RUSSIAN ACADEMY OF SCIENCES
INSTITUTE OF ECONOMIC FORECASTING

Russia and Europe: energy union or energy conflict?




Bangkok
2015

ИНП РАН

1. New version I-O tables for Russia (current and constant prices, 1980-2013)
2. New design of PCE, EXPORT, INVESTMENT, EMPLOIMENT blocks
3. Energy balance (IEA) integrated into structure of model

Main equations

Investment

f out_2 = @pos(outR%1 - peakoutR%1[1])
f prof_3=profit%1/def
f lag_5= capinv%1[1]
f kim_6 = outR%1/capstockClop%1[1]
r capinv%1 =out_2,prof_3,lag_5,kim_6,credloanjur%1/def

Households consumption

f wagall_pc = wagesallT/empT/def
f rdpce%1 =(pce%1/pceR%1)/def
f sat1 = 1-(pceR1[1]/popT[1])/pceRsaturation1
r pceRpc1= sat1,wagall_pc,rdpce1

Export

f realrub=CPI/rateusdm
r exR1 = b.EUgdpchain,outR1,outRCOMP,realrub

Three cases

1. Sanctions in energy sector and decreases of oil extraction for long term prospect

2. More oil products export from Russia to EU

3. Gas supply distribution between export and domestic markets

Multiplicative effects of export to Russia on production in EU

Import from EU to Russia

Agricultural and food products	Textile and leather products	Chemical products	Machinery and equipment	Electrical and Optical equipment	Transport Equipment
14 bln. $	**3 bln. $**	**26 bln. $**	**26 bln. $**	**16 bln. $**	**22 bln. $**

Direct effects on production in EU (% of output in case 10% fall of Russian demand)

Agricultural and food products	Textile and leather products	Chemical products	Machinery and equipment	Electrical and Optical equipment	Transport Equipment
-0.37%	**-0.33%**	**-0.26%**	**-0.56%**	**-0.27%**	**-0.82%**

Full effects on production in EU (% of output in case 10% fall of Russian demand)

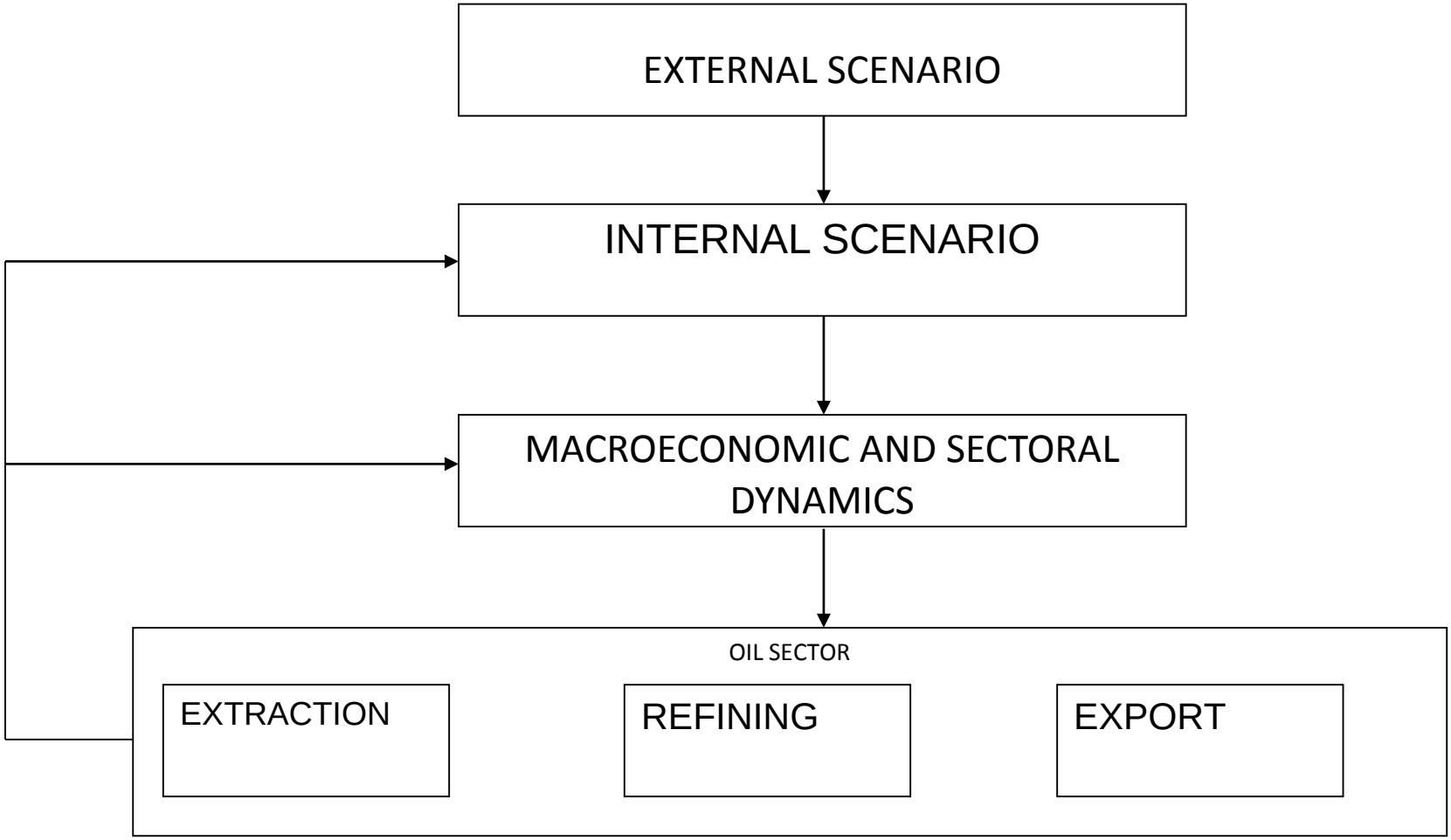
Agricultural and food products	Textile and leather products	Chemical products	Machinery and equipment	Electrical and Optical equipment	Transport Equipment
-0.89%	**-0.73%**	**-0.69%**	**-0.98%**	**-0,65%**	**-1.32%**

