E01

PROBLEMS AND PROSPECTIVE OF DEVELOPING SMALL-SCALE GAS FIELDS

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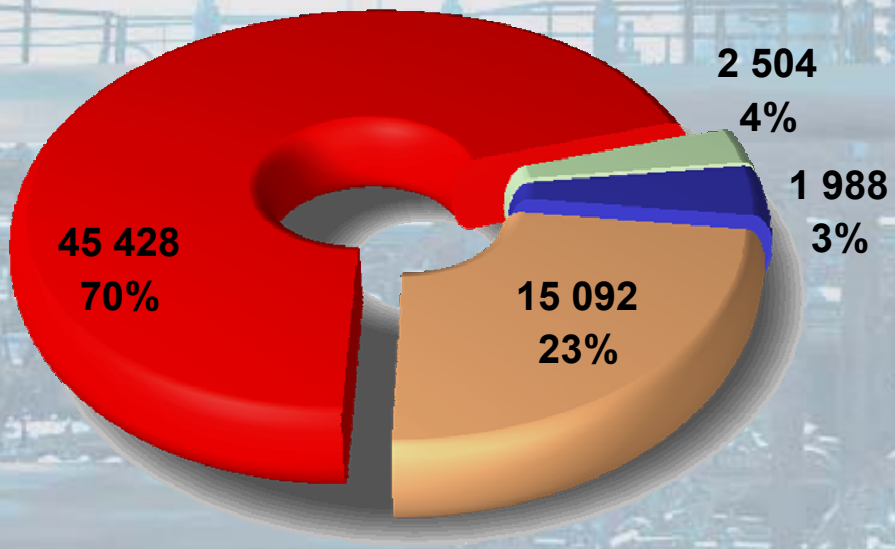
Natural Gas Resources in Russia

Distribution of gas fields by reserves ABC_1+C_2, bln. cu-m



- Small, 689 pcs. (< 40 bln. cu-m)
- Medium, 34 pcs. (40 – 75 bln. cu-m)
- Large, 78 pcs. (75 – 500 bln. cu-m)
- Unique, 24 pcs. (> 500 bln. cu-m)

Total number of gas fields	825
Developed	368
Prepared to development	62
Under exploration	227
Abandoned	168

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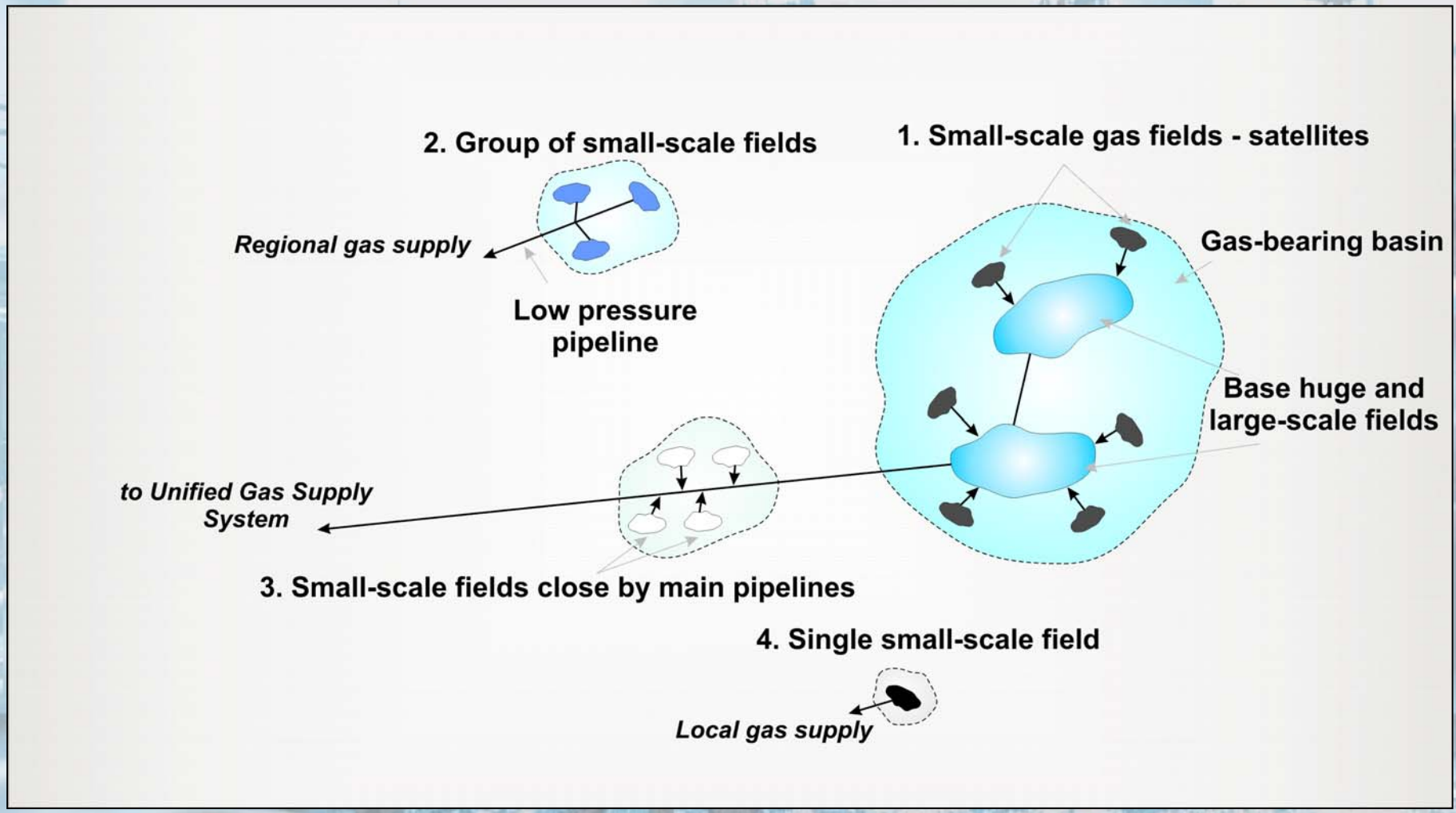
Systematization of Small-Scale Fields by Gas Supplying and Utilization



