



Forecasting of gas consumption and load of gas transportation system

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Our core specialty is consulting services in Russian fuel and energy sector . Our main activities :

Energy

Regulation

Transport

Analytics

Presentation structure

1 What are some questions we are trying to answer

2 Forecasting regional consumption of natural gas

3 Forecasting load gas transportation system

4 An example of a regional forecast

What concerns our customers

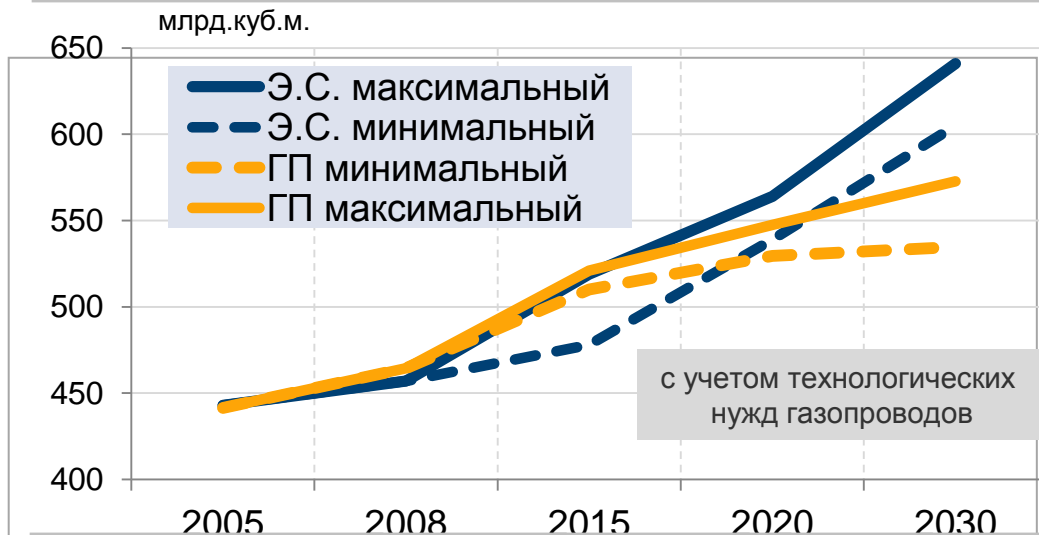
- The characteristic time for new projects in the gas industry from 5 to 15 years
- Will there be a future opportunity to realize the gas and how much?
- Investment decision should be taken today ...

Everyone needs a forecast to 2030

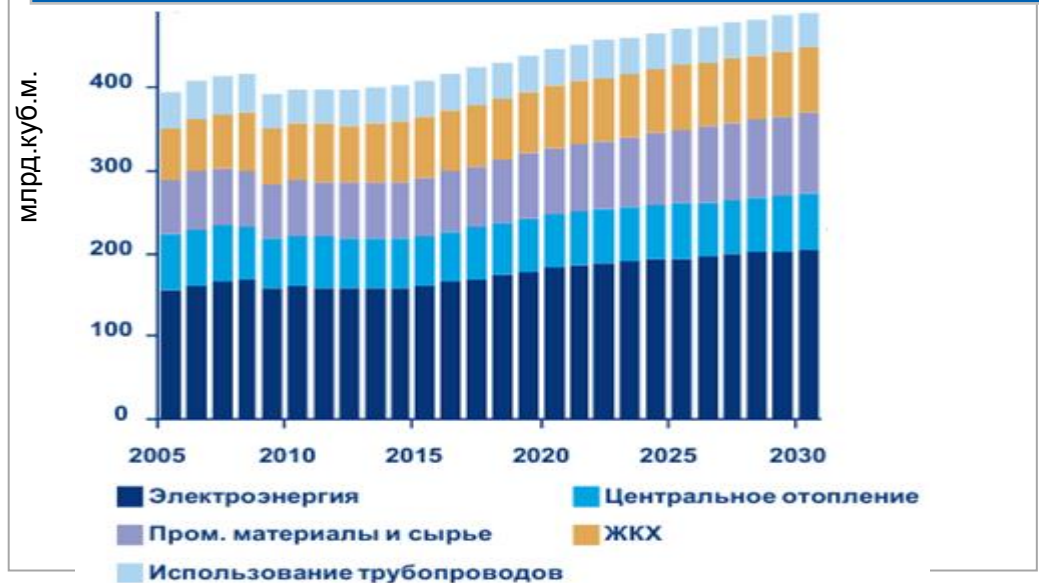
- What forecast have practical value?

