

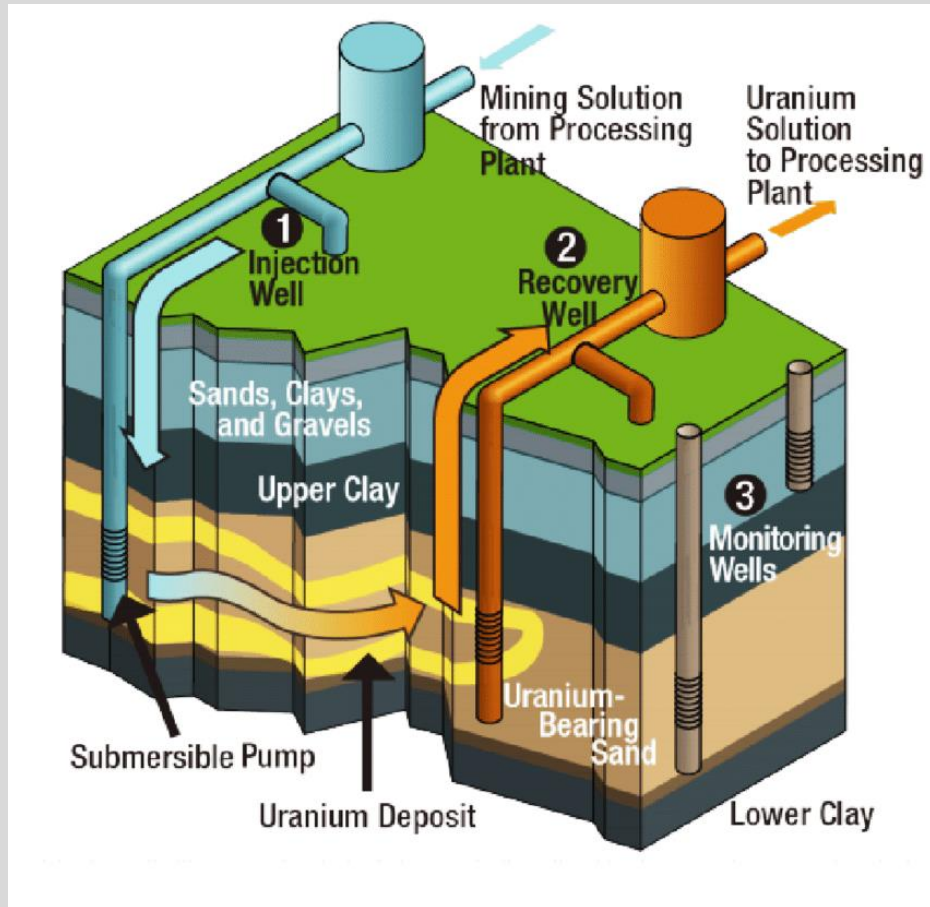


**Mega-Project  
“Rare metals and  
REE from  
Kazakhstan for  
Japan”**

2023

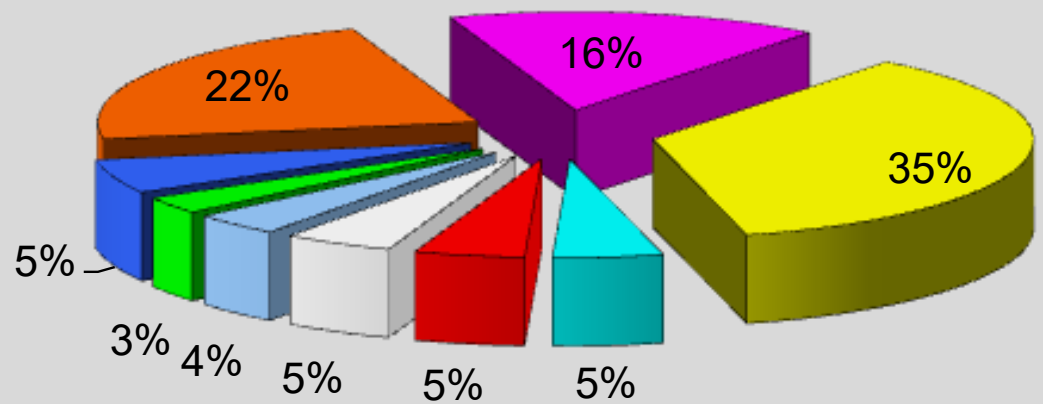
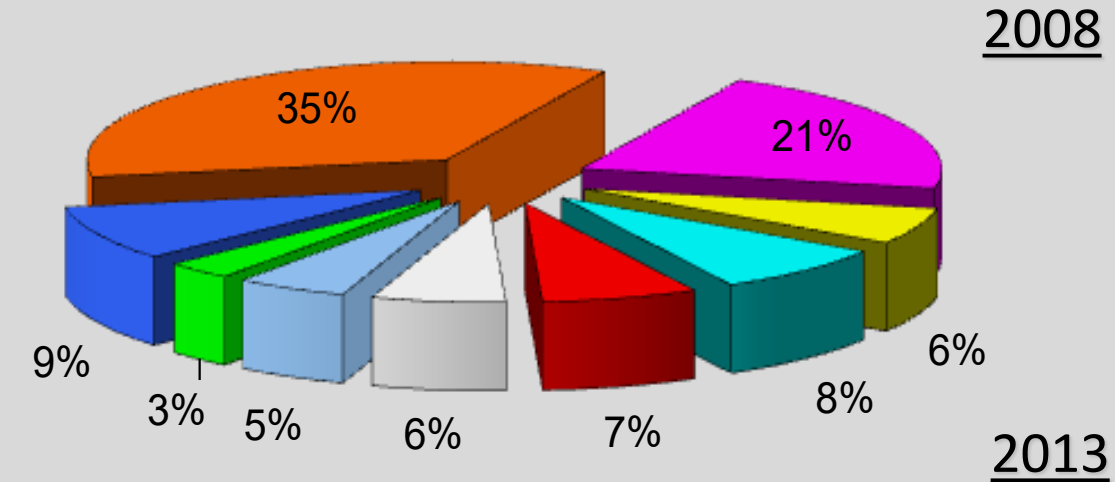
# **Vision, concept and strategy for creation of high-tech assets in the mineral industry of Kazakhstan**

# Input information and business idea



In recent decades the technology of in-situ leaching (ISL) has proven to be the most efficient one in the world's mineral industry. Widely applied in the uranium mining (over 50% of world production currently), it has ability to change radically the status-quo of mining of many other metals as well, such as nickel, copper, cobalt, gold, REE, titanium, aluminum, tungsten, molybdenum, phosphorus etc.