Total output decreases by 0.75% (≈ 180 US$ bln)

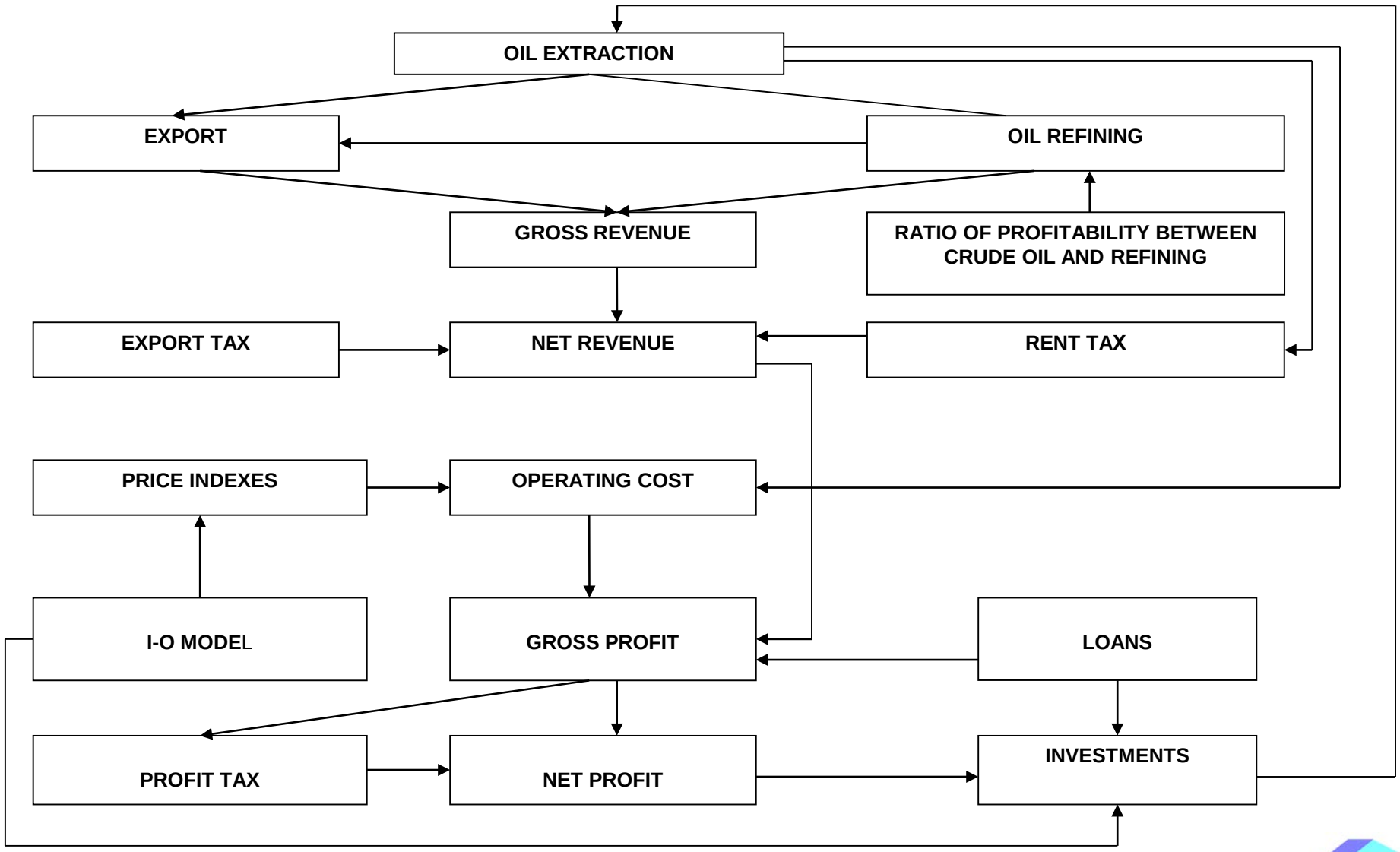
OIL AND GAS IN RUSSIAN ECONOMY

	Consolidated budget,%					Export sales, %				
	2010	2011	2012	2013	2014	2010	2011	2012	2013	2014
Oil (Crude and Products)	28.5	31.9	32.7	32.2	33.2	51.2	50.9	54.2	53.7	54.2
Gas	2.3	3.2	3.7	4.3	4.1	13.8	12.1	11.3	12.0	12.8
Other	69.2	64.9	63.6	63.5	62.7	37.1	36.7	37.7	33.8	33.5

Oil model in complex of calculations



Oil sector model

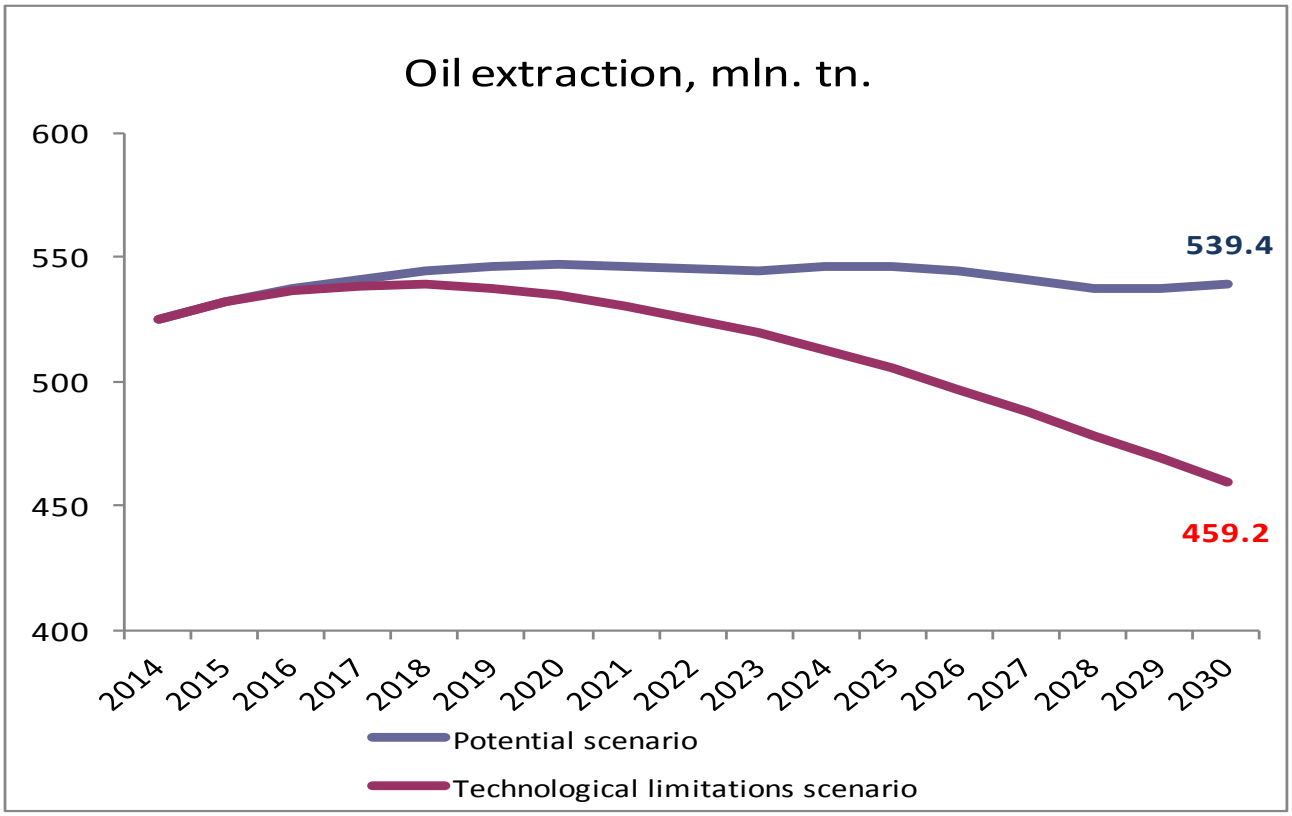


Oil production cost by reserves categories in Russia (USD/bbl)

	Production Cost			Capital Cost		
	Developed Reserves	Undeveloped Reserves	Resources	Developed Reserves	Undeveloped Reserves	Resources
West Siberia	9.3	10.2	11.7	4.7	5.1	5.8
South	12.1	13.3	15.2	6.5	7.2	8.2
Timan-Pechora Basin	12.6	13.8	15.8	9.3	10.2	11.7
Volga Region	11.2	12.3	14.0	8.4	9.2	10.5
East Siberia	23.3	25.6	29.2	18.6	20.5	23.3
Sakhalin	27.9	30.7	35.0	23.3	25.6	29.2
Caspian and Black Sea shelf	25.1	27.7	31.5	16.7	18.4	21.0
Bazhenov formation	24.2	26.6	30.3	15.8	17.4	19.8
Arctic shelf	41.9	46.1	52.5	32.6	35.9	40.8

Sources: RF Ministry of Natural Resources, BP, Wood Mackenzie, Rosstat

Technological embargo in oil sector



Embargo will limit options of oil and gas extraction on the new fields (shelf, non-conventional extraction, East Siberia).