Existing forecasts

Гаспром, Ministry of Energy



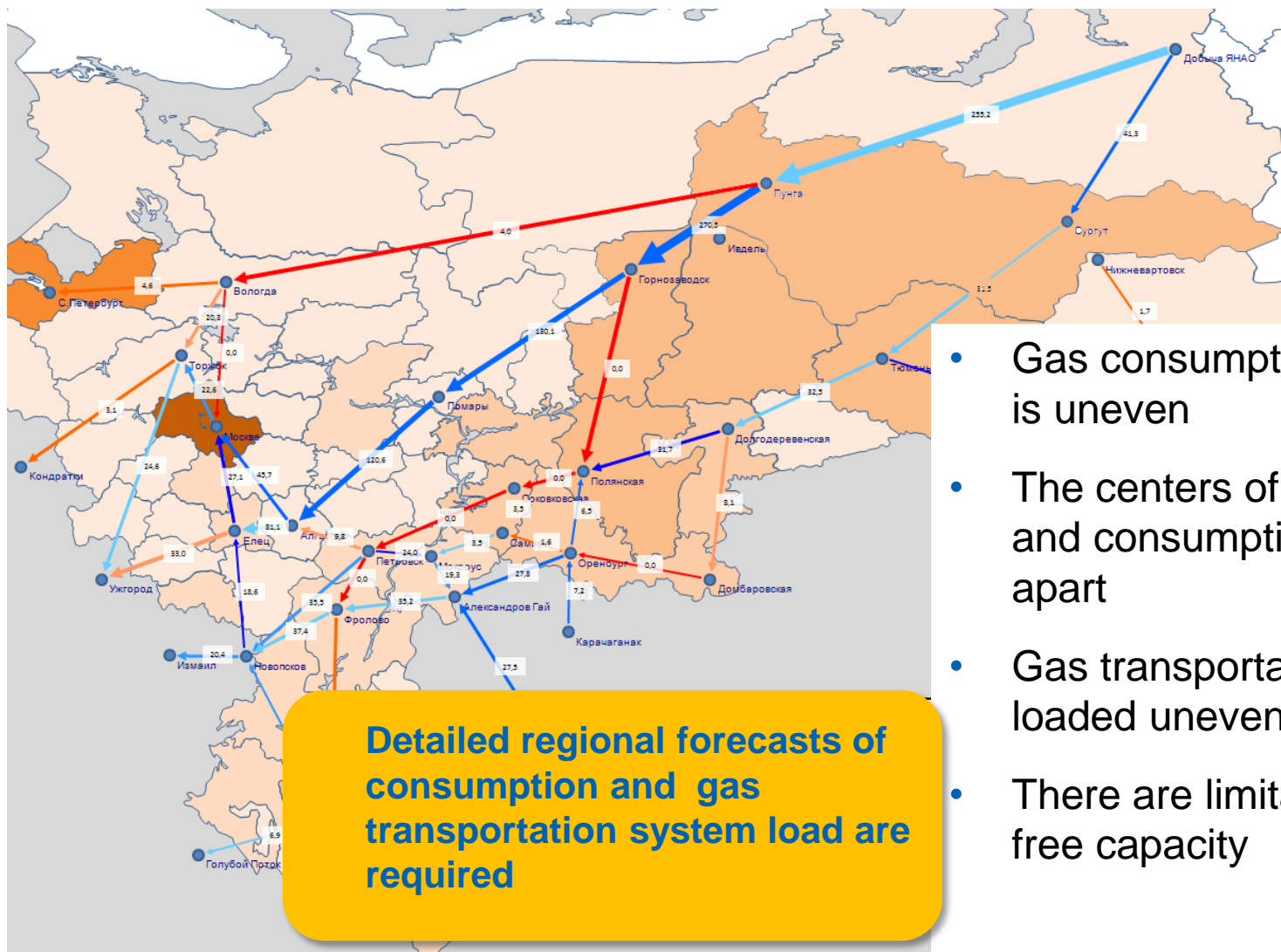
WoodMackenzie



- **Forecasts differs.** Whom to believe it is not clear, moreover, that
- Nobody explains his methodology of the forecast. **"How did we get here?"**
- The forecast given the **country in general**. In the best case - the **federal districts or industries**

Is the «aerial view»
enough for decision making?

Gas consumption and gas transportation system load in 2010



- Gas consumption by region is uneven
- The centers of production and consumption of gas far apart
- Gas transportation system is loaded unevenly
- There are limitations of the free capacity

What are some questions we are trying to answer:

- **Which regions would be most interesting producers of gas?**
- **What consumers in the region would be of most interest?**
- **Would there be an opportunity to deliver gas to customers with regard to future load of gas transportation system?**

Presentation structure



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An example of a regional forecast

Building a forecast "from below": from consumers to the region

- **The most "correct" way: gathering information about the future consumption of natural gas from the consumers themselves, but ...**
 - it is expensive and needs a long time
 - employees of consumers often do not have all the information
 - This information applies to the category of "commercial secrets" ...
- **We propose a methodology for forecasting, getting the best of available public information.**

We divide the main consumption groups



Electric power and thermal power - a major consumer of Russian gas (42%). Natural gas for this sector to date the dominant fuel



Gas is a key raw material in production of **mineral fertilizers**, as it is the most advanced raw materials for production of ammonia.



Iron and steel industry uses natural gas in blast furnaces, it increases the productivity of the furnace. In **metallurgy, machine building** the gas needed to heat the mill, smelter.



Cement industry - energy-intensive industry, the main fuel is needed for drying and roasting. Use of natural gas increases quality and reduces costs.



Network gas for **households** and **housing and communal services** facilities significantly improves the quality of life

Each group has its own characteristics and drivers of consumption

For each group:

- **We are looking for concrete companies, until we find 80 - 90% of the actual consumption groups**
- **Identifies the largest consumers**
- **Identify key parameters**
 - production plans;
 - specifics of production technologies and the use of gas;
 - demand for production.
- **Take into account the current gasification level and conduct an analysis of gasification programs**
- **Take into account the industry and economy-wide forecasts**
- **Analyze companies' plans and requirements of public authorities, etc.**
- **Coordinate with each other all of the data and construct a forecast**

Forecast of the regional centers of consumption is the sum of forecasts for individual consumers.

Identifies the largest and most perspective consumers.