# Famous case : Country Shares of the World Uranium Market

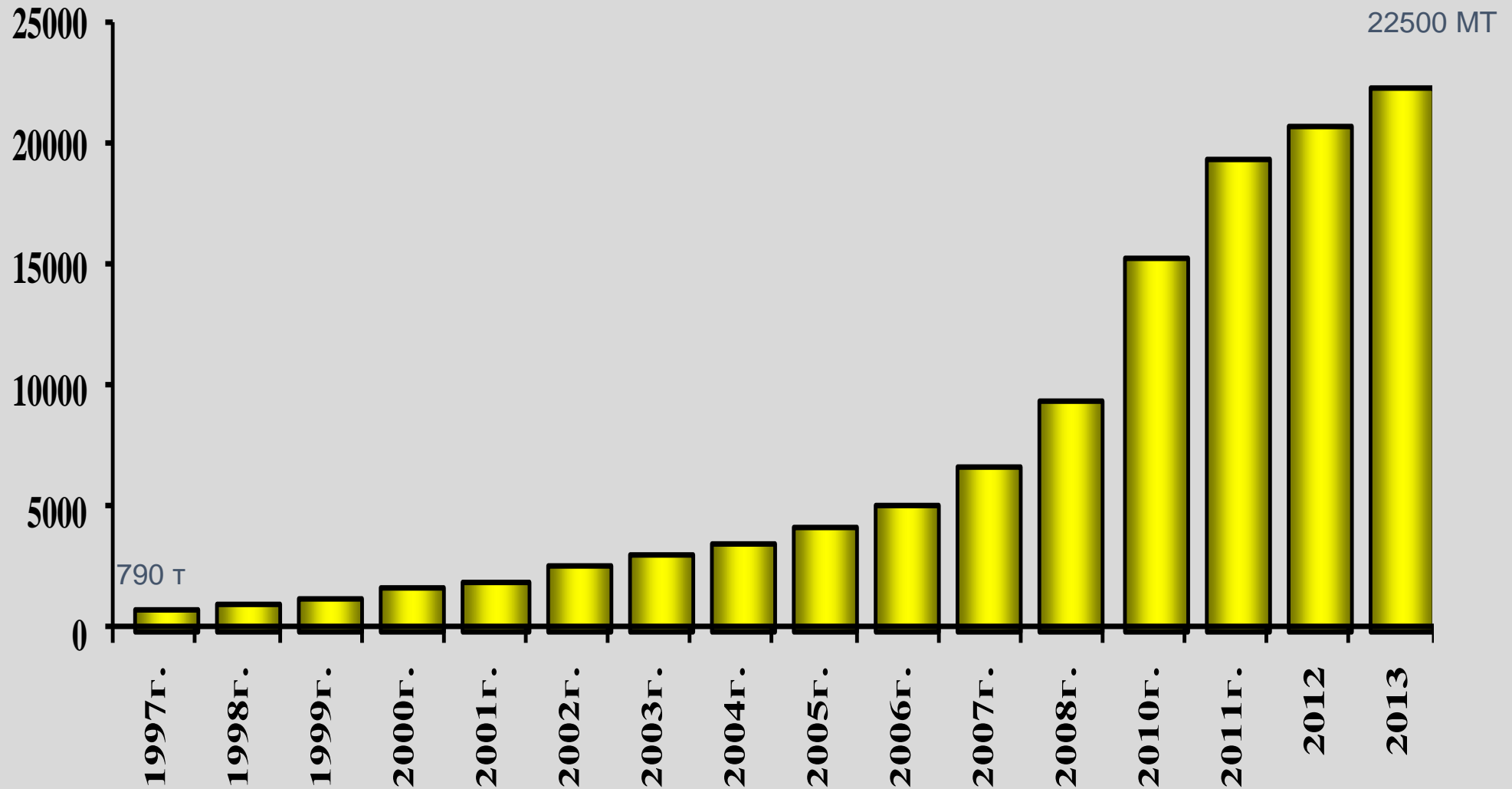


2014-2019

Kazakhstan, 22800 t, 41 %  
