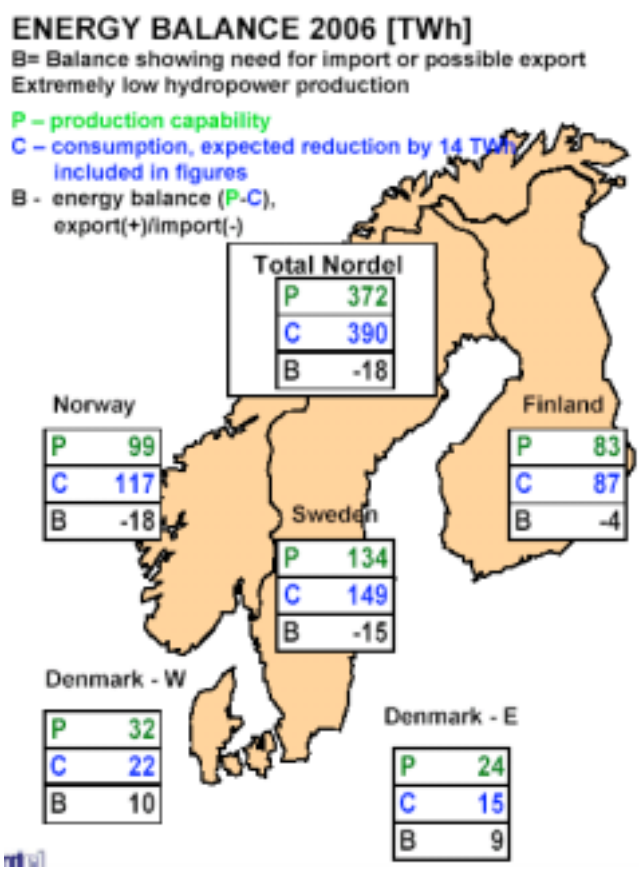
Electricity consumption in **Russia** is increasing annually by 3% Same time amount of installed capacities is decreasing with the same 3% year pace. Some experts indicate that **Russia cannot cover domestic demand already from 2005.**

Import from Nordic Countries?

Normal Year:



Low precipitation year



Source: Nordel

From 2006 Nordic Countries can cover its own demand only during "Normal" year. Finland has to import from neighbours anyway.

Elimination of excess capacities in Europe

REGIONAL ELECTRICITY MARKETS

IN THE ECT AREA

ENERGY CHARTER SECRETARIAT

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Table 6 Projected years for elimination of excess capacity

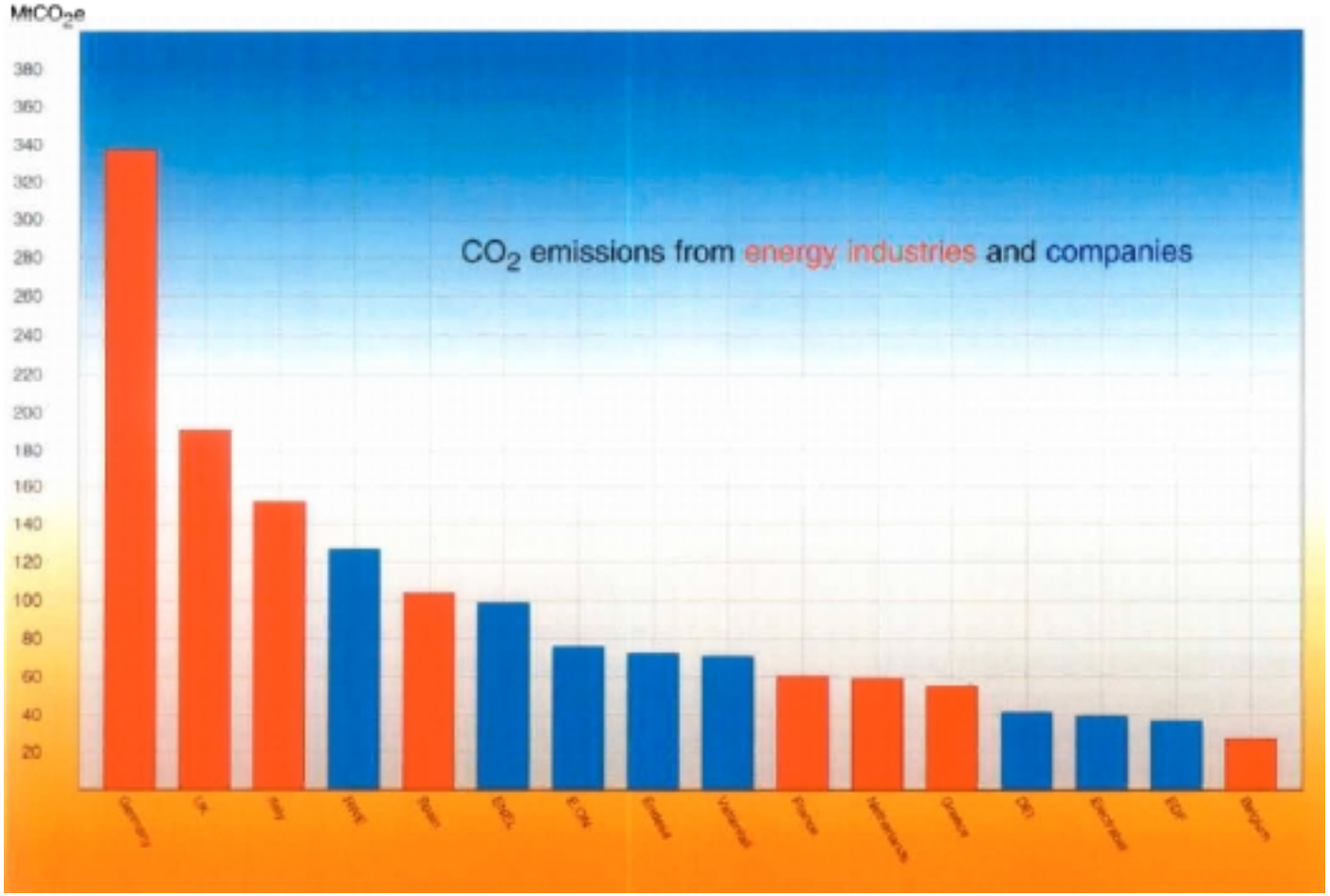
Regional Blocks	Year
Baltic States	2007
Bulgaria & Romania	2014
Caucasus	2006
Central Asia	2008
CENTREL	2004
Eastern Europe	2007
NORDEL	2005
European Russia	2004
Southern Europe	2007
UCTE	2006
Eurasian ECT	**2006**

Brussels, 25th April 2002

Carbon-taxes and Emission-trade

Impact to Estonian electricity sector?