Presentation structure



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Forecasting regional consumption of natural gas

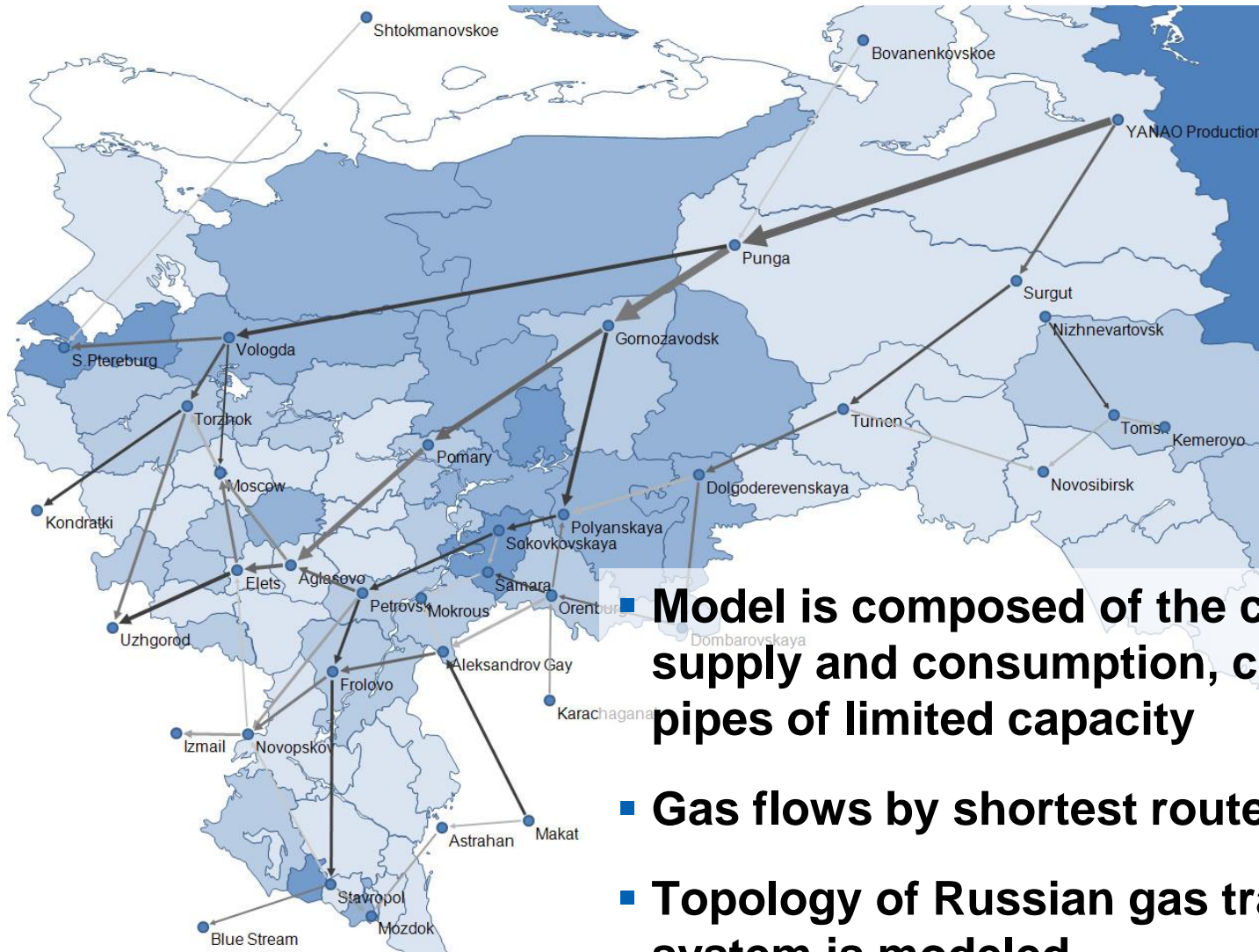
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Forecasting load gas transportation