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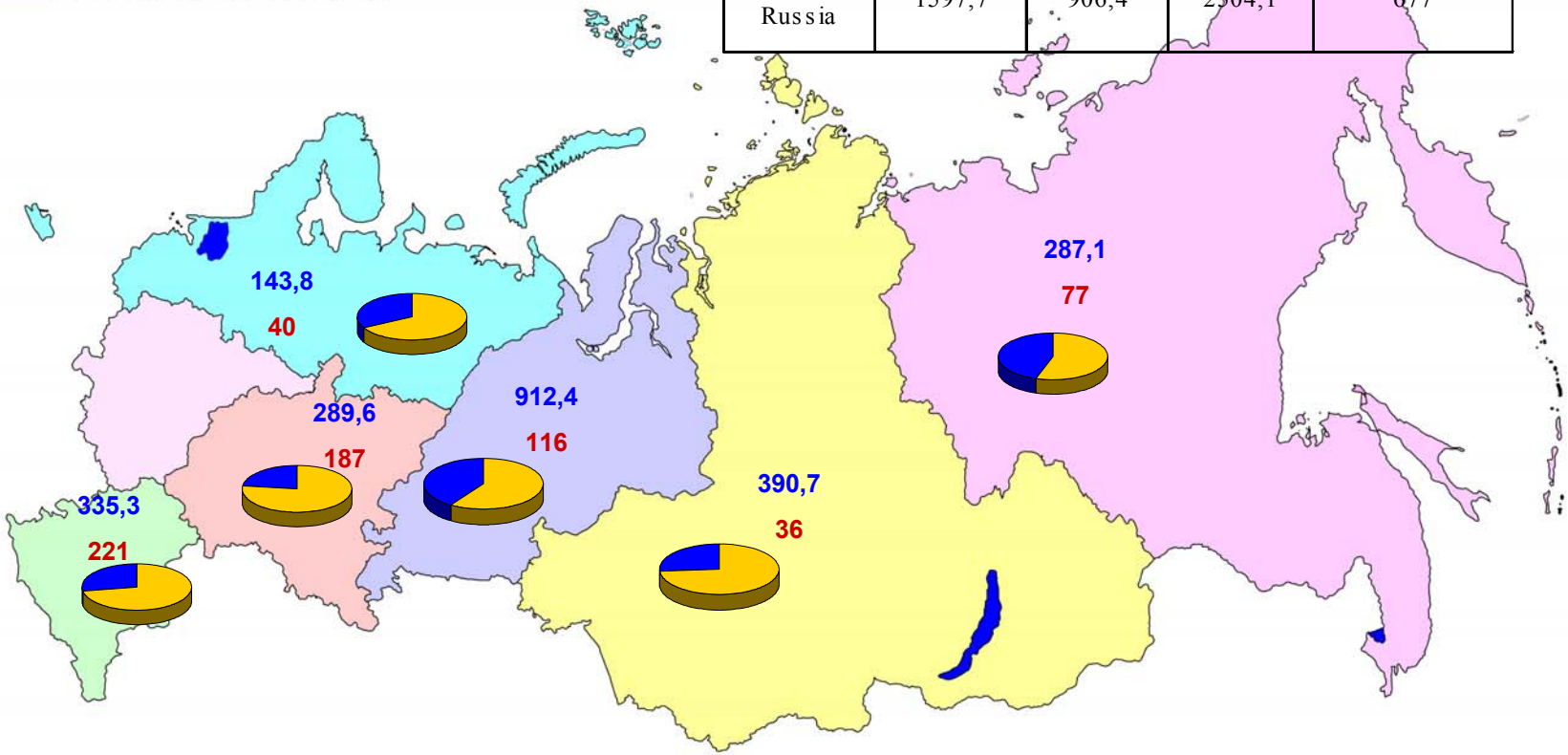
Territorial Distribution of Small-Scale Field Gas Resources in Russia