European biggest CO_2 emitters



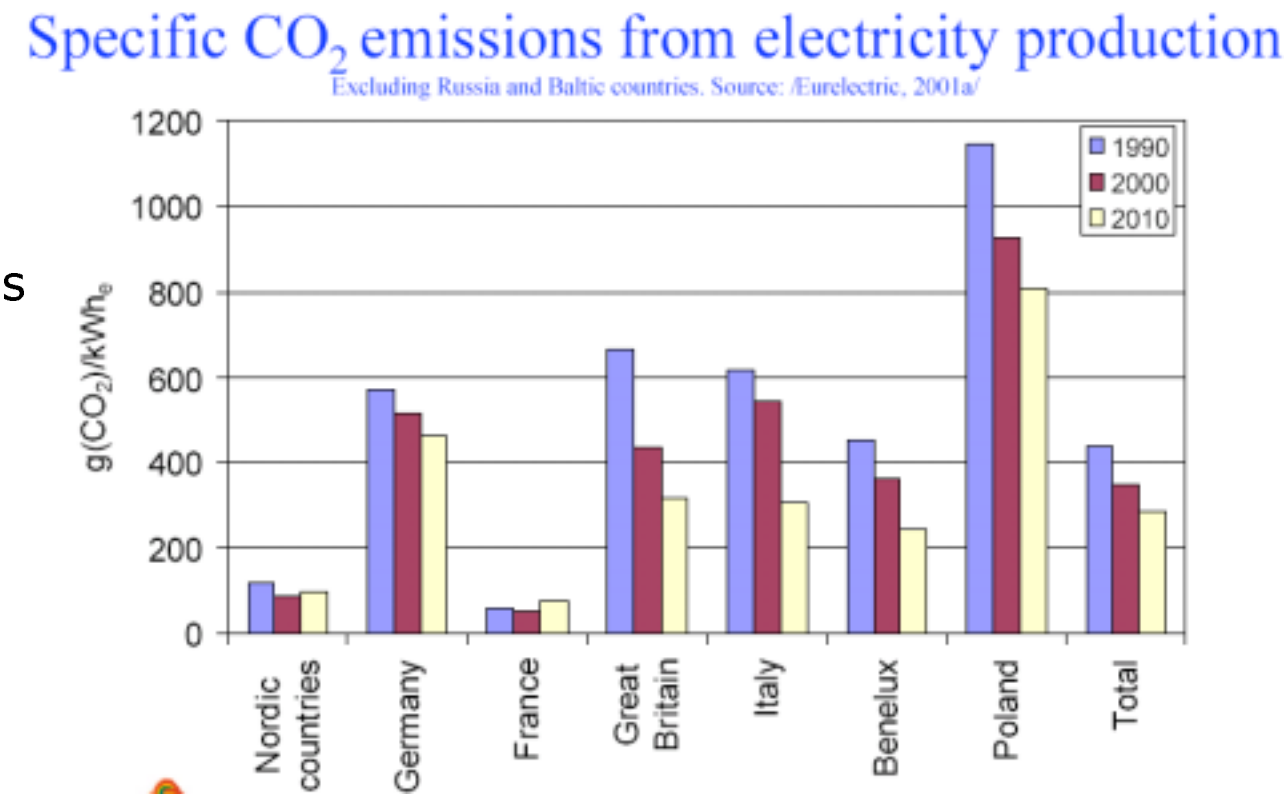
Source: Montel/powernews

CO_2 emissions of big energy companies bigger than some big countries emissions

CO_2-intensity of Estonian electricity

- Estonian CO2 emissions are relatively high: on year 2002 emissions were 12,2 tCO2 per capita

- Estonia has fulfilled the Kyoto commitment: on 2001 reduction compared to 1990 was - 55%



Allikas: Finergy

Average CO_2-emission in powerplants of Narva are in range 1,2-1,4 kg/kWh.
Both energy taxes level and CO_2-quota allocation have significant impact to production strategy of Eesti Energia.

Impact of Estonian CO_2-tax on electricity tariff

- Fee for CO_2 emission from Large Combustion Plants today is 7,5 EEK/tCO_2 (from 01.01.2005 11,3 EEK/tCO_2)
- CO_2 emission fee composed 80% from 2000 and 82% from 2001 total national emission fees revenue
- Share of CO_2 emission fee in electricity tariff is 0,9 %
- Share of overall environmental taxes (emission fees, resource fees etc.) in electricity tariff is 2,6%
- Today's (2002) CO_2-tax level in electricity tariff in Estonia is about 11,9 EEK/MWh
- Planned EU energy-tax minimum level from 01.01.2004 on electricity will be 9,5 EEK/MWh

