

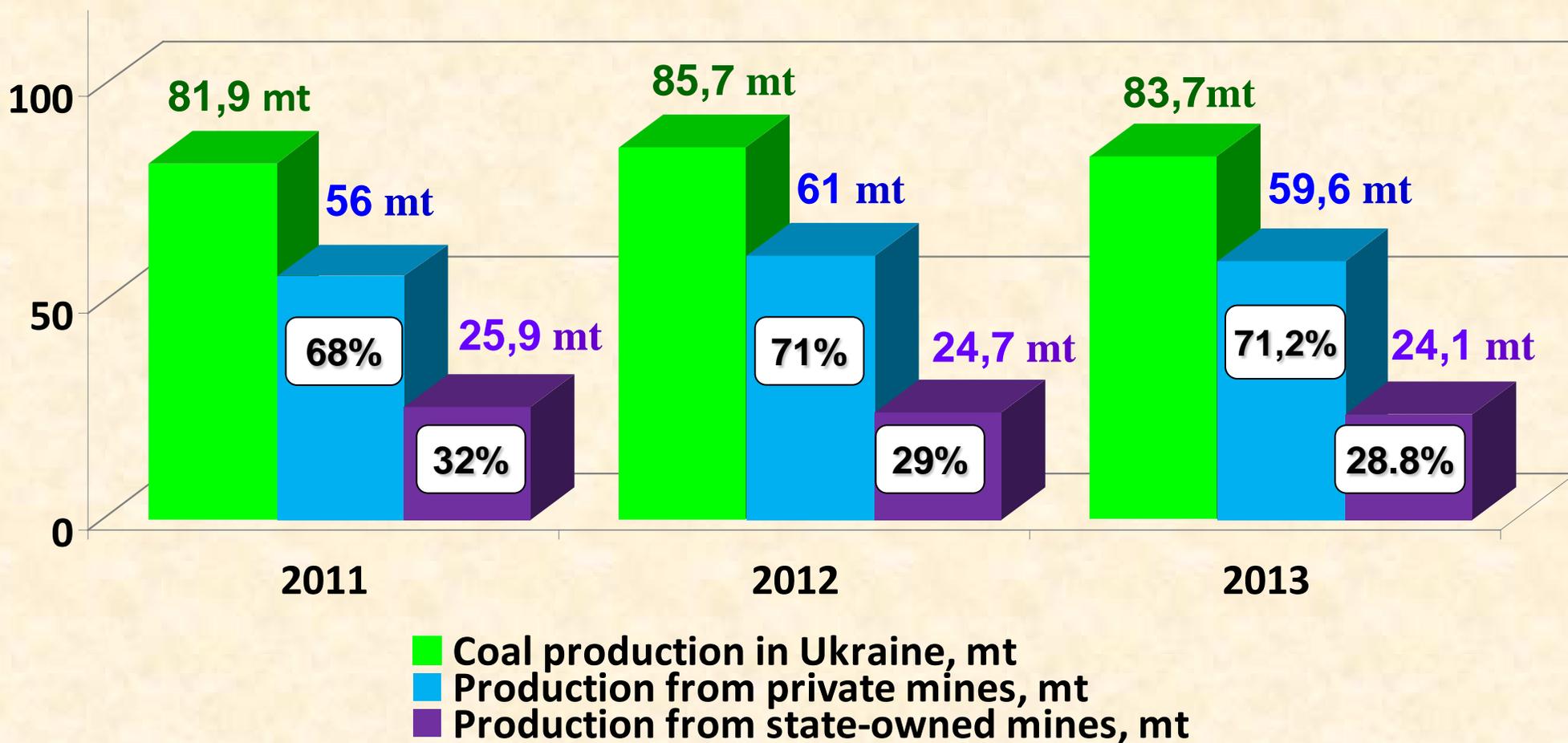
STATE AND DIRECTIONS OF DEVELOPMENT OF PRODUCTION AND USE OF MINE GAS-METHANE

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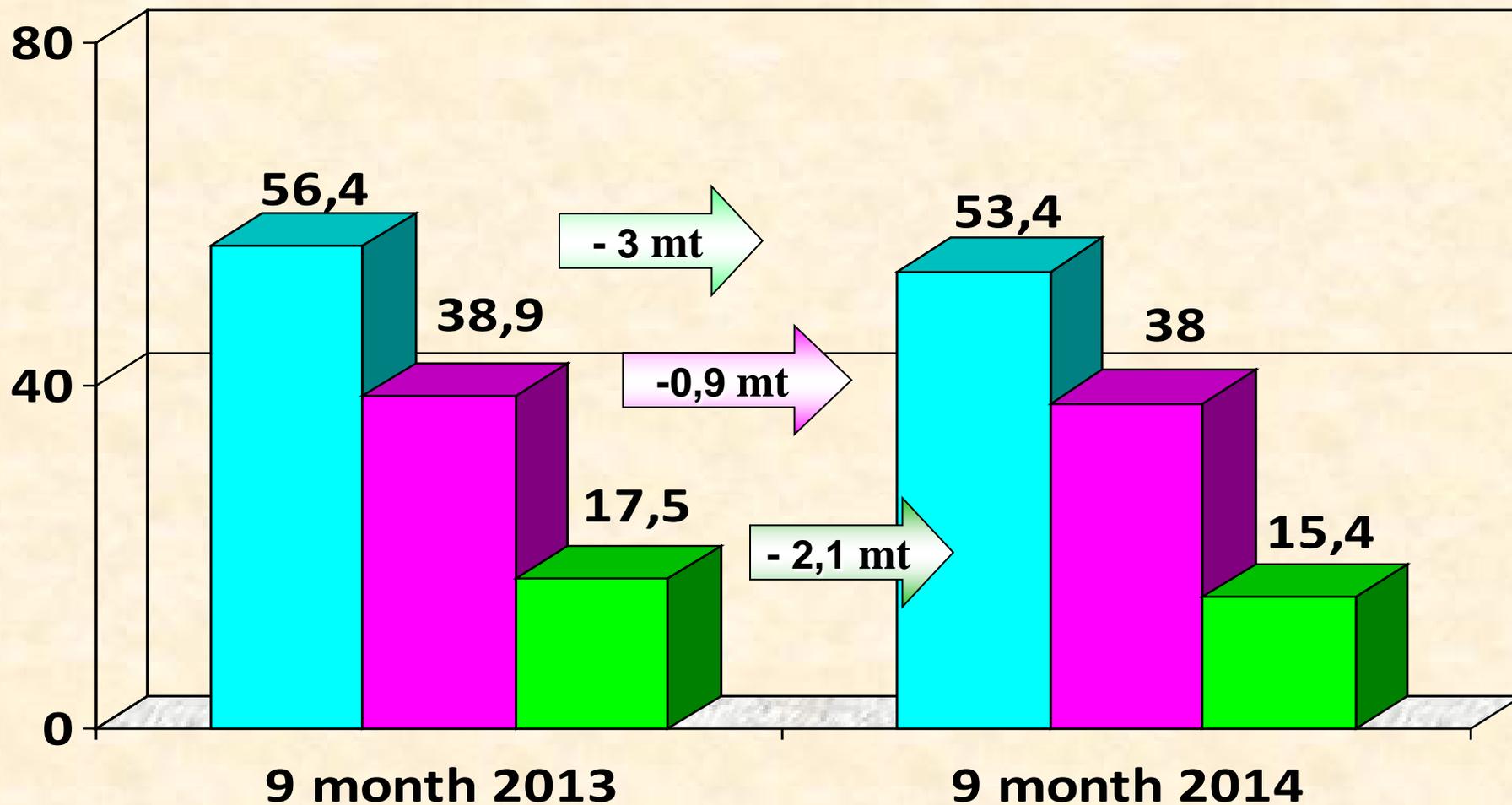
MINISTRY OF ENERGY AND COAL INDUSTRY OF UKRAINE

2014

By 2014 on mines of Ukraine it is noted stable (<80 million T.) level of coal production. In 2013 it made over 83,7 million T. Production from the mines which are not owned by the state is increasing and now accounts for 71,2 % in total coal production balance, while that from state-owned mines – for 28,8%