Kazatomprom, 13600 t, 24 %

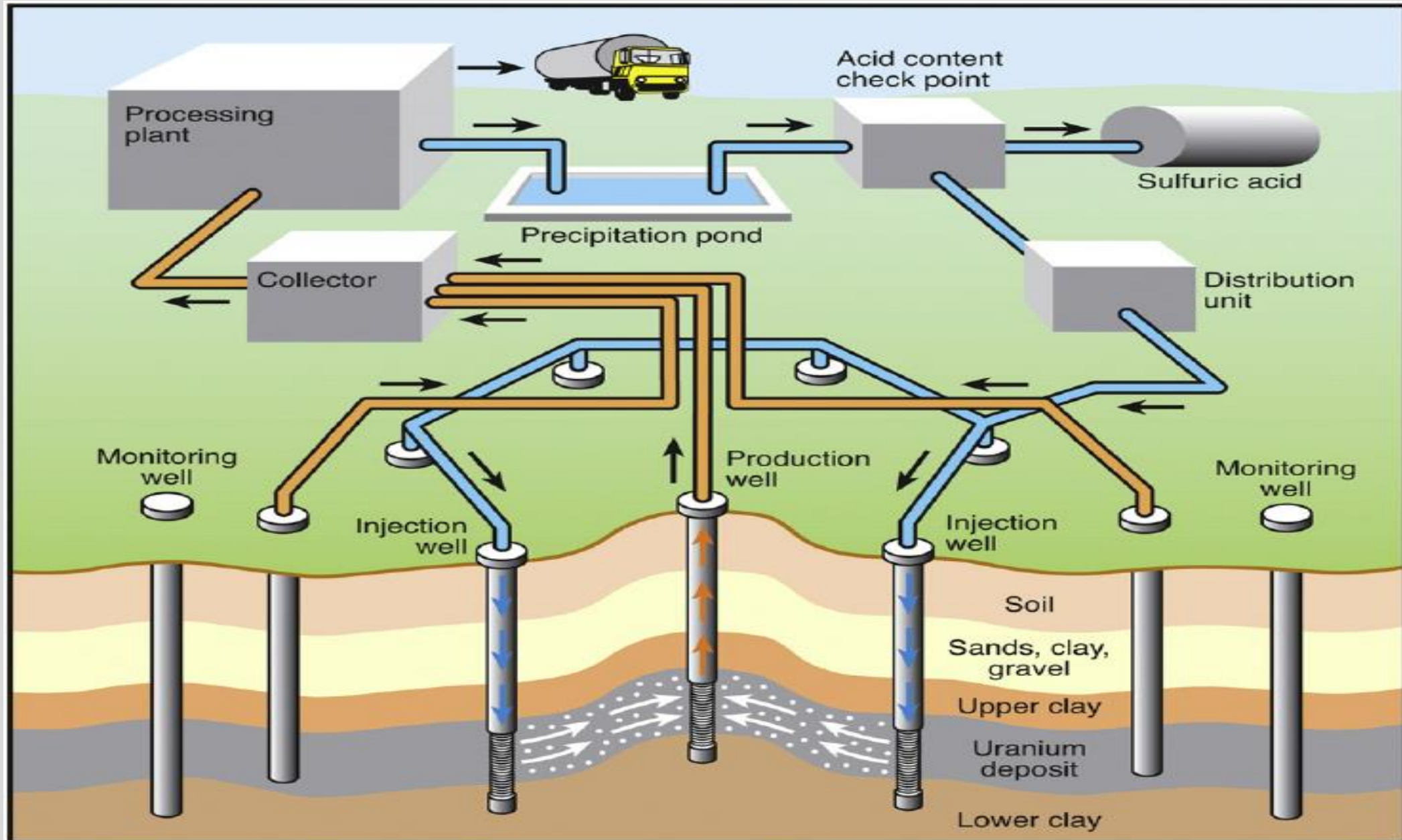
- Canada
- Australia
- Kazakhstan
- Niger
- Russia
- Namib
- Uzbekistan
- USA
- Other