CO_2-trade impact to electricity prices in Nordic Countries 2010

Table 5.2 Marginal prices in the year 2010, €/MWh										
			Free allocation			Auction			Free allocation	
		Baseline	€ 5	€ 10	€ 20	€ 5	€ 10	€ 20	Dry € 20	Wet € 5
Year average:		17.3	21.2	24.9	32.6	21.3	25.0	32.8	39.3	10.6
FWV1, 2879 h		18.3	22.0	25.5	33.5	22.2	25.6	33.7	37.8	11.8
FWSO, 3672 h		16.4	20.4	24.0	31.1	20.4	24.1	31.4	37.1	7.9
FWV2, 2209 h		17.5	21.4	25.6	33.9	21.5	25.7	34.0	44.9	13.6
Winter 1	day	19.0	22.5	26.1	34.8	22.8	26.1	34.8	39.6	12.4
	night	17.5	21.4	24.7	31.9	21.4	25.0	32.3	35.8	11.1
Summer	day	17.2	21.6	25.9	34.4	21.6	25.9	34.6	41.1	8.8
	night	15.5	19.0	21.8	27.3	19.1	22.0	27.8	32.5	6.9
Winter 2	day	17.7	21.7	26.1	35.0	21.7	26.1	35.0	49.1	15.2
	night	17.2	21.2	25.0	32.7	21.2	25.2	32.8	40.0	11.8

EU Emission Trade scheme will increase electricity price by 4-16 EUR/MWh (depending on prices of CO_2-quotas)

Source: Electrowatt-Econo

Conclusions : CO_2-taxes and Emission Trade will increase electricity tariffs

- Estonian specific CO_2 emissions on electricity production (t_{CO2}/MWh) are highest in the world;
- Implementation of recently adopted EU Energy Tax Directive does not have major impact on electricity tariffs, but higher tax than EU minimum tax level or possible double taxation, due to internalisation of external costs of electricity production either for environment protection or for increasing budget revenues, has significant impact;
- Emission Trade impact will depend on allocation of CO_2 Emission Quotas
- Major driving force to increase electricity tariffs comes from coming investments to achieve compliance with EU environmental requirements

Future Energy Scenarios for Estonia (with U-PLAN)

Comparison of two scenarios:

Max scenario:

Eesti Energia will cover domestic demand on basis of domestic generation capacities

CO_2-tax scenario:

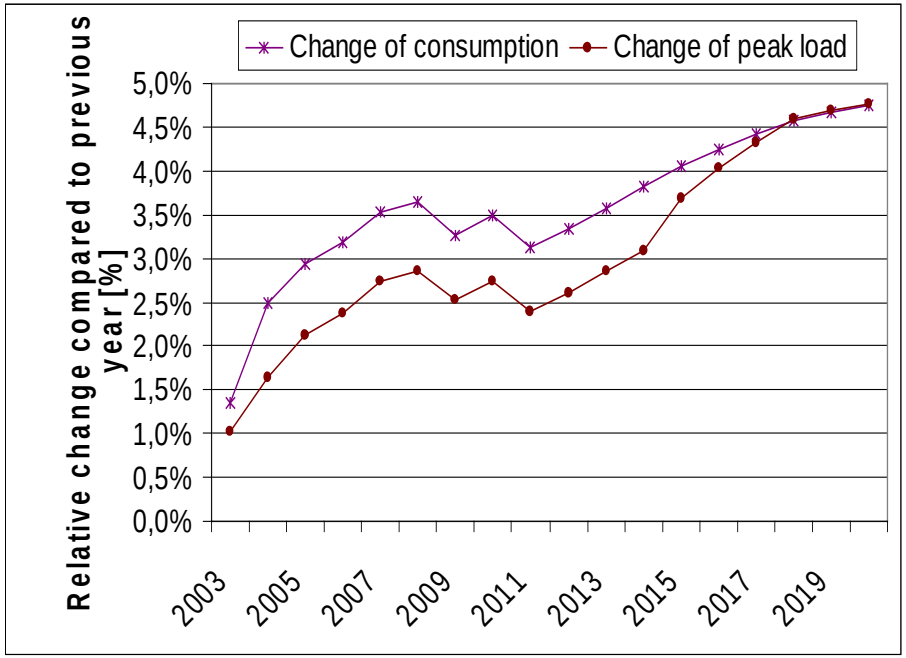
Similar to max scenario but with established constant CO_2 tax on level of 16 EUR/t with import to cover peak load

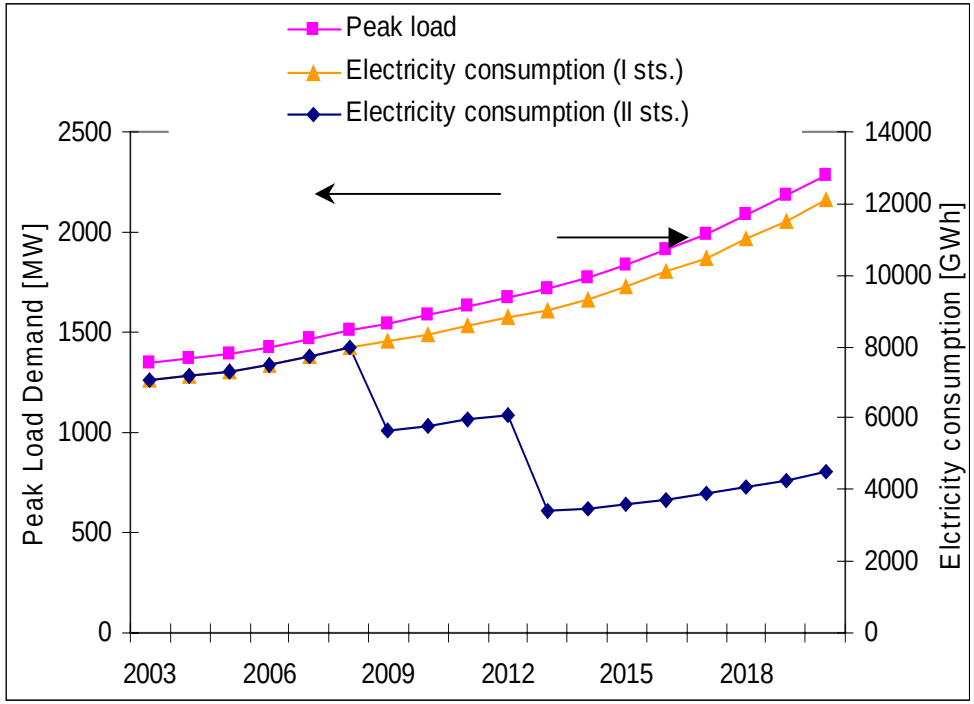
Basic assumptions

- Other environmental taxes increase 20% per annum (as proposed by MoE);
- Real price of oil-shale remain unchanged;
- Natural gas price 2003 on level 1330 EEK/1000 nm^3 price increases 3% annually;
- Max possibility to re-power to CFB 7 Eesti PP blocks;
- Possibility to re-power only one block annually;
- Renovation of one block takes 3 year;
- From year 2012 there is national SO_2 emission sealing 25000 tons/y
- Old oil-shale capacities will be closed by 2016
- Interest rate 8%