4

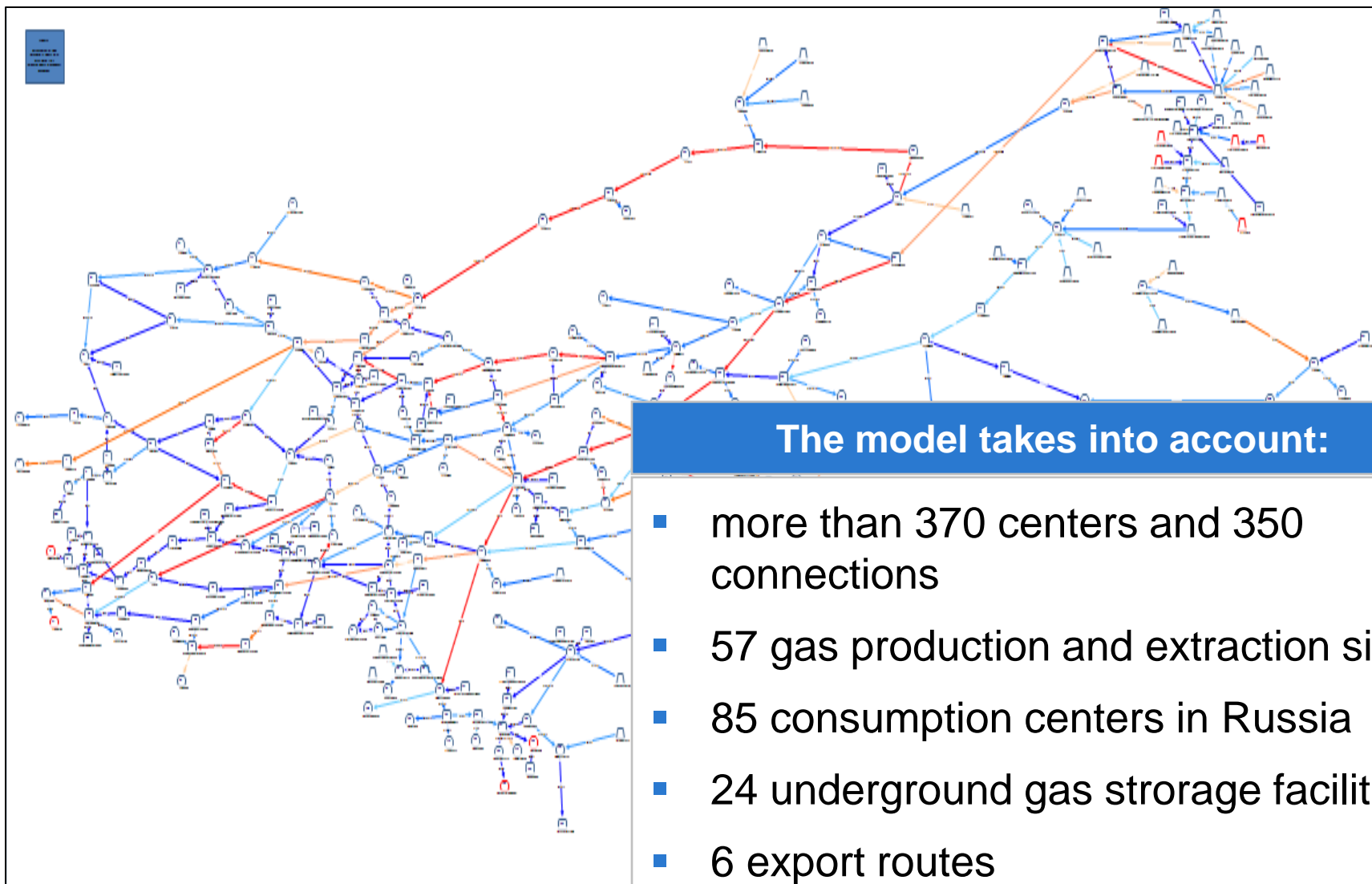
An example of a regional forecast

Gas transportation system model



- Model is composed of the centers of supply and consumption, connected by pipes of limited capacity
- Gas flows by shortest routes
- Topology of Russian gas transportation system is modeled

Gas transportation model (comprehensive scheme)



The model takes into account:

- more than 370 centers and 350 connections
- 57 gas production and extraction sites
- 85 consumption centers in Russia
- 24 underground gas storage facilities
- 6 export routes

Only public data is used



- **Maps and schemes** (UGSS on the whole, separate segments, exact locations of fields and GPP)

	янв.07	фев.07
Сухой и компримированный газ	5242	4787
Сухой газ (млн.м куб)	4502	4173
Оренбургский ГПЗ	1942	1902
ООО "Газпром добыча Оренбург"	1486	1350
Прочие	456	552
Управление по подготовке ГК	79	76
ООО "Газпром добыча Уренгой"	62	60
Прочие	17	16

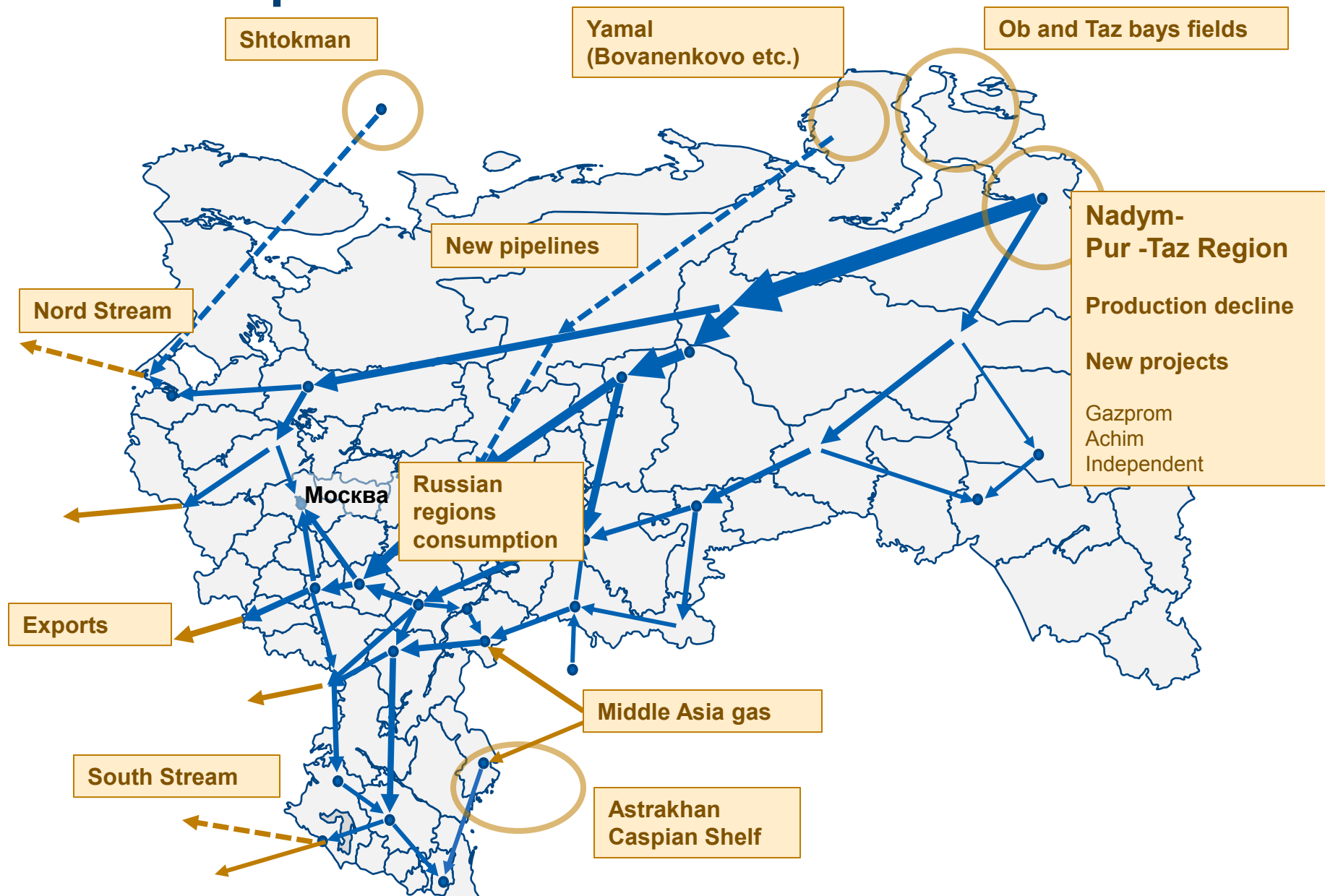
- **Central Dispatch Department** data (actual figures on gas extraction, production and consumption)