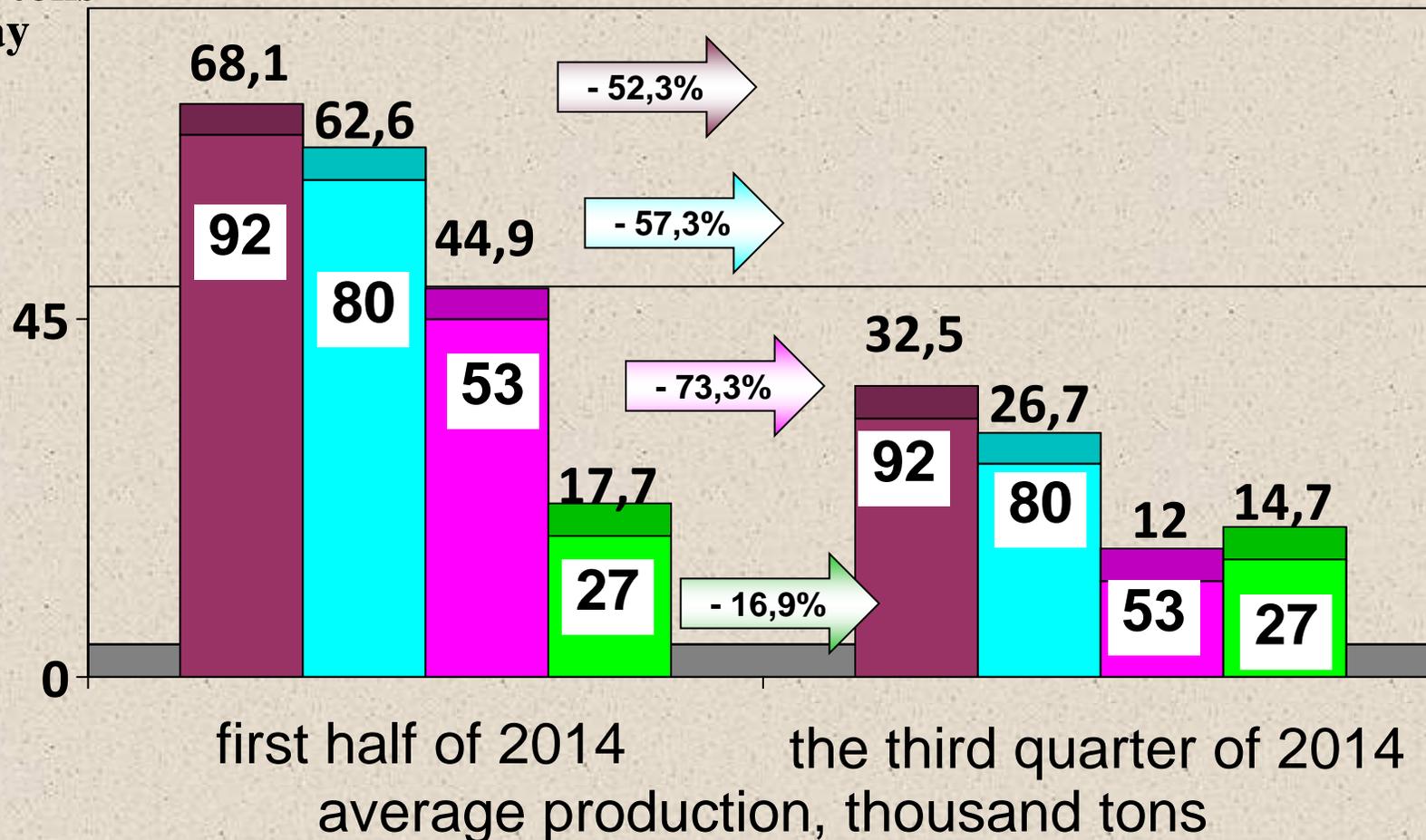
Dynamics of coal mining in Ukraine for 9 months 2013 – 2014



■ Mines total, mt ■ Private mines, mt ■ State mines, mt

Work of the state coal-mining enterprises during anti-terrorist operation in 2014