Elecricity consumption forecast

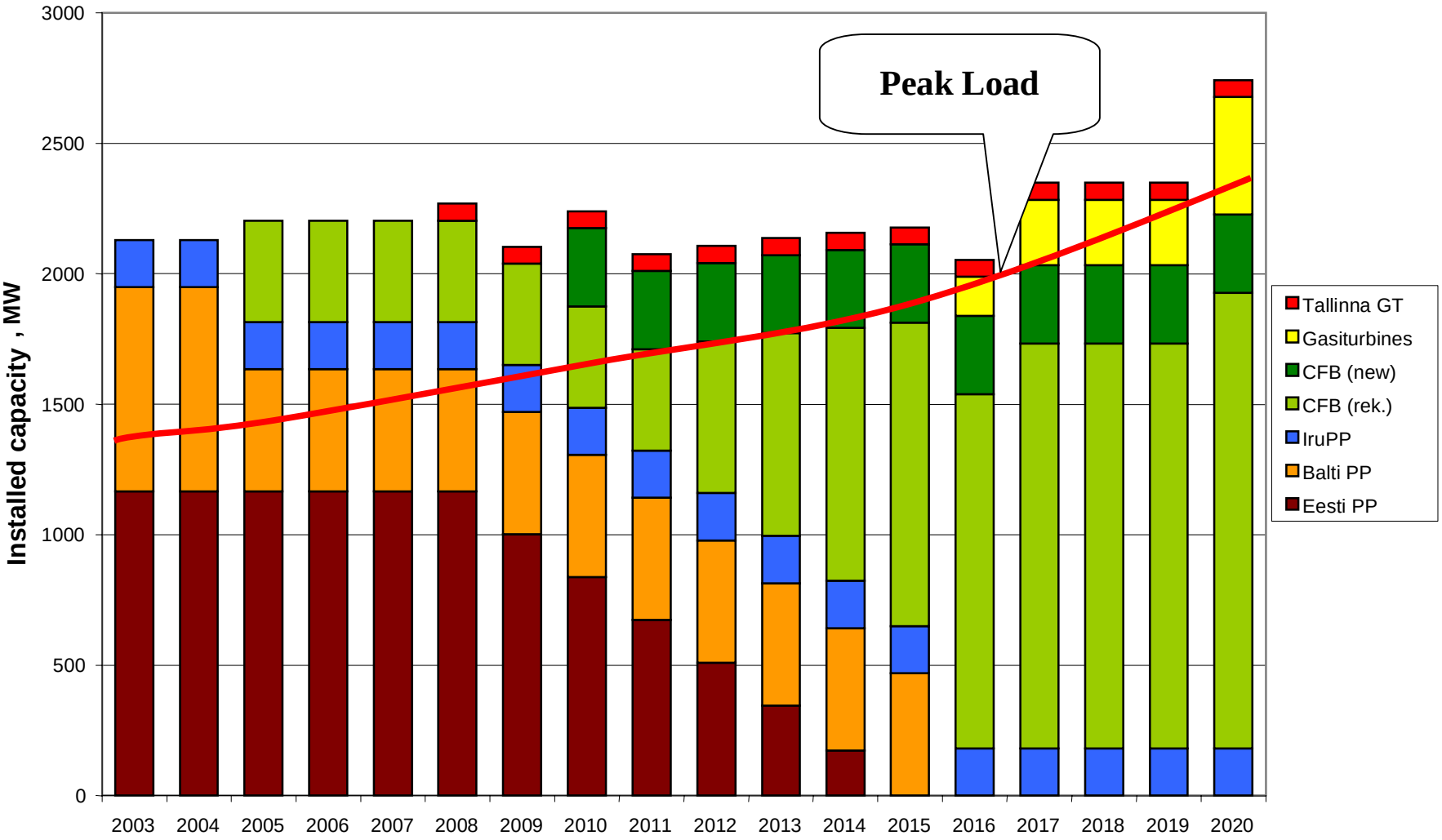
Based on Moderate Economic Growth Scenario of MoEC