- **News flow**, articles, public interviews, internet (projects on debottlenecking of gas transportation system, launch of new gas fields and GPP, new consumers)

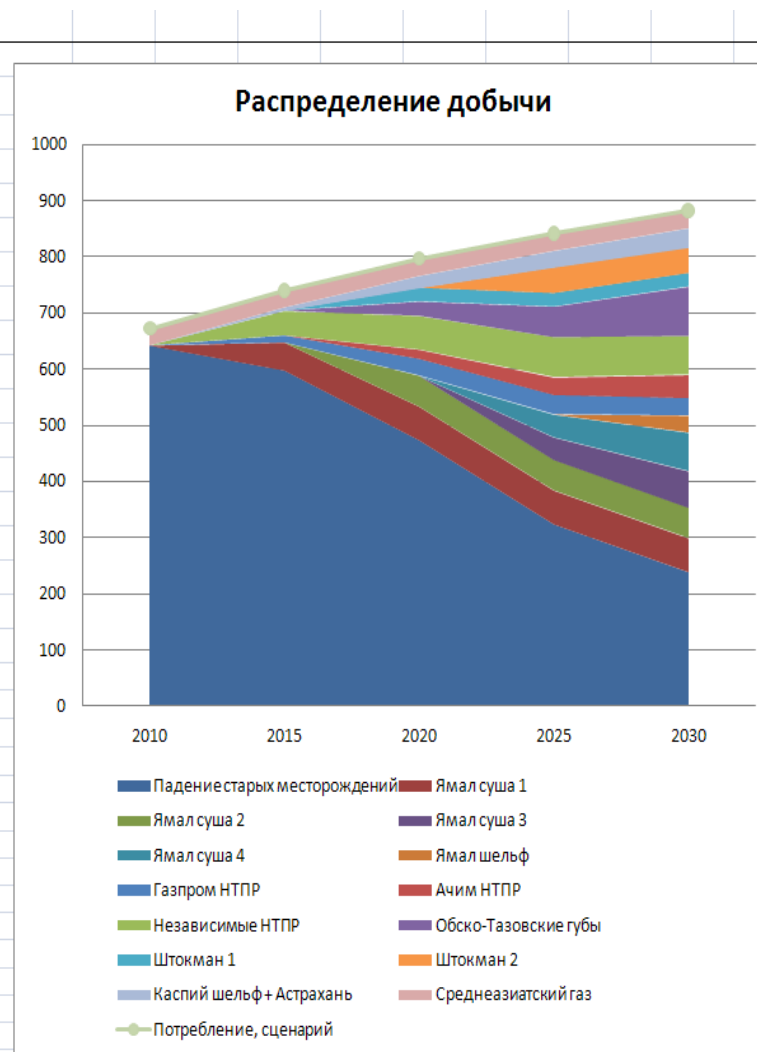
The most valuable component of the model - it's constantly updated database

The forecast of load is not only forecast of the consumption...