thousand tons
per day



■ Total mines in Ukraine

■ Located on Donbass

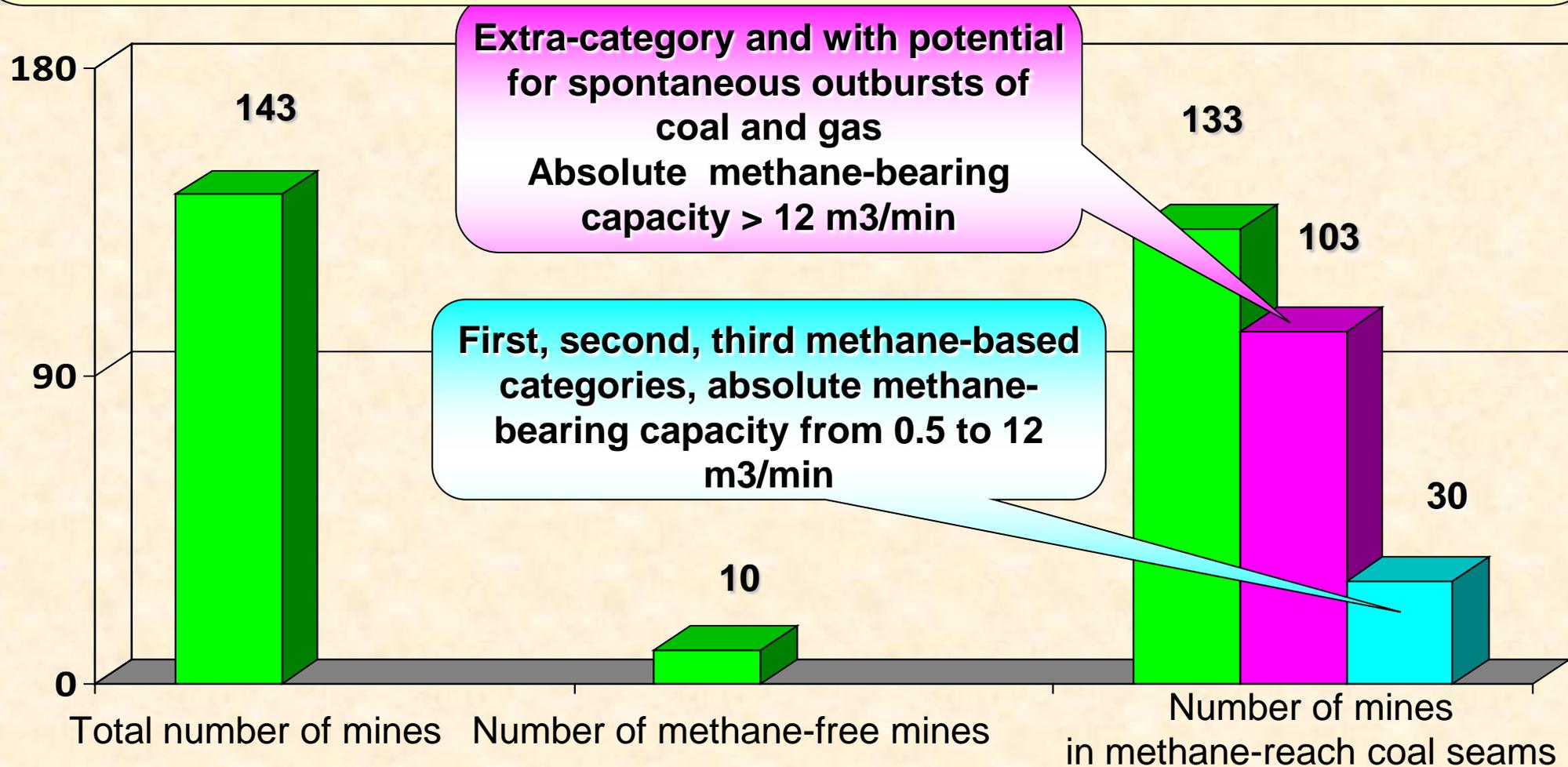
■ In zone of anti-terrorist operation

■ Beyond of zone of ATO

Geological reserves of gas methane in Ukraine exceed 12 trillion m³, 1.1 trillion m³ of which are recoverable ones, including 150 billion m³ in operating mines



Coal in Ukraine is produced by 143 large mines, 133 of which (93%) have methane-rich coal seams (30 mines have absolute methane emissions between 0.5 and 12 m³/min, and 103 mines – over 12 m³/min and potential for spontaneous outbursts. These mines in 2013 produced over 60 million tones of coal, or 70% of total production).