The estimations were made on the base of capital costs by region and fields.

Potential decrease of oil extraction on the period 2014-2030 is about 29,6 mln t. (in 2030 about 73,1 mln t). Average annual losses for Russian GDP are estimated as US$ (2010) 20,7 bln from export decrease and US$ (2010) 6,2 bln from investment reductions in oil sector

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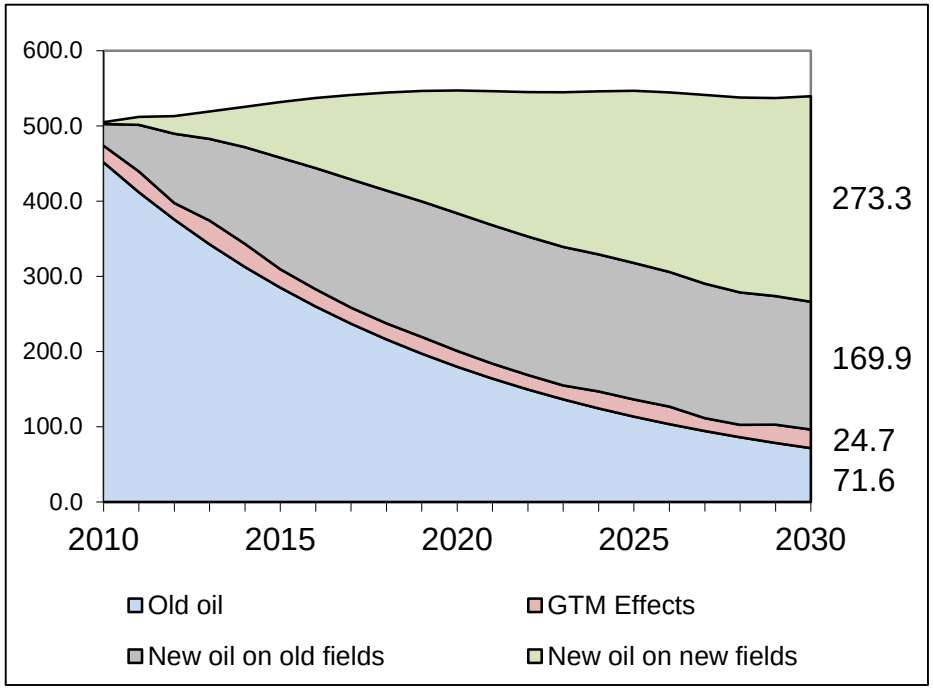
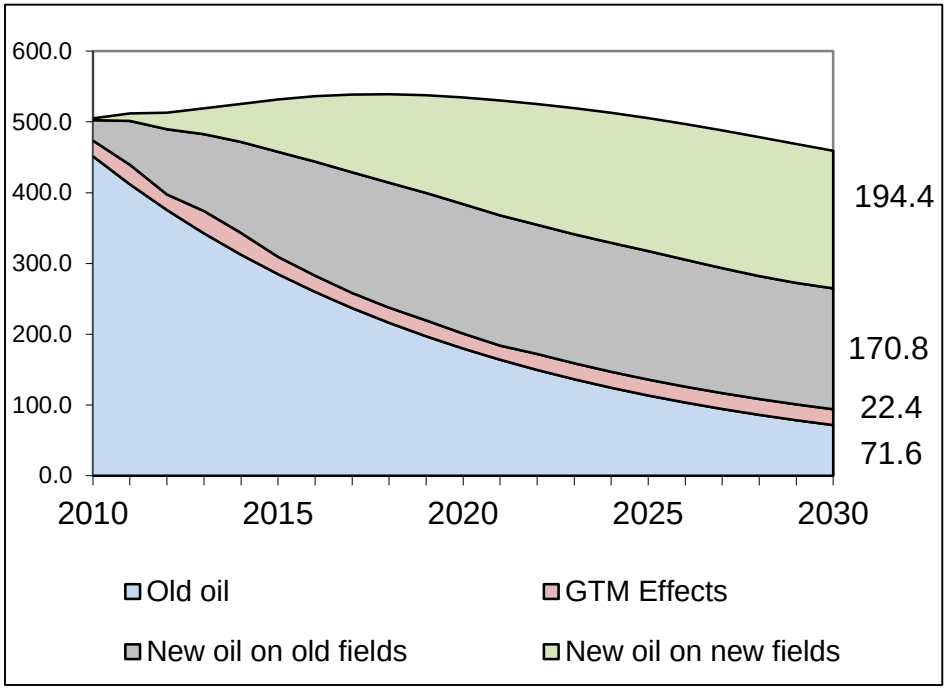
Technological embargo in oil sector

OIL EXTRACTION BY CATEGORIES MLN.T.
BASE SCENARIO



OIL EXTRACTION BY CATEGORIES MLN.T.
SCENARIO OF SANCTIONS



- The main differences between scenarios consist in oil production on new fields.
- Development of these fields will be complicated in the conditions of technological sanctions.