FAR EAST FEDERAL DISTRICT
SIBERIA FEDERAL DISTRICT
URAL FEDERAL DISTRICT
PRIVOLGYE FEDERAL DISTRICT
NORTH-WEST FEDERAL DISTRICT
CENTRAL FEDERAL DISTRICT
SOUTH FEDERAL DISTRICT

	Reserves, bln. cu-m			Number of fields
	$A+B+C_1$	C_2	$A+B+C_1+C_2$	
Total in Russia	1597,7	906,4	2504,1	677



ABC_1

C_2

390,7 – ABC_1+C_2 reserves, bln.cu-m

36 – number of fields

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Reserves and Production Abilities of Small-Scale Fields

1. About 250 fields with total reserves of 2.5 tln m^3 (ABC_1+C_2) can be potential sources of regional and local gas supply.
2. In prospect gas production from small-scale fields can reach 30-40 bln m^3 providing 10-25 % of gas production growth by 2030.
3. At the first stage it is advisable to develop 123 small-scale gas fields in Urals, Povolzhskiy and South federal regions (64% of their total number). Their reserves consist of 234 bln m^3 of gas (26%) and 17,1 bln tonn of condensate.

Problem of Small-Scale Field Development

- Small extent of resources exploration, necessity of supplementary exploration.
- Unavailability of standards of integrated designing from bed to consumer.
- Lack of low productivity modular facilities and suitable development technologies.
- Relative low profitability not fully compensated geological, technological and financial risks
- Lock of necessary laws guaranteeing return of investments

Factors Reducing Development Eficiency

- Complexity of mining and geological conditions, low well productivity, small-scale resources
- Complicated composition of hydrocarbon raw material, presence of hydrogen sulfide and other impurities
- Remoteness from existing pipelines, strong connection with specific consumers used small gas volumes
- Low wellhead pressure after 5-6 years of operation

Groups of non-Developed Gas Fields

I. purely gas fields not required complicated gas conditioning

II. gas condensate fields with low condensate content (not exceeding 30 g/m^3)

III. gas condensate fields with low condensate content and availability of hydrogen sulfide

IV. gas condensate fields with high content of condensate (exceeding 30 g/m^3)

V. gas condensate fields with high content of condensate and availability of hydrogen sulphide

VI. gas condensate fields with oil rims

VII. gas condensate fields with oil rims and hydrogen sulfide

Main Tasks of Small-Scale Gas Field Integrated Development

- Supplementary exploration of resources
- Development of standards of integrated designing from bed to consumer
- Application of best world technologies and creation of low productive modular gas field facilities
- Creation of favorable investment conditions