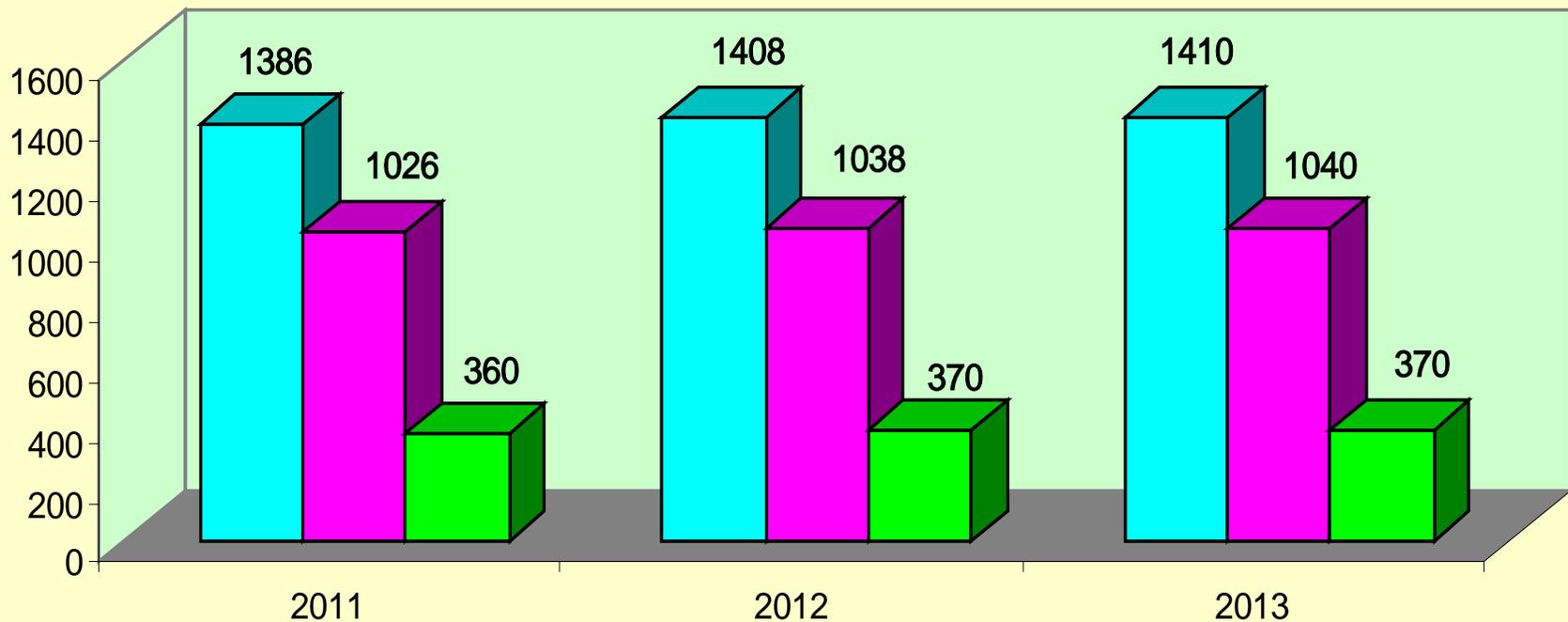


Volume of methane emissions from mines is about 1400 million m³/year. Coal production process is accompanied by natural methane gas emissions into mine ventilation system in approximate amount of 1000 million m³/year. Degasification recovers 370 million m³/year, or about 25% of total methane emissions

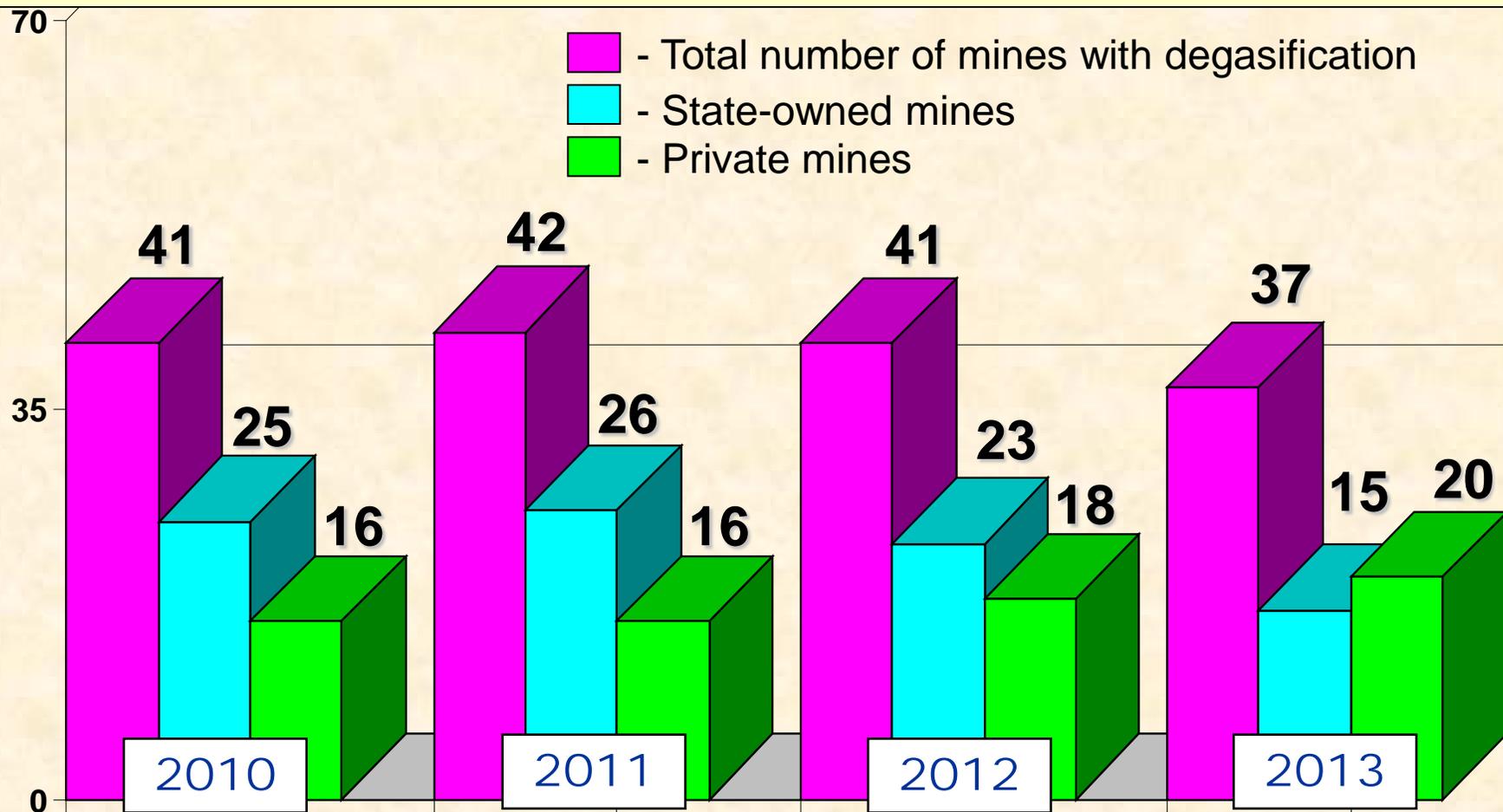
■ total amount of gas-methane, million m³