# Dynamics of Uranium Production with ISL Method in Kazakhstan

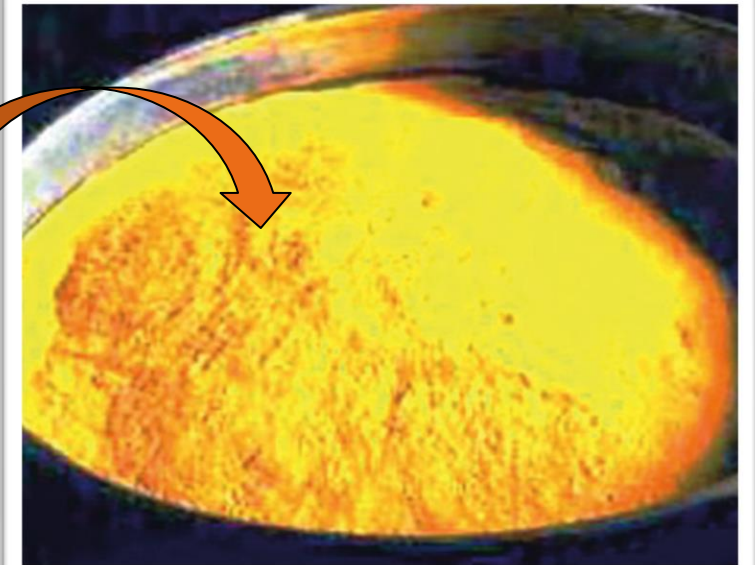
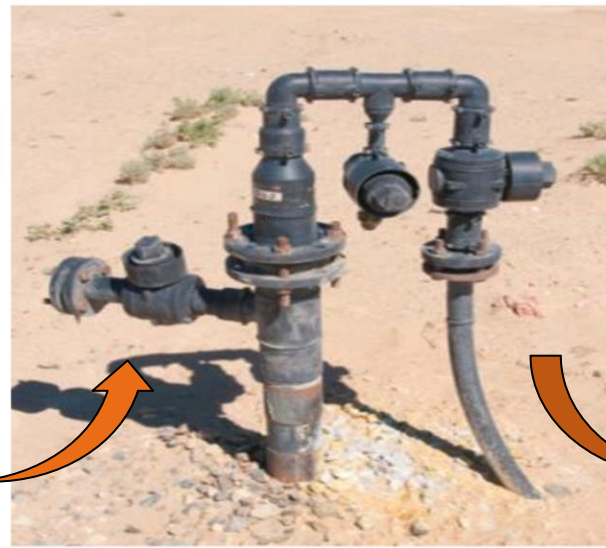