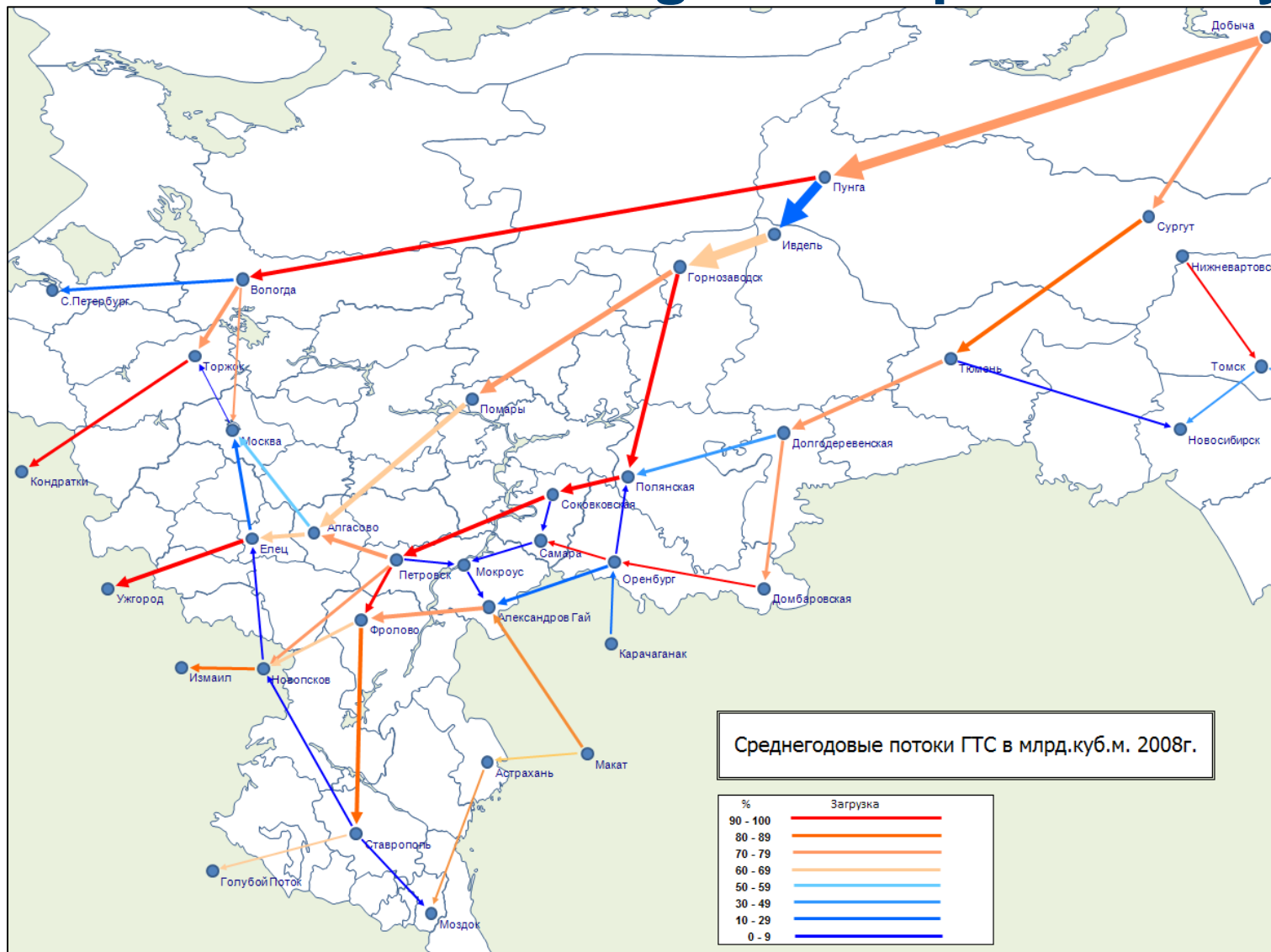


The choice of the forecast scenarios of gas production and consumption, gas transportation system development

		2010	2015	2020	2025	2030
Потребление, сценарий	Опт	673	740	797	841	882
	Запуск, г.					
Падение старых месторождений		643	598	474	324	239
Ямал суша 1	2015 2	0	50	60	60	60
Ямал суша 2	2020 2	0	0	55	55	55
Ямал суша 3	2025 2	0	0	0	40	65
Ямал суша 4	2025 2	0	0	0	40	68
Ямал шельф	2030 2	0	0	0	0	30
Газпром НТПР	2015 2	0	13	30	35	32
Ачим НТПР	2020 3	0	0	16	31	41
Независимые НТПР	2015 2	0	44	61	72	70
Обско-Тазовские губы	2020 2	0	0	25	54	87
Штокман 1	2020 2	0	0	24	24	24
Штокман 2	2025 2	0	0	0	46	46
Каспий шельф + Астрахань	2015 2	0	6	22	30	35
Среднеазиатский газ	30 30 30 30 30 30 30 30 30 30					
Сумма добычи		672,7	740,5	796,6	841,4	881,8
Небаланс		0,0	0,0	0,0	0,0	0,0
		20,8	11,8	31,6	55,7	24,9
Падение старых		664	610	506	380	264
Потребление	Опт	672,7	740,5	796,6	841,4	881,8
	Песс	646,1	657,6	682,8	725,9	774,1
Ямал суша 1	Нет					
	2015		50	60	60	60
	2020			50	60	60
	2025				50	60
	2030					50
Ямал суша 2	Нет					
	2020			55	55	55
	2025				55	55
	2030					55



Simulation results: the forecast download of individual sections of gas transportation system



Presentation structure

A faint background image of a hiker with a backpack walking up a mountain trail, used as a decorative element for the presentation slide.

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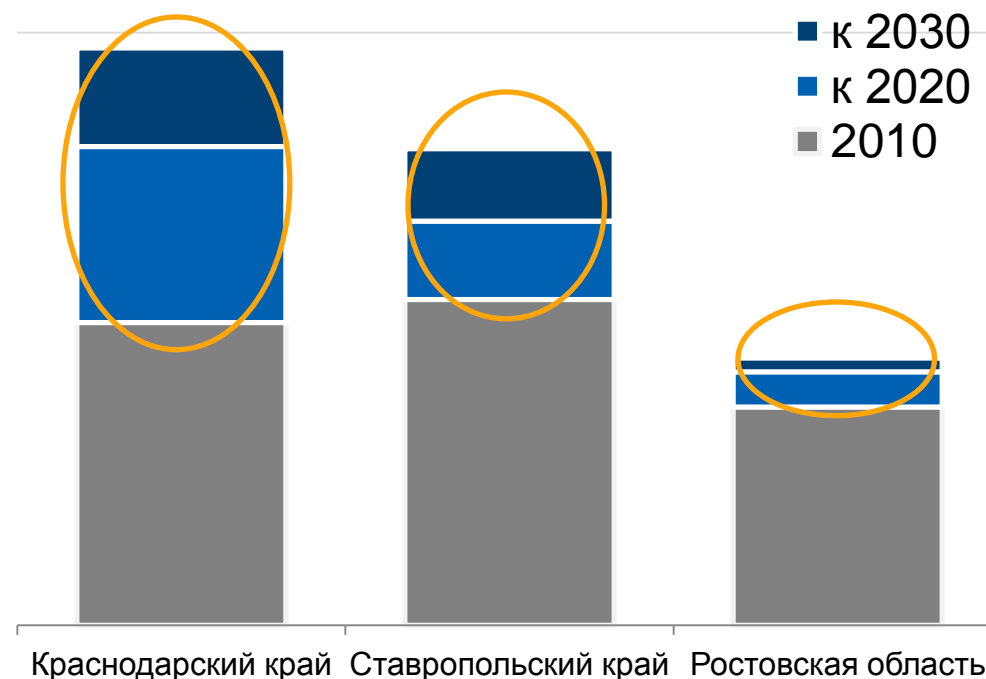
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An example of a regional forecast