■ emissions with ventilation air, million m³

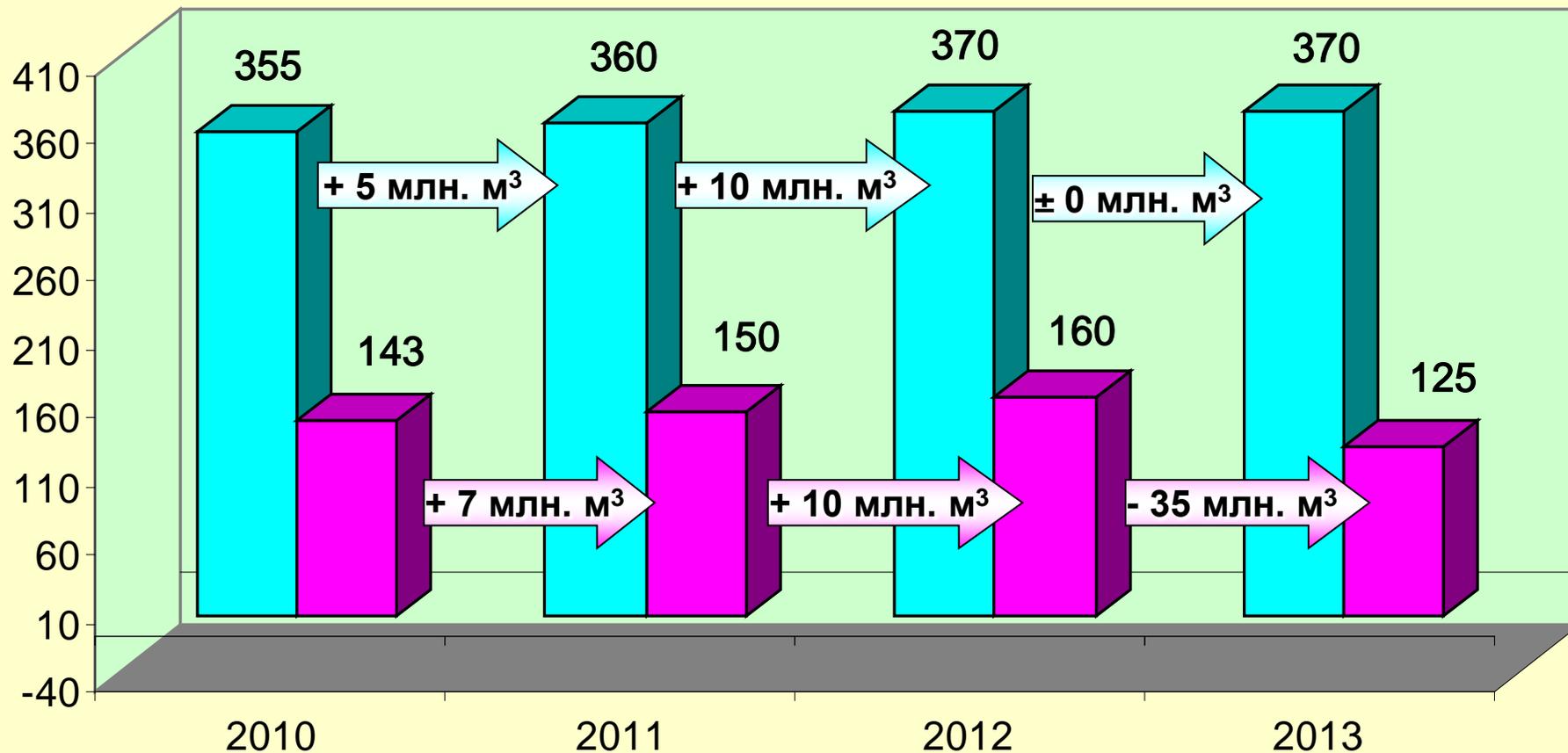
■ capture by degasification systems, million m³



Currently degasification is performed at 37 mines that account for 41% of total coal production in Ukraine, including 20 mines not owned by the state, with annual production of 28.6 million tones, and 17 state mines with annual production of 10 million tones. On 10 mines degasification is applied periodically, depending on rate of coal mining.