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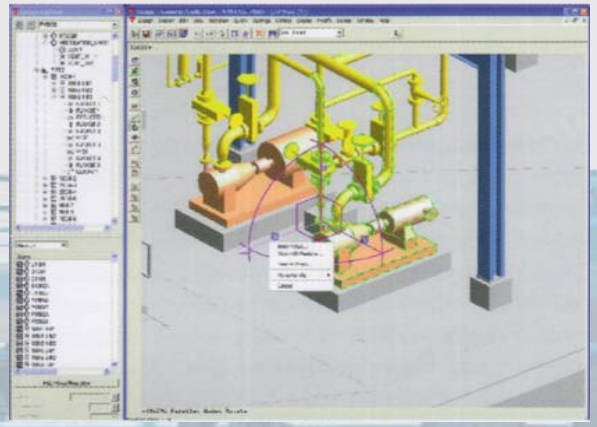
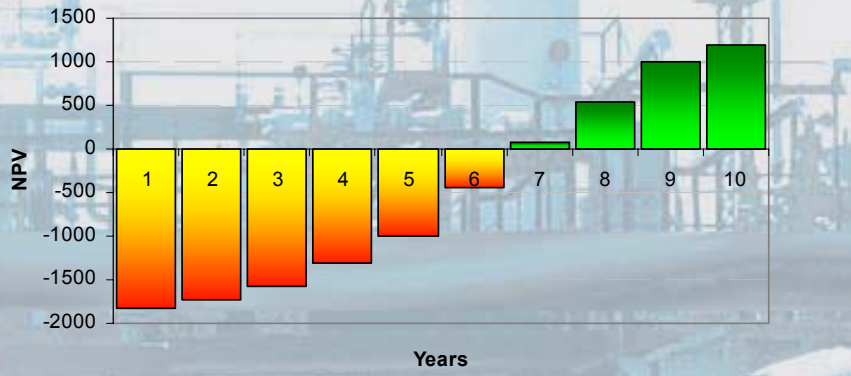
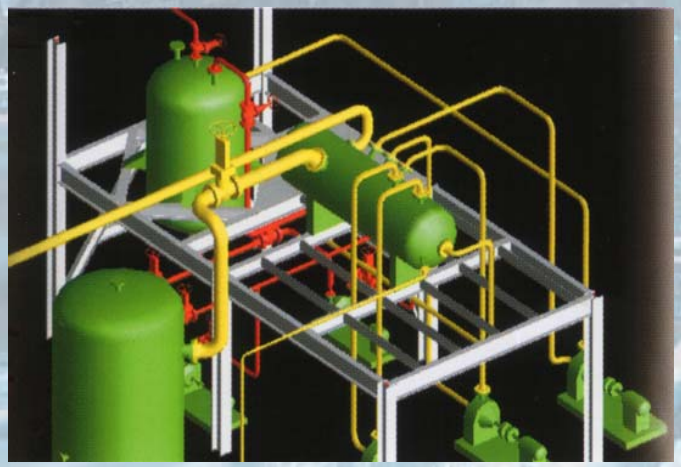
Research and Engineering Works Providing for Integrated Small-Scale Gas Field Development



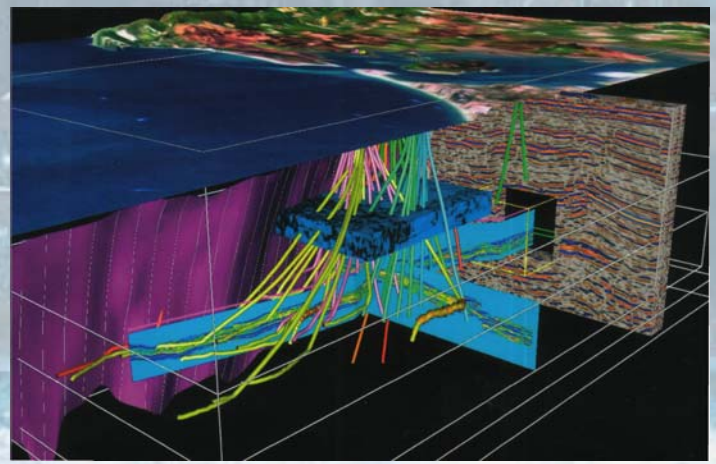
Designing



Economy



Engineering



Research & Development

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Main Methodological Principles of Designing Small-Scale Field Integrated Development

- Provision of long-term steady state production (SSP) and capability margin ensuring peak gas supply
- Determination of production rate on the basis of technical and economic calculation and terms of gas supply to consumers
- Ensuring the stable well productivity during SSP and avoiding the operational complications (send production, drowning etc)
- Ensuring the uniform bed drainage by optimal well location on the surface
- Substantiation of optimal well construction regarding small gas flow rate;
- Designing the integrated technological scheme of field development and surface facilities installation in contrast to traditional stage designing

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Improvement of Designing the Integrated Small-Scale Gas Fields Development