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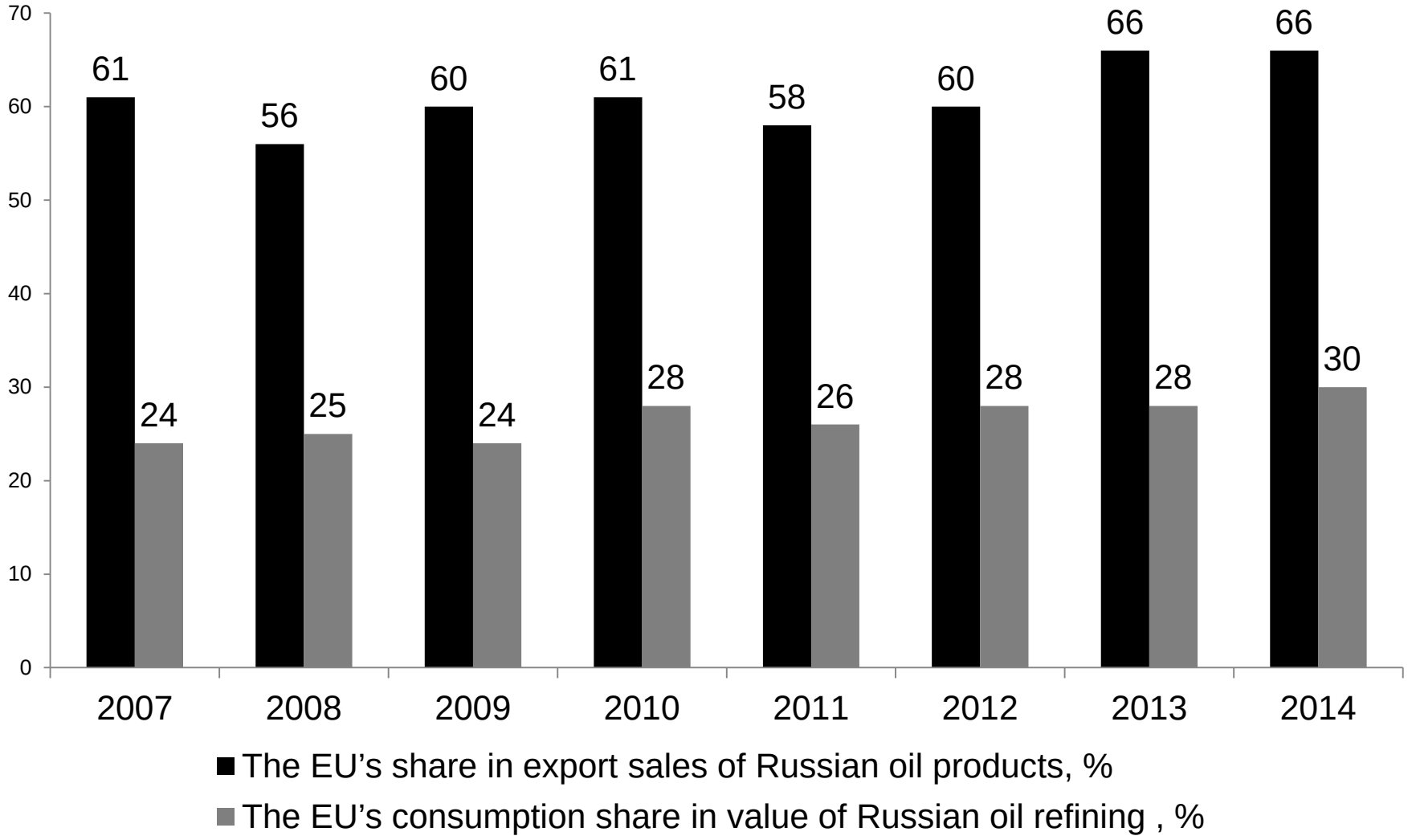
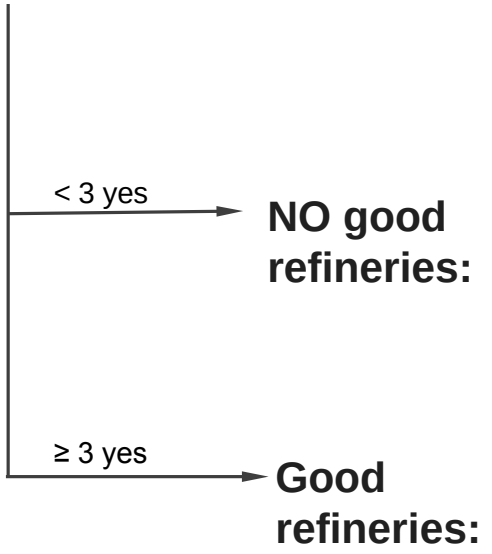


Criteria by processes for every refineries in Europe (including non EU countries):
YES or **NO**

- Hydro cracking to refinery facilities ratio > 65-70%;
- Coking, cracking, reforming processes to refinery facilities ratio > 40-50%;
- Vacuum distillation to refinery facilities ratio > 30%;
- Importance for a country.