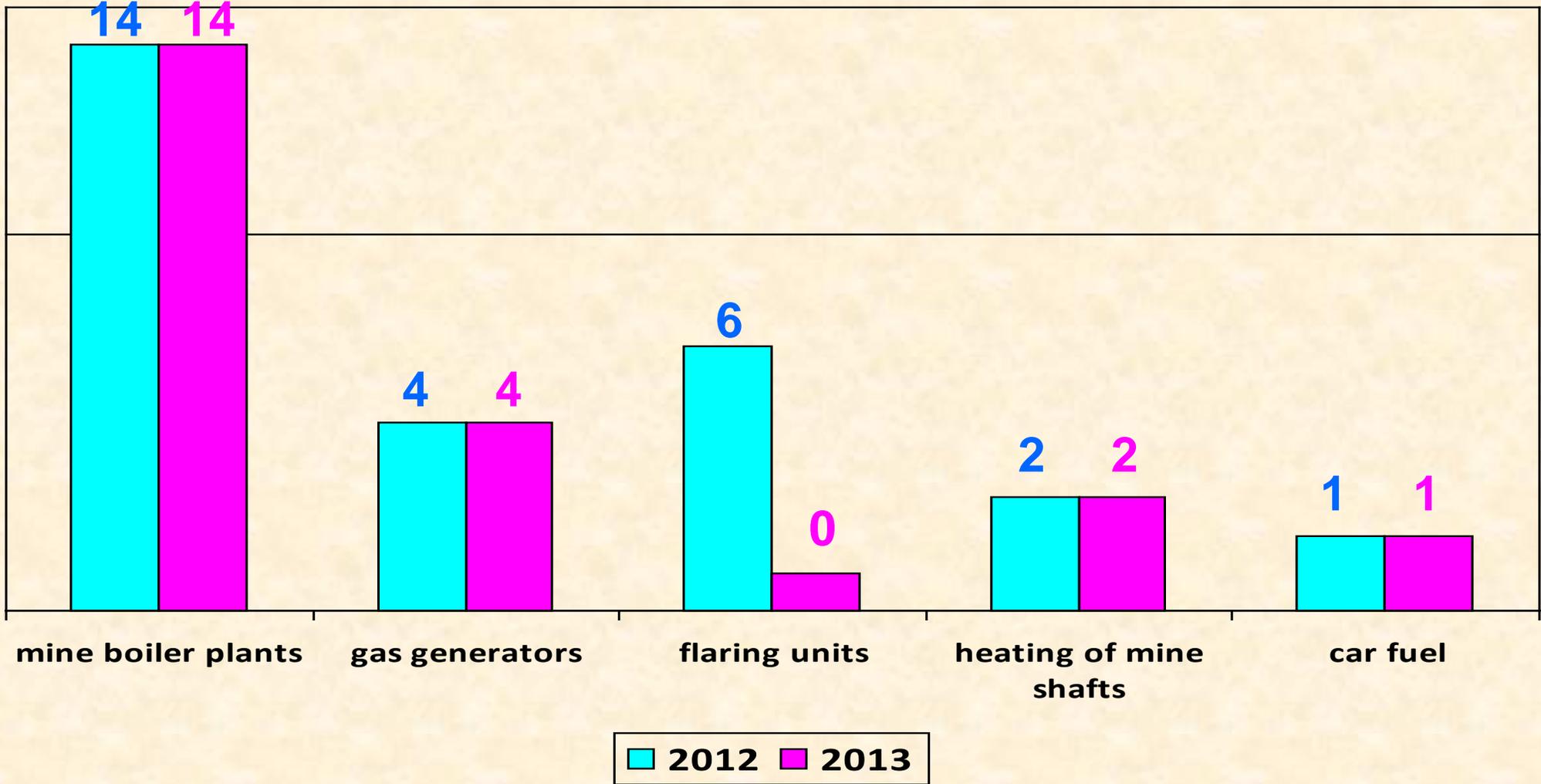


With 370 million m³ of gas - methane, capture degasification systems, annually utilize about 125-160 million m³ - 40-50%. In 2013 - 125 million m³ (reduction due to the termination of use of torch installations)