Regions of southern Russia



Regions of largest consumption increase



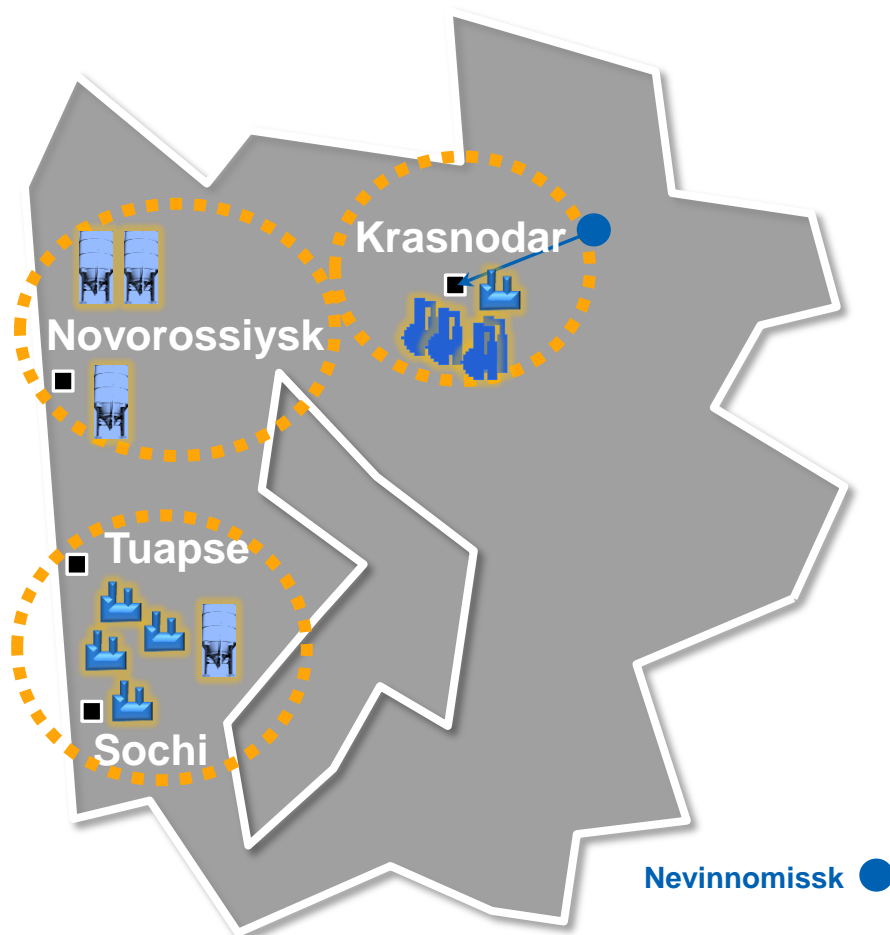
Regions of southern Russia



Largest consumers Largest increase of consumption.

Region	Consumer	2010, bcm	2020, bcm
Rostov	OGK-6 (Novocherkasskaya GRES)	1.3	2.4
Stavropol	OGK-5 (Nevinnomisskaya GRES)	1.9	2.7
Stavropol	OGK-2 (Stavropolskaya GRES)	2.7	3.4
Stavropol	Nevinnomissk Azot	1.9	2.8
Krasnodar	TGK-8 (Krasnodarskaya TEC)	1.6	2.0

Regions of southern Russia



electric power station



cement plant



chemical plant

New consumers forecast

■ Power generation – Sochi Olympics

- The region badly needs energy (only 30% of energy consumption is covered by region's own generation)
- 5 major projects are in place:
 - new block for Krasnodarskaya TEC (2.6 bcm in 2030)
 - two new blocks for Sochinskaya TEC (0.3 bcm in 2030)
 - three new TEC in Sochi-Tuapse region (1.8 bcm in 2030)

■ Cement industry – Sochi Olympics

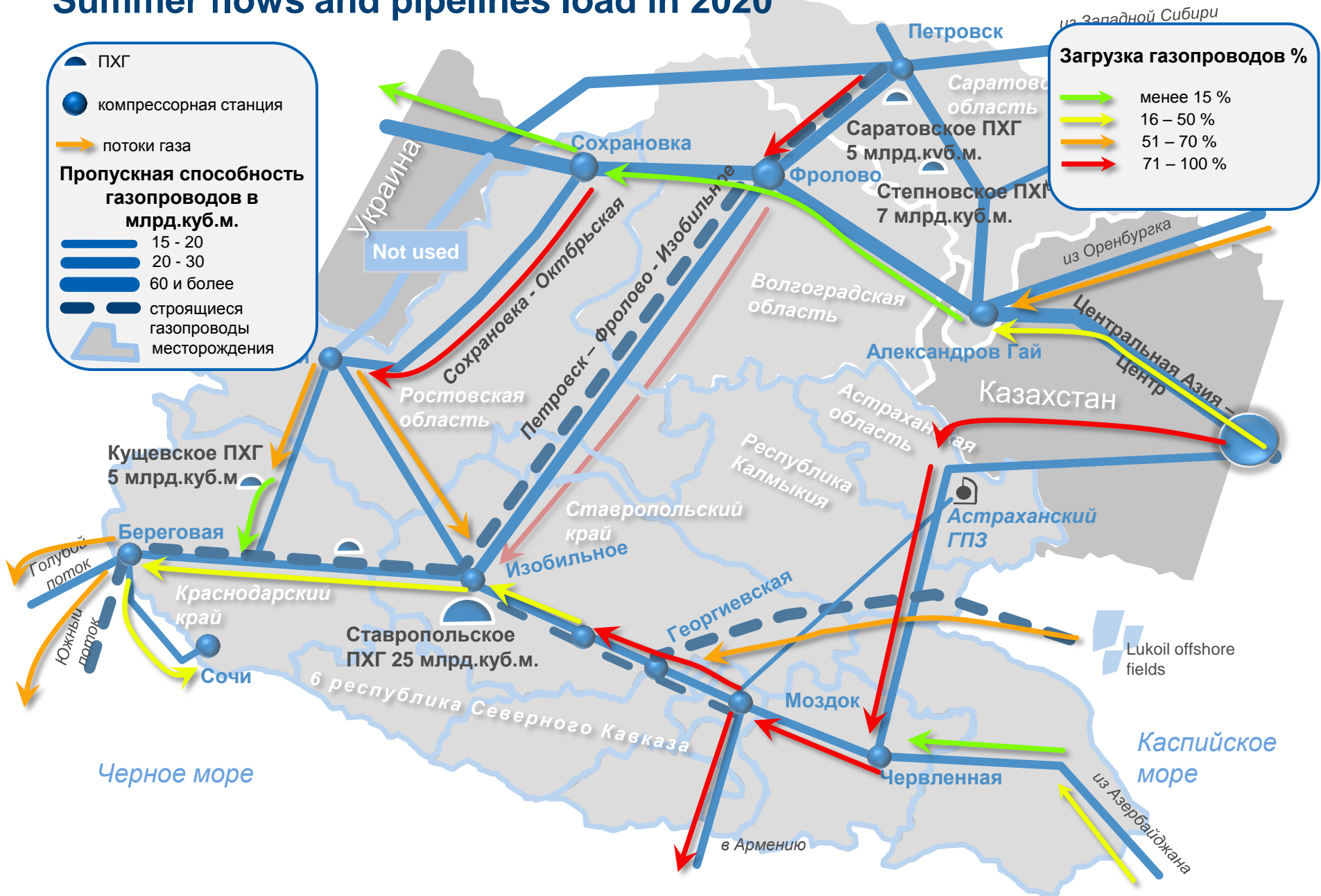
- 1.6 times production growth
- Existent plants:
 - Verkhnebakinsky (0.8 bcm in 2030)
 - Novoroscement (0.9 bcm in 2020)
- 2 new plants
 - Lafarge plant in Krymsky area (0.3 bcm in 2030)
 - BazelCement in Tuapsinsky area (0.3 bcm in 2030)