# Foundation of Kazakhstan leadership: advanced technology of uranium ISL



# Recent history : ISL method (underground leaching) is the best in uranium industry





# Today's new vision : New applications of ISL

◆ Oxidized copper and lead-zinc ores;

◆ Oxidized nickel ores;

◆ Vanadium ores;

◆ Titanium and zirconium ores ;

◆ Oxidized gold ores;

◆ Borates and potassium salts;

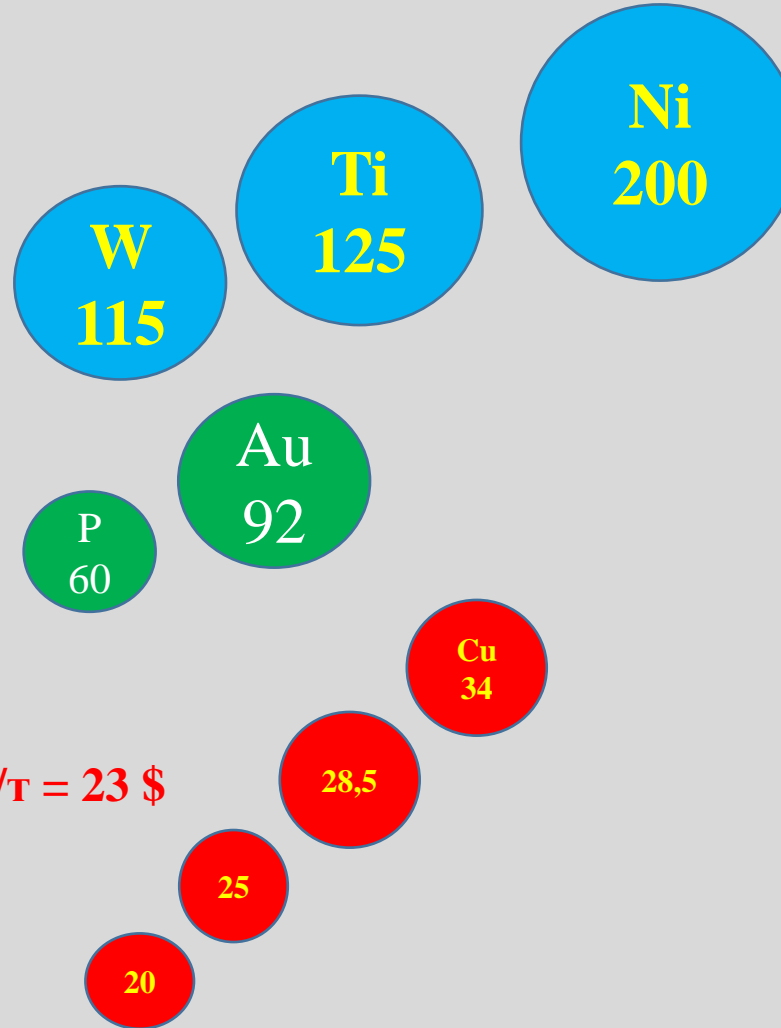
◆ Apatite and phosphorite;