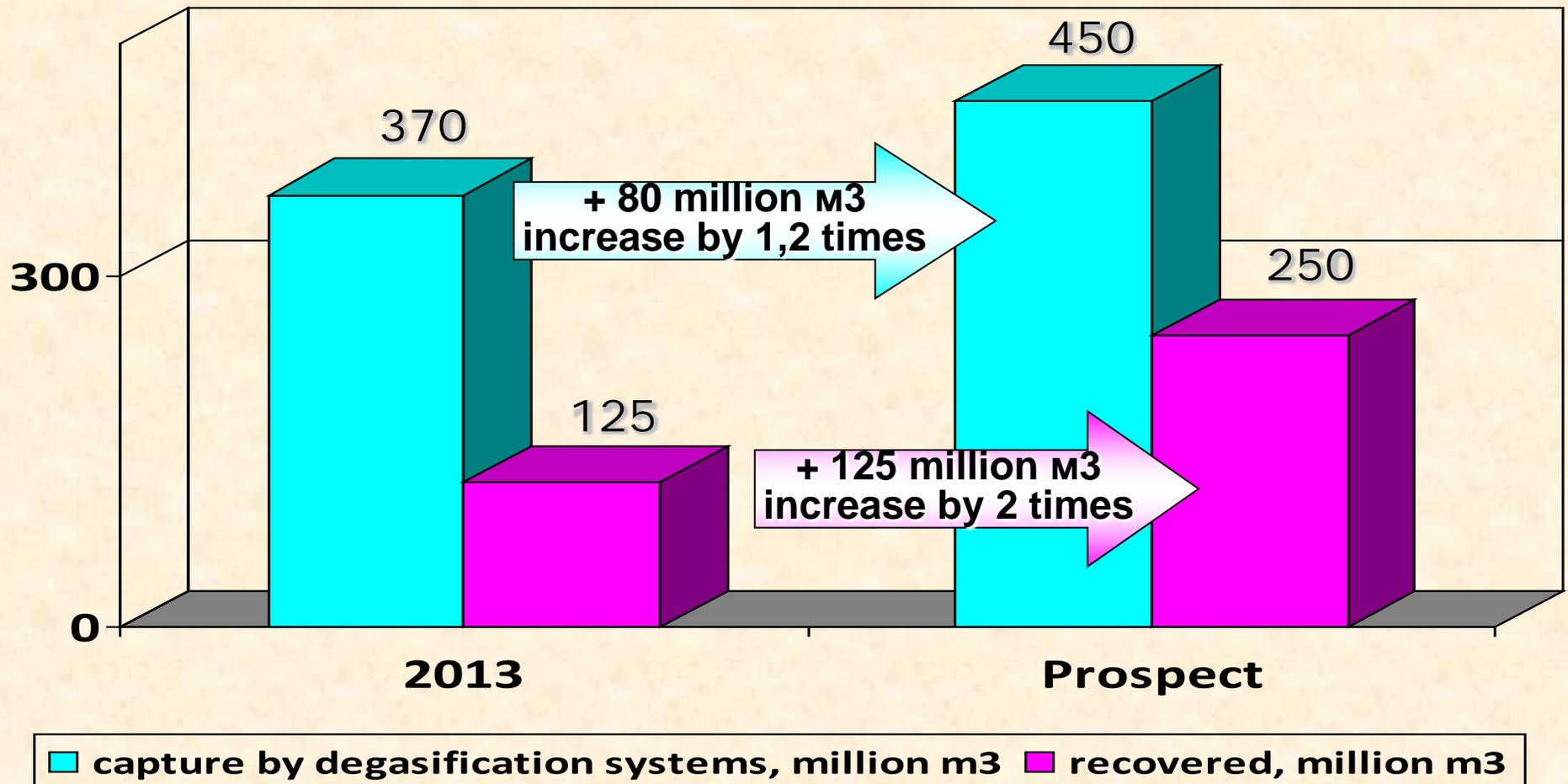


■ Каптування дегазаційними системами, млн. куб. м ■ утілізовано, млн. куб. м

**Captured methane gas is utilized in the following way:
for mine boiler plants – 14 mines, for gas generators – 4 mines,
flared – 0 mines, for heating of mine shaft – 2 mines,
as a car fuel – 1 mine**



Prospects of increase in objects of degasification and the subsequent utilization of gas - methane on mines of Ukraine are possible at the expense of increase in number of mines, sites where is degasification, reconstruction of underground vent networks, by increase of efficiency of degasification, application of degasification from a surface, utilization of methane for the purpose of obtaining electric energy, heat, etc.



Main directions of increase of degasification level and methane utilization

1. Introduction of the approved technologies of preliminary degasification of coal fields, due to drilling of wells from a surface with hydraulic fracturing application.
2. Conducting researches on preliminary degasification, taking into account collection properties of the breeds containing coal layer. Permeability of sandstones makes $<0,1$ mD (millidarcy), porosity of sandstones on average $5 \div 6\%$.
3. Increase of production level in clearing faces >1000 t/days and rates of advancing of a face for the purpose of growth of intensity of methane release.
4. The application of advanced technologies and equipment for underground degasification allowing drill vent wells extent more 100m and with a diameter more than 100 mm.
5. Reconstruction of mine vent networks increase in diameter of the pipeline with $250 \div 350$ mm to $400 \div 600$ mm.
6. Use of the equipment of degasification control with support of its parameters first of all (concentration $>25\%$) and productivities.
7. Improvement legislative and normative documents on stimulation of investments and the preferential taxation.

EXPECTED RESULTS

from implementation of methane degasification and utilization projects in Ukraine:

- Decrease in level of accident rate and increase of safety of miners work;
- Increase of use level of alternative types of fuel;
- Creation of prerequisites for increase in volumes of coal mining;
- The possibility of receiving by mines is cheaper than electric and thermal energy;
- Receiving additional financial resources by results of joint activity of mines (enterprises) with the investor in the sphere of degasification and utilization of mine methane;
- Essential reduction of greenhouse gases emissions;
- Creation of additional workplaces.

Thank you for your attention!