1. Overhaul of regulatory procedural base of designing, constructing and operating.
2. Development of new type technical solutions
3. Automation of designing process on the basis of computer technologies
4. Implementation of project management system at all stages including designing, funding, maintenance, construction and commissioning.
5. Creating the data base of technological schemes and designing solutions

Example of Efficient Small-Scale Field Development in Krasnodar Region

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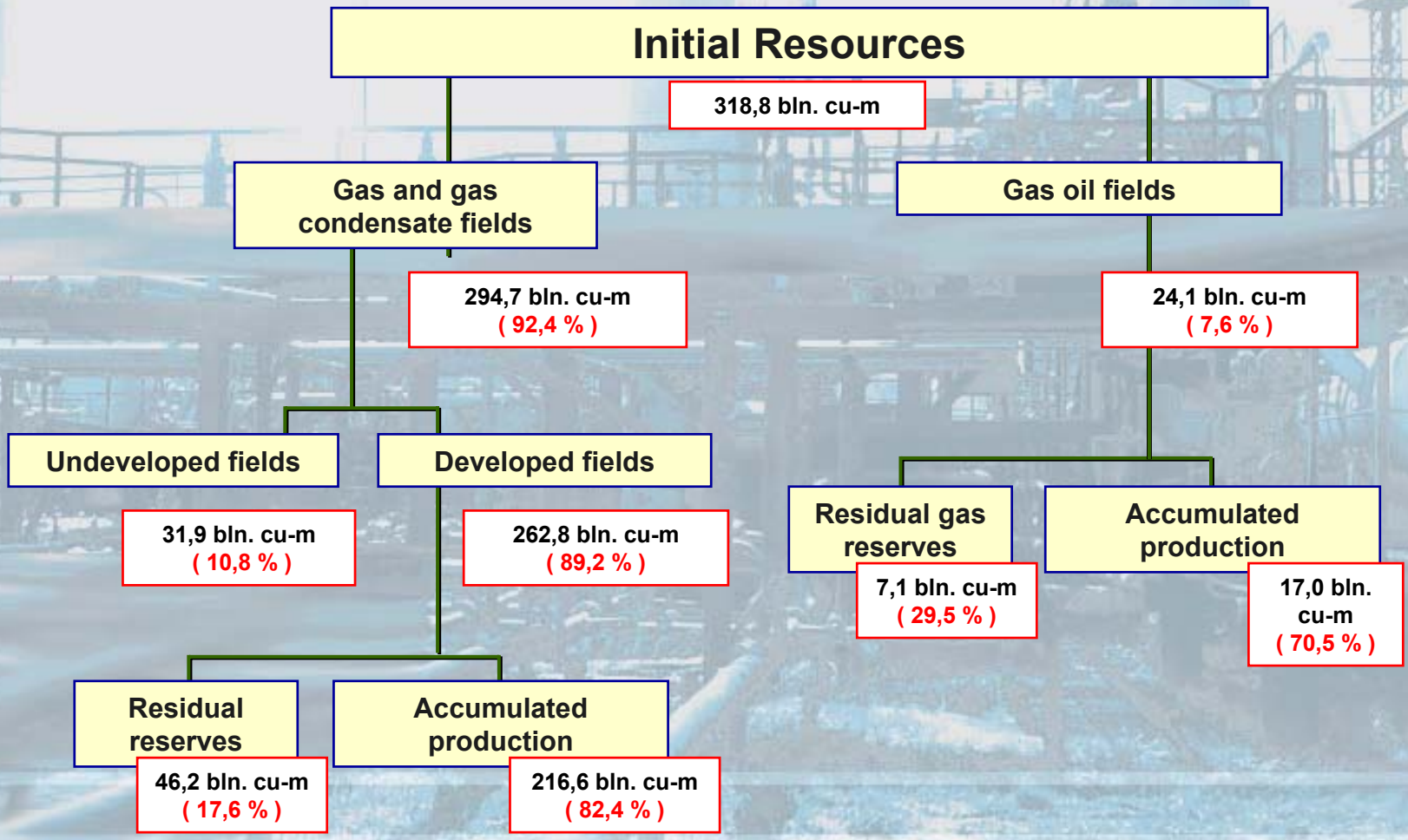
Structure of Gas Resources