◆ Industrial wastes



# Value in 1 ton of different ores, USD

- Nickel Ni 1% \* 20 \$/kg = 200 \$
- Titanium oxide TiO<sub>2</sub> 2,5 \$/kg \* 5 % = 125 \$
- Tungsten W 0,4% \* 28,7 \$/kg = 115 \$
- Gold Au 2 g/T \* 46 \$/g = 92 \$
- Phosphorus oxide P<sub>2</sub>O<sub>5</sub> 0,3\$/kg \* 20 % = 60 \$
- Copper Cu 0,5% \* 6,9 \$/kg = 34 \$
- Germanium Ge (in uranium ore) 2300 \$/kg \* 10 g/T = 23 \$  
+ Scandium Sc 1100 \$/kg \* 5 g/T = 5,5 \$
- REE (in phosphorite) 5 \$/kg \* 0,5 % = 25 \$
- Uranium U 0,04% \* 50 \$/kg = 20 \$



# **The potential new types projects which will be operated by ISL in the near future may include:**

- ◆ Oxidised copper mineralisation (**industrial operation in USA and Russia**)
- ◆ Base metals mineralisation; (**Russia and Kazakhstan experience**)
- ◆ Oxidised nickel mineralisation; (**completed field ISR tests in Russia and Kazakhstan**)
- ◆ REE and rare metal bearing weathering crusts;

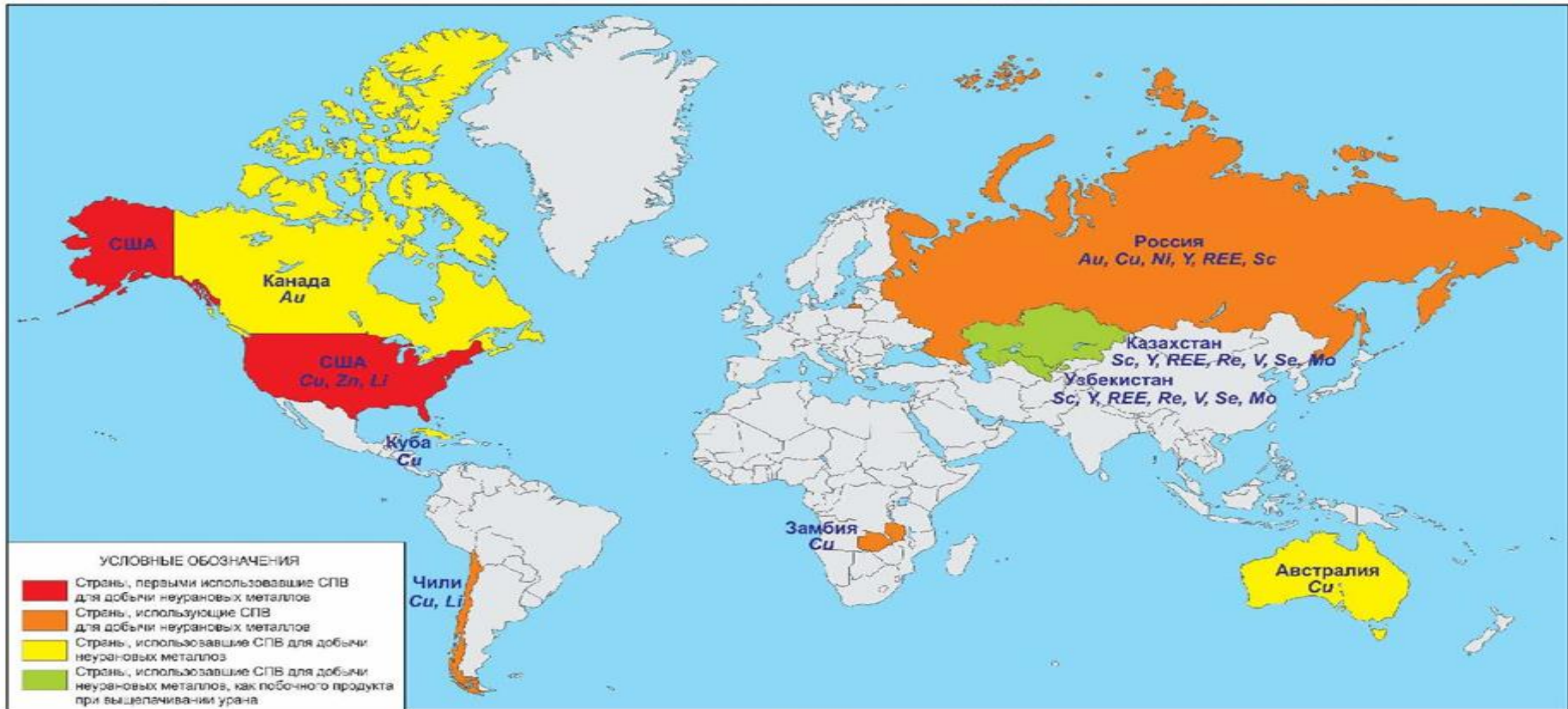
**(completed field ISR test on one REE deposit with recovery of 90% and ISR push pull test on the tungsten deposit in Kazakhstan)**