■ Agrochemistry

- There are lots of small and mid-size fertilizer producers in the region.
- The official Strategy of Chemical industry forecast 70% growth in nitrogen fertilizers production.

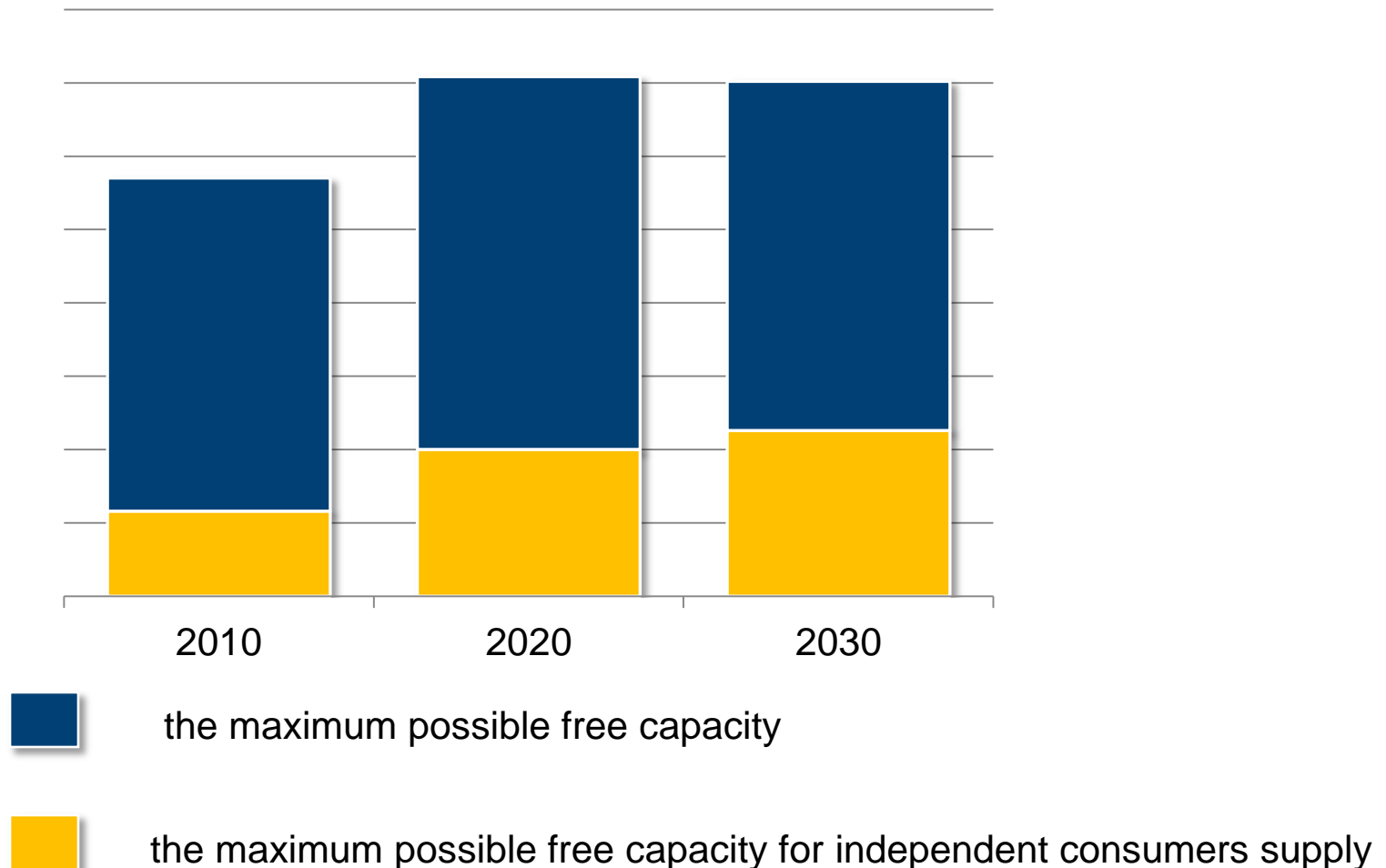
Regions of southern Russia

Summer flows and pipelines load in 2020



Regions of southern Russia

Spare capacity to transport gas from the fields of region



Thanks for attention!

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