Two grade of no good refineries for scenarios

- 1 mbd (50 mln tones per year) by crude – will be closed
- 1,5 mbd (75 mln tones) by crude – may be closed by crude, of which 2,5 mbd should be modernized

12 mbd (600 mln tones) by crude,
of which 2,5 mbd should be modernized

Data: O&GJ, 2014, database worldwide refiners with capacities by processes

Oil refining competitiveness

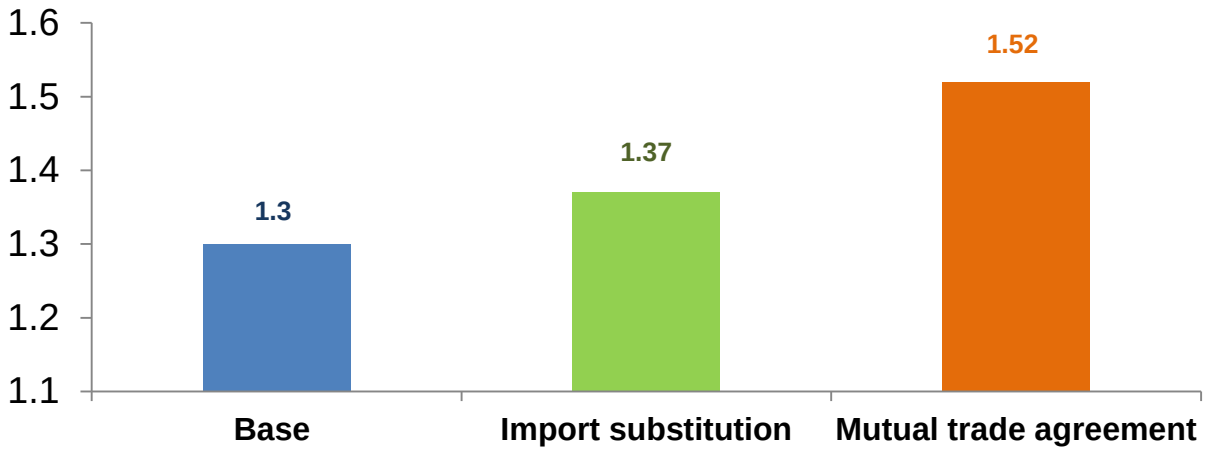
COUTRY	COMPANY	TBD OF PRIMARY PROCESSING	ASSESSMENT OF DISPOSAL AT THE PERFORMANCE AND COMPETITIVENESS	TH. T. OF OIL REFINING PER YEAR
Albania	domestic	30	eliminated	1 500
Belgium	domestic	100	eliminated	5 000
Belgium	Exxon	300	partially	15 000
Belgium	Total	340	partially	17 000
Bosnia	domestic	200	eliminated	10 000
Bulgaria	Lukoil	115	partially	5 750
Croatia	domestic	250	partially	12 500
Denmark	Statoil, Shell	170	partially	8 500
France	Not Majors	200	eliminated	10 000
France	Majors	1200	need investment	60 000
Germany	Gunvor	110	partially	5 500
Germany	Majors	600	need in investment	30 000
Greece	domestic	150	eliminated	7 500
Italy	Rome	80	eliminated	4 000
FYRM	domestic	50	eliminated	2 500
Netherlands	Amsterdam	10	eliminated	500
Netherlands	Total	140	partially	7 000
Norway	Монштад	200	need investment	10 000
Romania	domestic	80	eliminated	4 000
Serbia	Gaspromneft	116	partially	5 800
Slovenia	domestic	13	eliminated	650
Spain	domestic	120	eliminated	6 000
Spain	Repsoil Tenerife	90	need in investment	4 500
Spain	Repsoil Cartagena	220	need in investment	11 000
Sweden	domestic	40	eliminated	2 000
Sweden	domestic	210	need investment	10 500
not EU				
			Not effective processing (tpy)	≥ 200 000
TOTAL OIL REFINING		14727		736 350

Petroleum Refining

- Share of value added in petroleum refining in EU differs from 2% up to 18%. Average value added share in petroleum refining is **7,1%** Current multiplicator of petroleum refining on output equals **1.30**