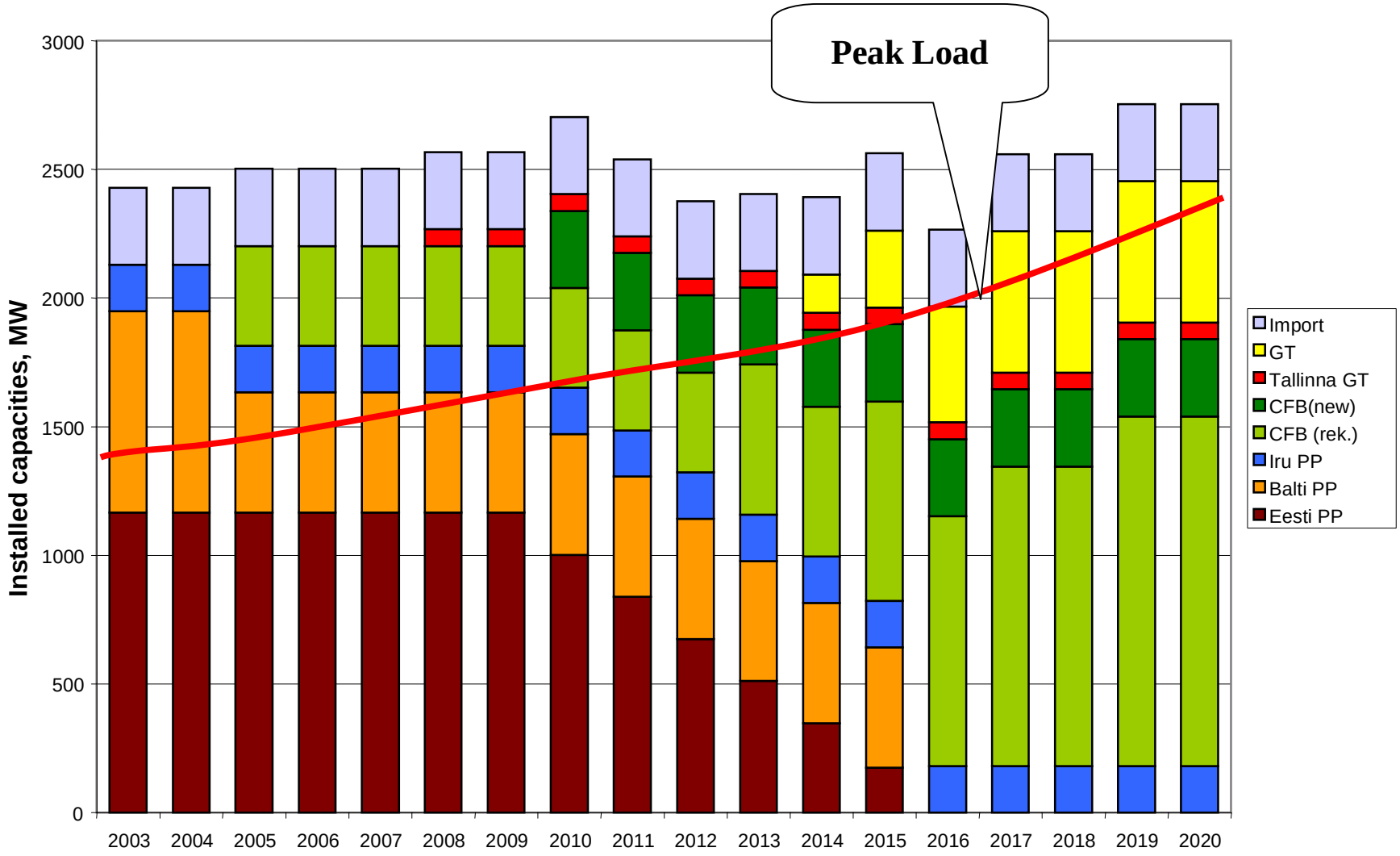


Electricity consumption and Peak Load Demand increase on average 3,6% and 3,1% annually

Max scenario production capacities



CO_2-tax scenario production capacities



Distribution of renovated and new capacities

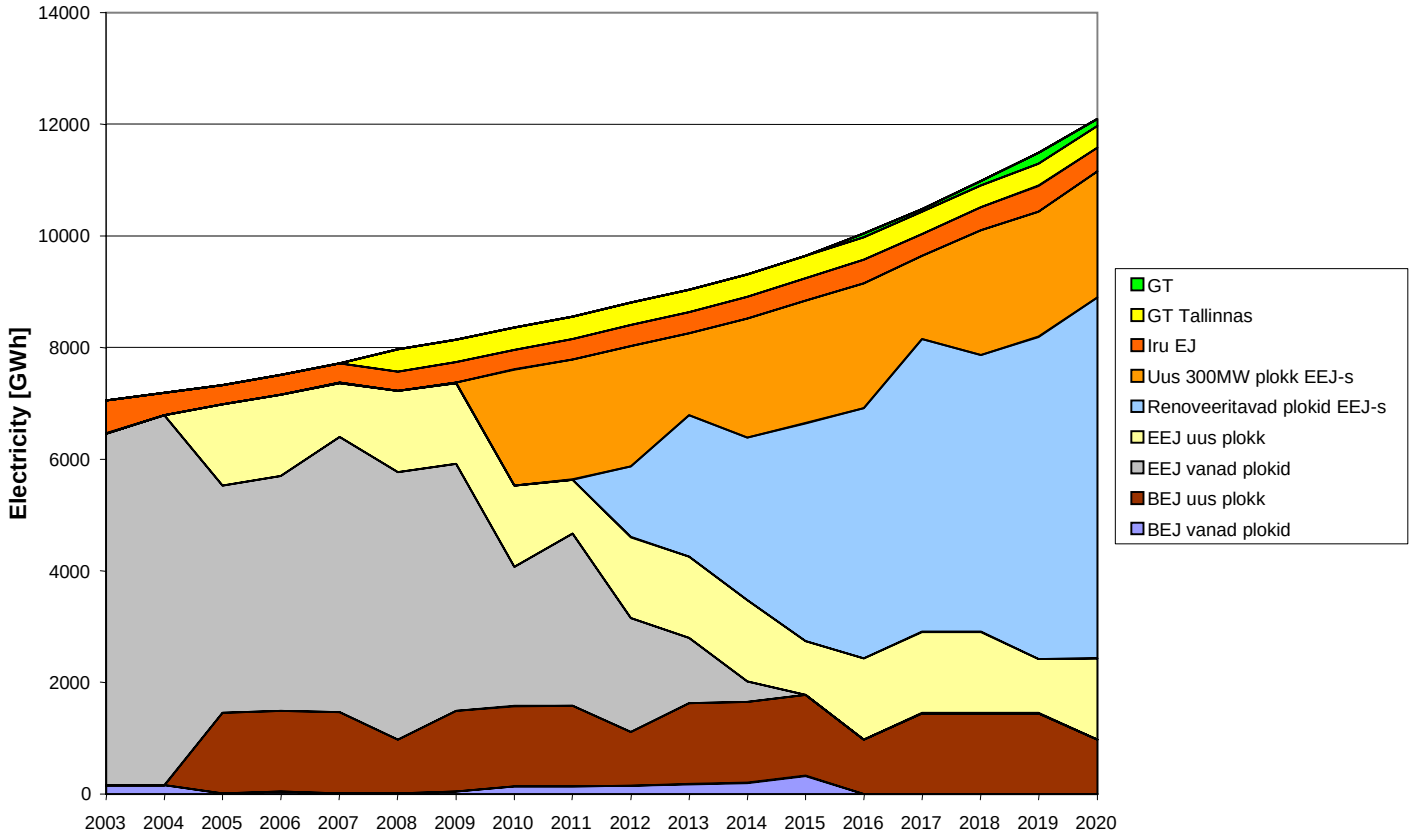
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Max scenario																		**2561 MW**
- repowering oil-shale.		2x194							194	194	194	194	194	194			194	1746 MW
-new oil-shale							300											300 MW
- gasturbines					65								3x50	2x50			4x50	515 MW
CO_2-tax scenario																		**2273 MW**
- repowering oil-shale		2x194								194		194	194	194		194		1358 MW
- new oil-shale							300											300 MW
- gaas turbines					65						3x50	3x50	3x50	2x50				615 MW