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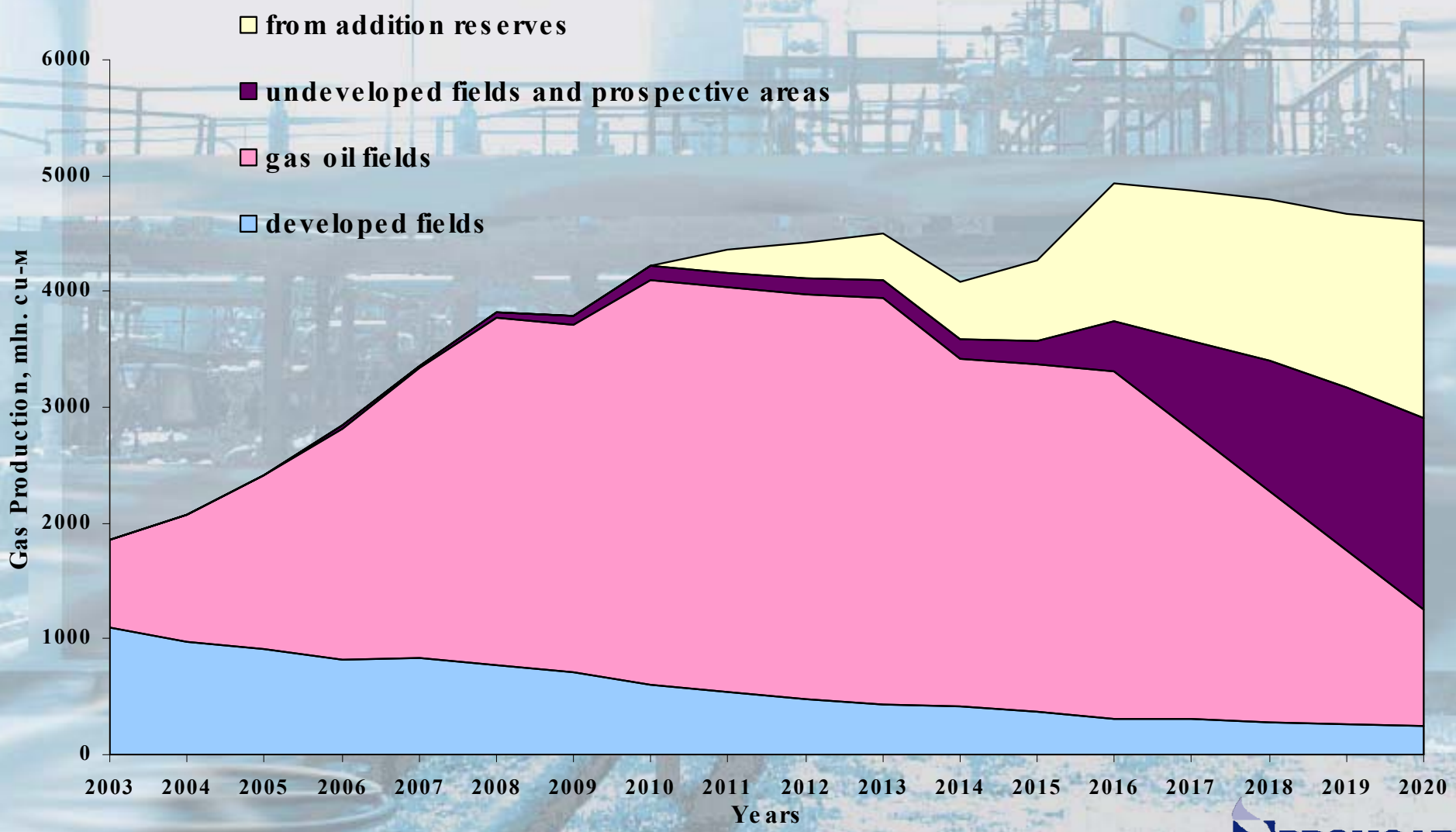
Forecast Production Level by 2020