- If 10% of less effective refineries will be replaced with import of Russian petroleum products instead of oil import, then: Value added share in petroleum refining will increase up to **7.9%** Multiplicator of petroleum refining will increase up to **1,37**

- Increase of investment and production in Russian petroleum refining means additional demand on production of machinery and equipment, which can be satisfied with exports from EU countries In this case multiplicator on output will increase up to **1,52**

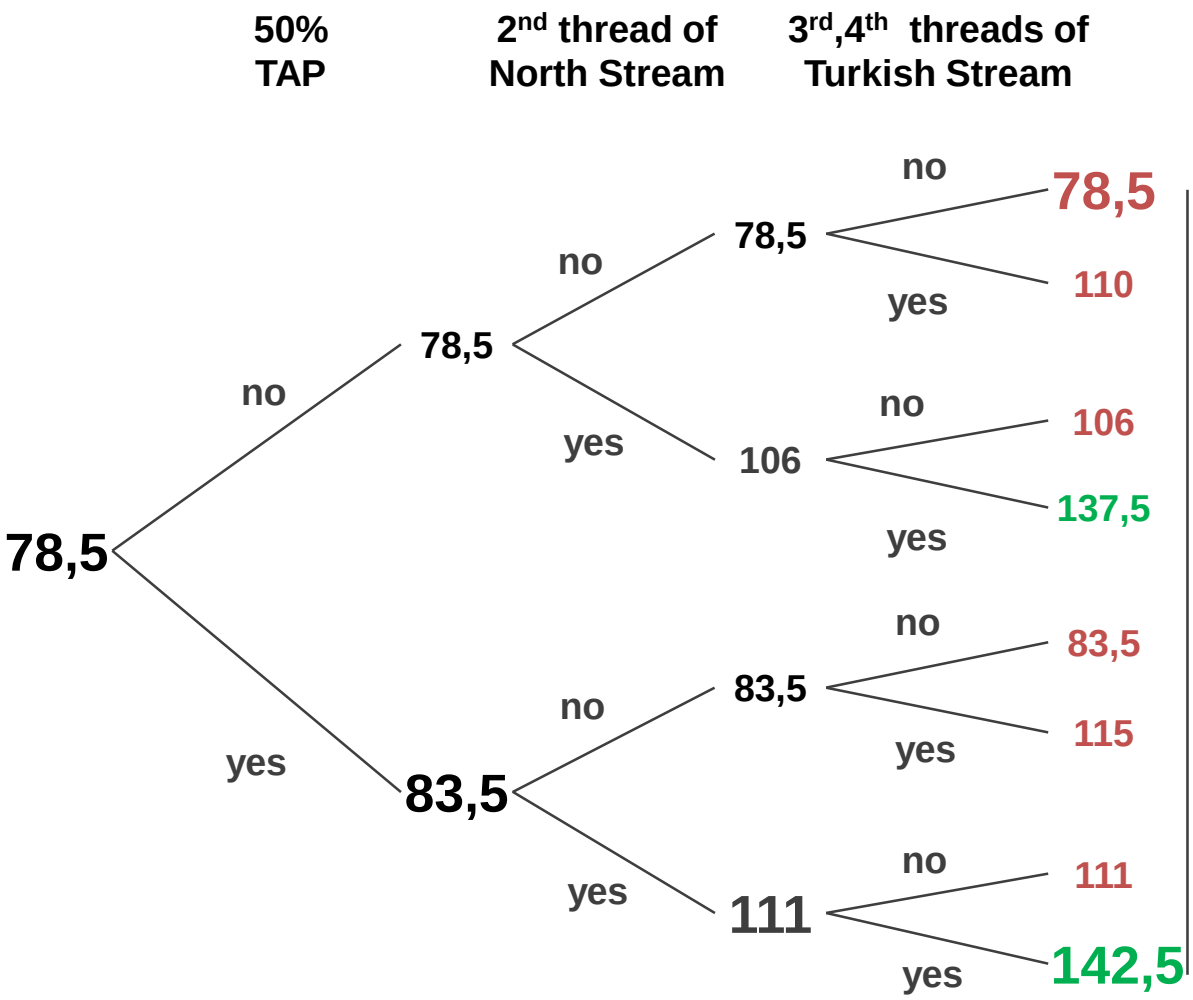


Scenario for estimations

- The volume of the contracted gas from Russia to the EU after 2019 will be **~ 125 bcm**
- Resource and production potential of Russia in the direction of the European Union is estimated up to 180-200 bcm
- Russia refuses to transit gas through the territory of Ukraine
- Russia is ready to supply gas on the rules of 3rd Energy Package : input stream and the Turkish transit for EU from the entry point to Baumgarten under the contracted volumes (Article 13.2)
- 1st and 2nd threads of Turkish stream will be implemented regardless of EU position

Actual supply lines from Russia to EU, bypassing Ukraine

- Yamal –Europe 33 bcm
- North stream 27,5 bcm (+27,5 bcm currently not used)
- StPetersburd -Finland 6 bcm
- 1st thread of Turkish stream – Designed to meet the Turkish demand on natural gas
- 2nd thread of Turkish stream+ Trans-Balkan pipeline =10-14 bcm on EU entry point for Bulgaria, Slovakia, Romania