New and renovated capacities:

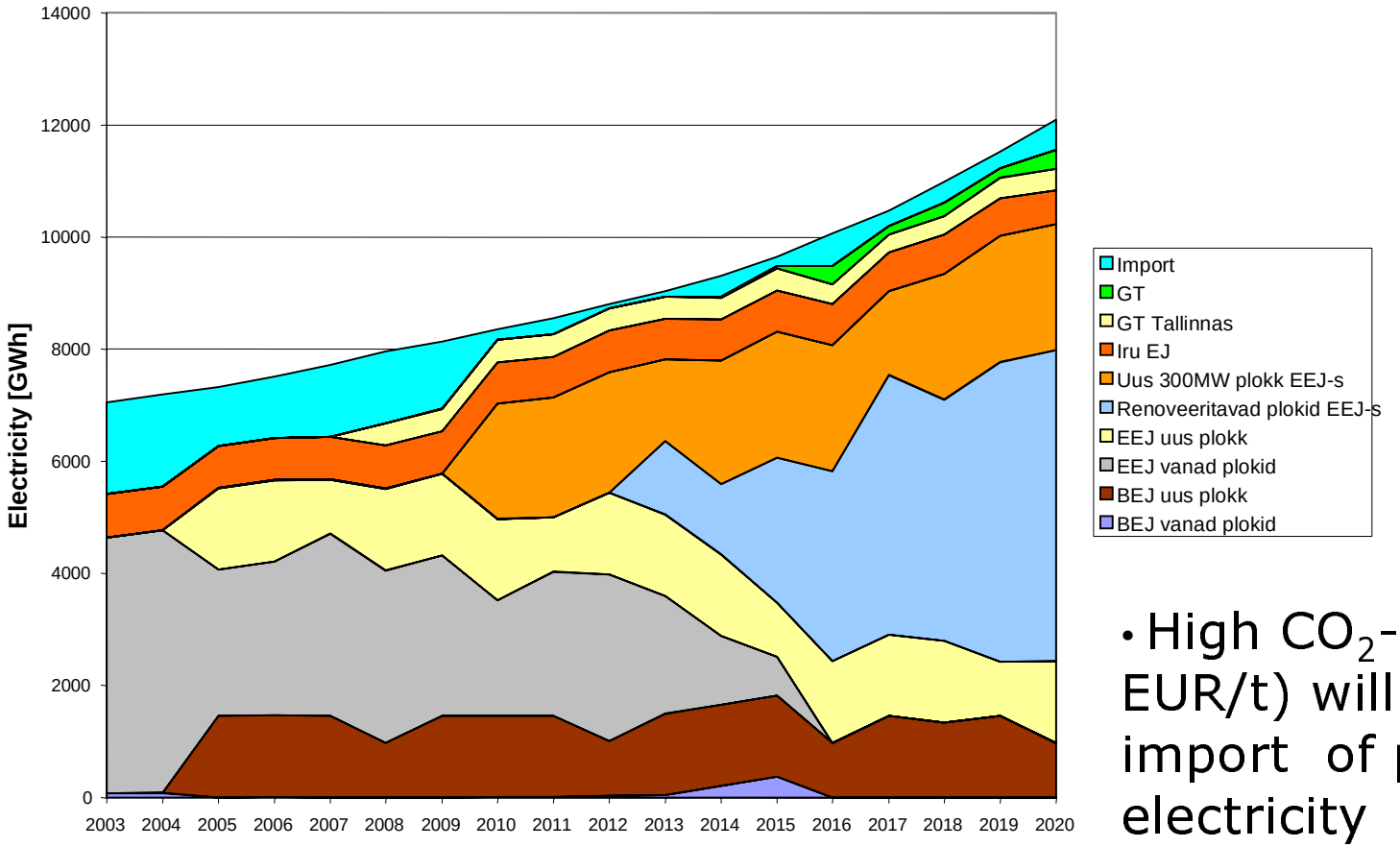
Max scenario: 1658 MW oil-shale CFB ja 515 MW Gas Turbines

CO_2-tax scenario: 1270 MW oil-shale CFB ja 615 MW Gas Turbines (Peak load capacities not available, electricity imported)