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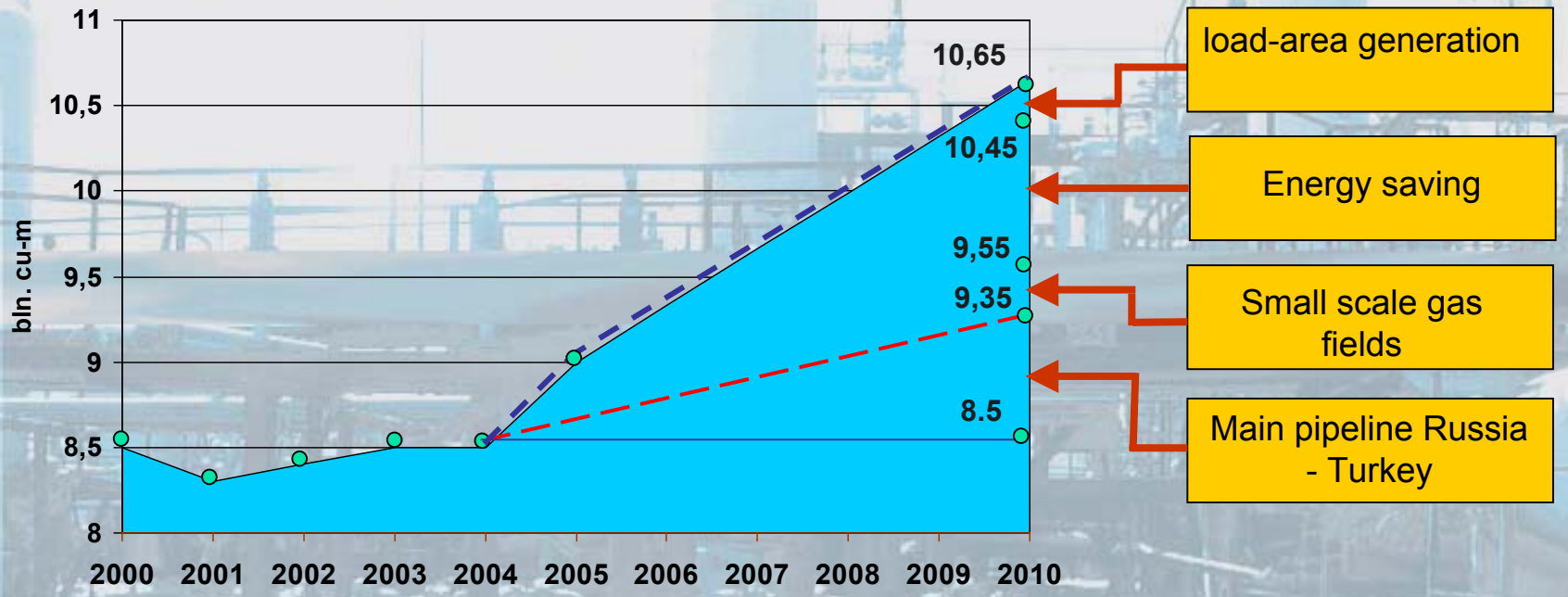
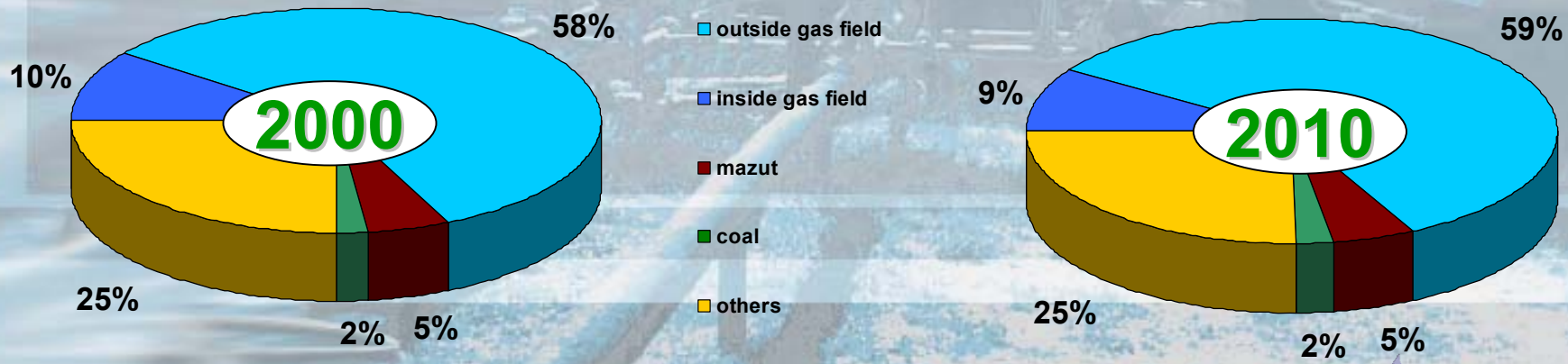
Gas Consumption Structure





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