- ◆ Gold mineralisation (**Russia and Kazakhstan experience**)

- ◆ Phosphorites, borates и potash salt;

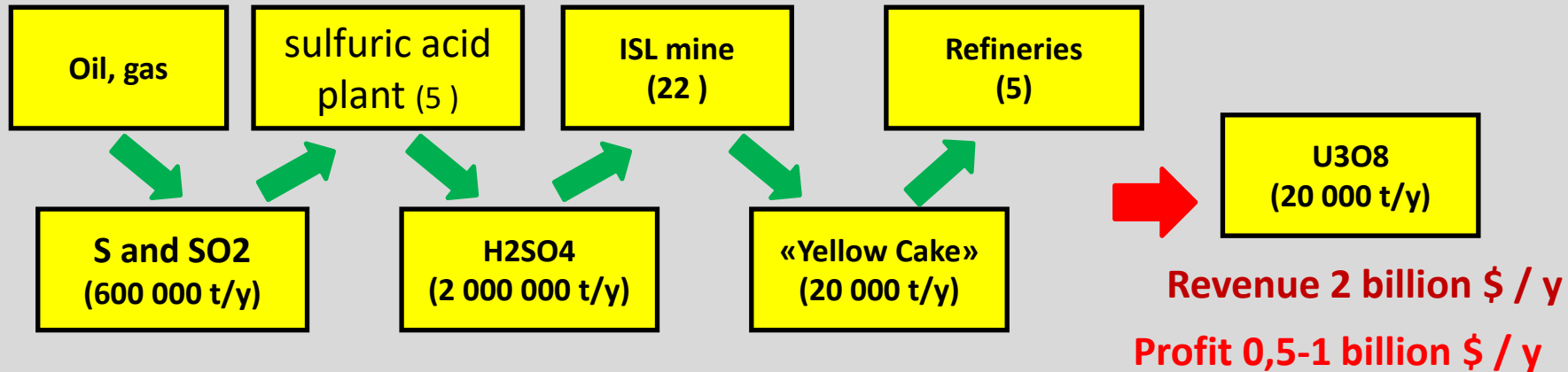
**Cheaper mining of basic industrial metals will also reduce the cost of energy (energy production, transmission and storage, where Cu, Al, Zn, Pb, Cd, Li, Ni, Co, REE and many other metals are consumed.)**