Electricity production – Max stsenaarium



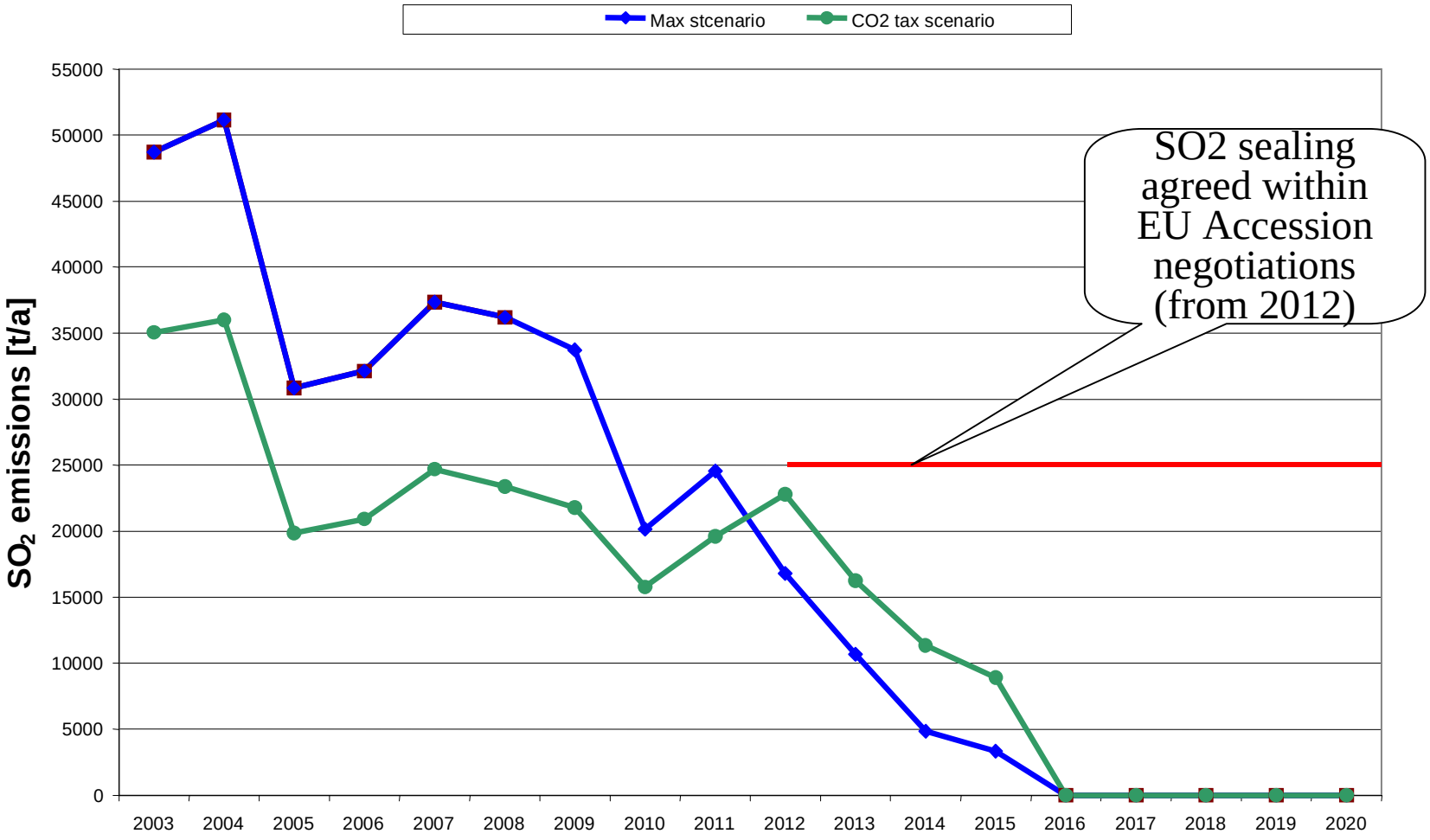
Electricity production – CO_2-tax scenario



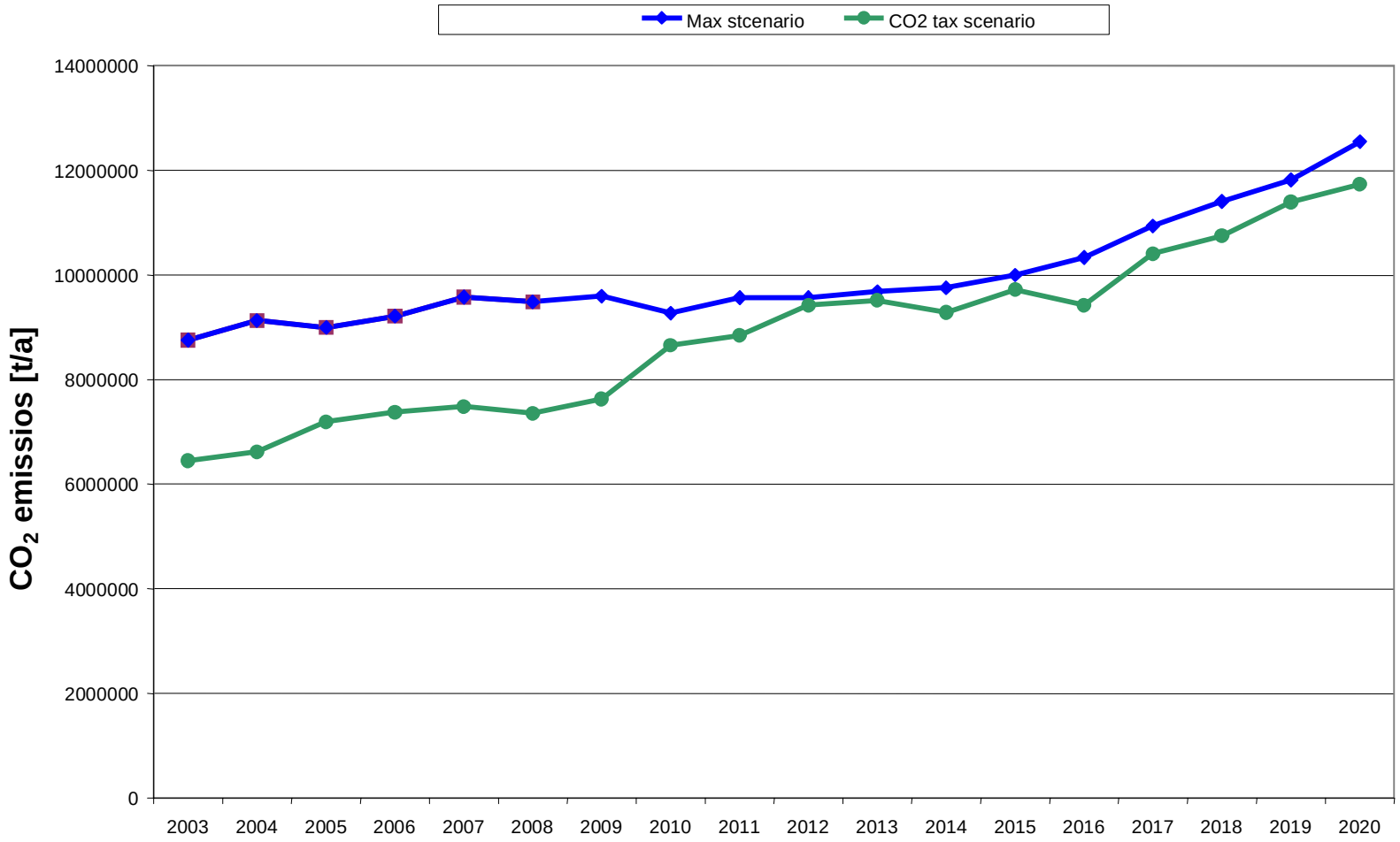
- High CO_2-tax (16 EUR/t) will increase import of peak load electricity