Short delivery by 47 bcm

Short delivery by 15 bcm, additional EU transport capacities in 31,5 bcm are required(~€3,5 bln)

Short delivery by 19 bcm

Contractual obligations are fulfilled, but additional EU transport capacities in 19 bcm are required (~€2,1 bln)

Short delivery by 42 bcm

Short delivery by 10 bcm, additional EU transport capacities in 31,5 bcm required(~€3,5 bln)

Short delivery by 14 bcm

Contractual obligations are fulfilled, but additional EU transport capacities in 14 bcm are required (~ € 1,6 bln)

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Scenario for gas sector

conflict

Export to EU ~80 bcm after 2019

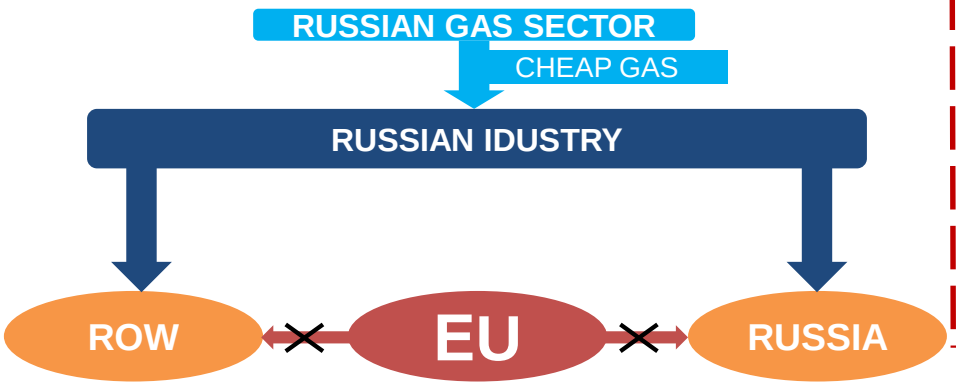
Internal scenario

Stagnation in extraction

Gas sector isn't the main source for budget

Cheap prices in domestic market

More competitiveness for industries



union

Export to EU ≥120 bcm after 2019

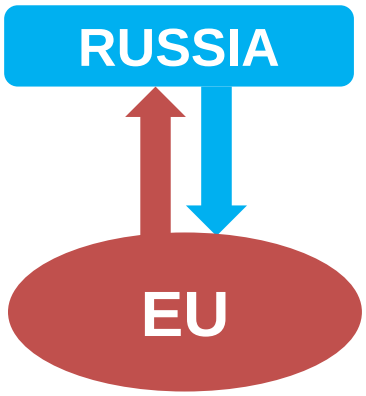
External scenario

Increase of extraction

Gas sector is the important source for budget

Higher prices in domestic market

Cooperation with international companies



Natural gas

- In case of decrease of EU demand on Russian natural gas, Russia can lower prices on internal markets, allowing other export oriented sectors to compete better

	Value added share	Natural gas share in cost structure	Expected VA share growth	Output growth	Multiplicator
Chemicals and Chemical Products	35,2%	9,2%	3,0%	103,5%	1,14
Rubber and Plastics	33,1%	0,9%	0,3%	100,3%	1,05
Other Non-Metallic Mineral	38,5%	9,7%	3,0%	103,3%	1,32
Basic Metals and Fabricated Metal	28,1%	3,3%	1,2%	101,3%	1,38
Machinery	44,2%	0,9%	0,9%	101,0%	1,17
Electrical and Optical Equipment	41,7%	0,8%	0,9%	101,0%	1,10
Transport Equipment	30,4%	0,5%	1,0%	101,1%	1,16

Export growth, bln $	
Natural gas	**-4,67**
Chemicals and Chemical Products	**2,09**
Other Non-Metallic Mineral	**1,23**
Basic Metals and Fabricated Metal	**1,65**
Machinery and Electrical and Optical Equipment	**1,01**
Total	**1,32**

Conclusions

1. Decrease of oil extraction in Russia will lead to decrease in it's exports to Europe. This can cause an increase in prices on the world markets, need of technology changes in refinery, growth of costs for transportation and logistics. Increase in prices for final consumer is estimated not less than 10 USD per b.
2. Growth of investments in Russian oil refining allows to increase export to Europe. Available volumes of export (50 mln.t.) will allow to increase of efficiency in the European oil refining and won't lead to negative macroeconomic effects.
3. Resource and production potential of Russia in the direction of the European Union is estimated up to 180-200 bcm. per year. Infrastructure restrictions allow to export from 72,5 to 142,5 bcm. per year. Depending on European position about energy cooperation Russia can change strategy in gas sector.
4. Russia and the EU can supplement each other in the energy sector creating additional volumes of the income. Possibilities of use this potential depend on political decisions.