# ISL geographic today

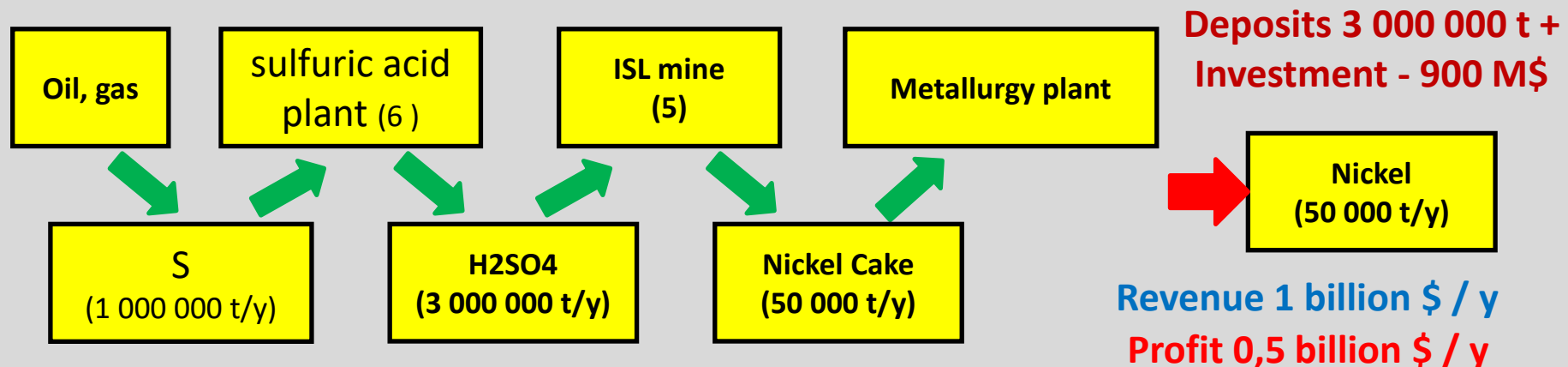


# Case of uranium-ISL transformation for another metal mining with ISL

Existing ISL uranium industry in Kazakhstan with 900 000 t deposits



Analogical perspective ISL industry for nickel and cobalt





# **Step by step Plan for implementing the strategy and assessing the investments**

- 6-12 months - mobilization of staff, creation projects database, obtaining licenses, marketing, establishing partnership with customers and suppliers - \$1,5-2 M
- From 12 to 20 months - acquisition or creation of initial technological and production assets - \$50-100 M
- Up to 36 months - Development and withdrawal of assets for design capacity - \$300-400 M
- From 6 to 7 years - Stable operation of a diversified group of companies with income \$1 B per year and \$300-500 M net profit
- From 8 to 10 years - Expansion to income \$5-8 B per year.

# “Rare metals and REE for Japan” team



Dr. Baurzhan Duisebayev



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Alexander Egorov



Anton Kononov



Erkin Koilubayev



Tolkyn Duisebayeva



Akmurat Altynbek



Tolganay Egorova



Olzhas Duisebayev



Aliya Umiralieva

# Speakers



**Dr. Baurzhan Duisebayev**

Dr. Duisebayev has been a science leader in both the private and state own scientific institutes and centers for over 30 years.

He coordinated all research programs of the National Atomic Company Kazatomprom in 2001-2014 years. Dr. Duisebayev has authored or co-authored 40 technological patents, 80 scientific articles and reports. Dr. Duisebayev graduated Tomsk Polytechnical University (TPU) in 1982, defended candidate of science dissertation in 1985 in TPU (Russia) and doctoral dissertation in 1997 in Irkutsk Polytechnical University (Russia).



**Zhandos Abishev**

Abishev Zhandos - Candidate of Technical Sciences. In 1987 he graduated from the Moscow Institute of Steel and Alloys with a degree in Physico-Chemical Research of Metallurgical Processes, in 1990 - full-time postgraduate study of the All-Union Institute "Mechanobr", St. Petersburg, with a degree in Mineral Enrichment, in 1993 - the Joint Vienna Institute of International Economics. Corresponding member of the Kazakhstan National Academy of Natural Sciences and the Kazakhstan Mining Academy, author of 17 patents and copyright certificates of the USSR, the Russian Federation and the Republic of Kazakhstan. Has the diplomatic rank of 1st Secretary.

**Thank you for your  
attention!**