Environmental impact of selected scenarios

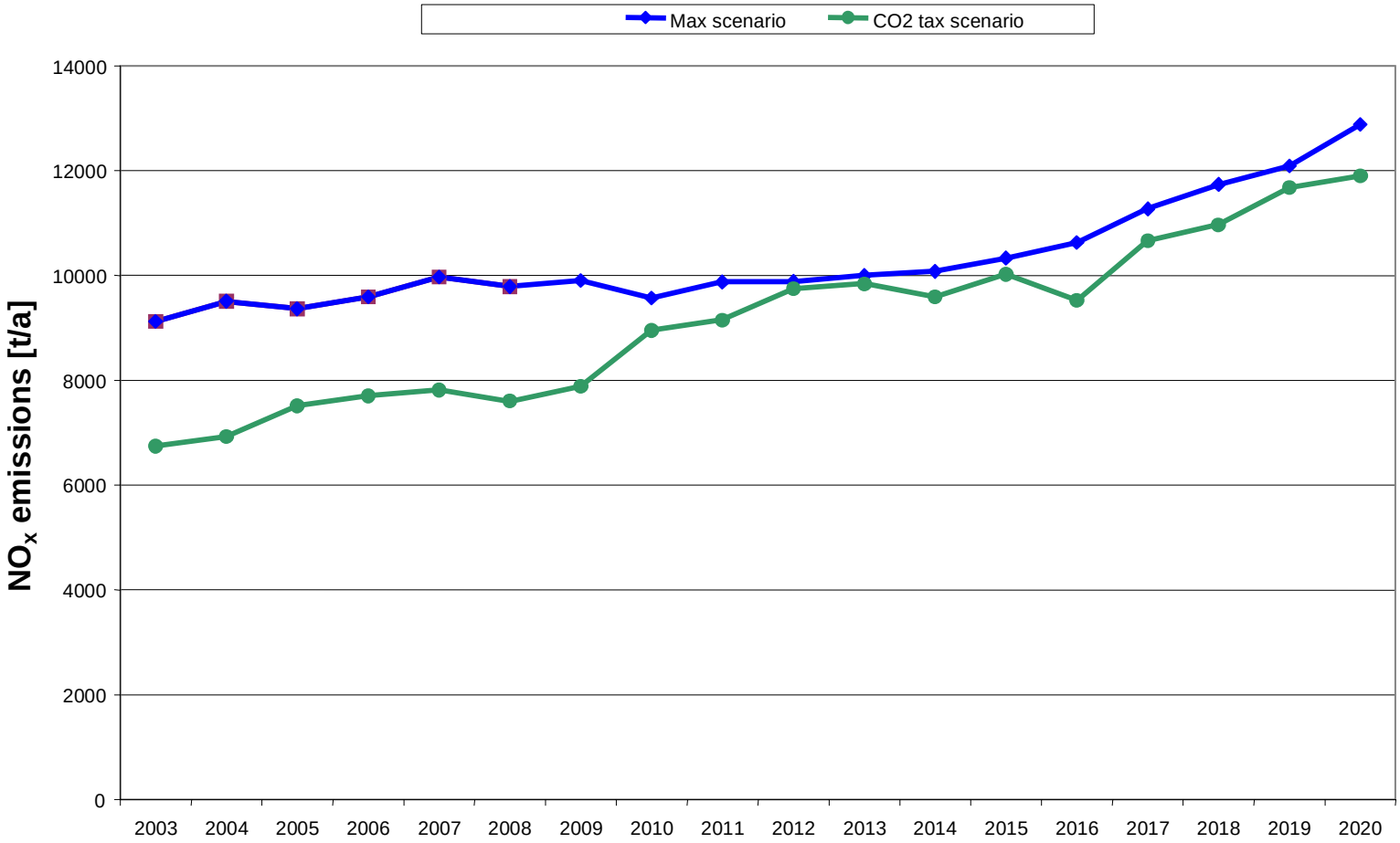
SO_2 emissions



CO_2 emissions



NO_x emissions



Conclusions

Impact of CO_2–tax:

• CO_2-tax starts to compete out oil-shale from level above 14 EUR/t. Used model (U-Plan) starts to replace oil-shale electricity first with import and secondly with electricity produced from Natural Gas (also imported). Used model does not allow to consider impact of emission trade.

Import of Peak Load electricity:

• Model showed that Gas Turbines installed for covering the peak load will work only at minimum loads (operational time only 1-5 %) therefore it is more economically feasible to import the peak load electricity from Latvia. **Environmental impact:**

•Emissions are only slightly down with CO2 -tax scenario. With higher tax level differences become bigger on account of replaced fuel and if increasing electricity import.

•**Renewables use:**

• National target for increasing renewables share in electricity balance is 5,1% by 2010 (assumed 10% by 2020). Model showed that implementing these targets does not reduce investment needs into big fossil fuel power plants.