Experience of using and classification harmonizing UNFC in Ukraine

Commercial projects
Potentially commercial projects
Non-commercial projects
Exploration projects
Additional quantities in place
Other combinations
Extracted quantities
123 Codification (E1;F2;G3)

Mariia Kurylo
Ukrainian Association of Geologists (UAG)
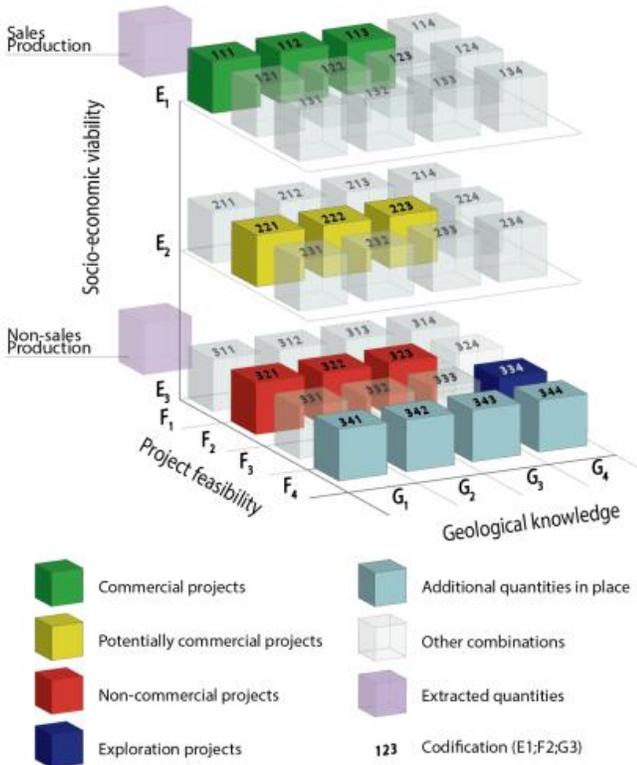
- Classification of the State Subsoil Fund

- ABC categories - due to historical and current accounting of reserves and resources

- CRIRSCO standards - at the request of subsoil users

Criteria for Classification of the State Subsoil Fund

Commercial value	Degree of technical and economic investigation	Degree of geological exploration	Class code
1. Balance reserves	EGE-1	Explored (proved) reserves	111
	EGE-2	Explored (proved) reserves	121
	EGE-2	Prospected (probable) reserves	122
2. Conditionally balance and off-balance reserves	EGE-1	Explored (proved) reserves	211
	EGE-2	Explored (proved) reserves	221
	EGE-2	Prospected (probable) reserves	222
3. Commercial value undetermined	EGE-3	Prospected (probable) reserves	332
	EGE-3	Prospective resources	333
	EGE-3	Prognostic resources	334

Commercial value

- Balance **reserves**
- Conditionally balance reserves
- Off-balance reserves
- Undetermined commercial value

Level of technical and economic investigation

- Detailed economic-geological evaluation (EGE-1)
- Preliminary economic-geological evaluation (EGE-2)
- Initial economic-geological evaluation (EGE-3)

Geological exploration

- Explored Reserves
- Pre-Explored Reserves
- Prospective Resources
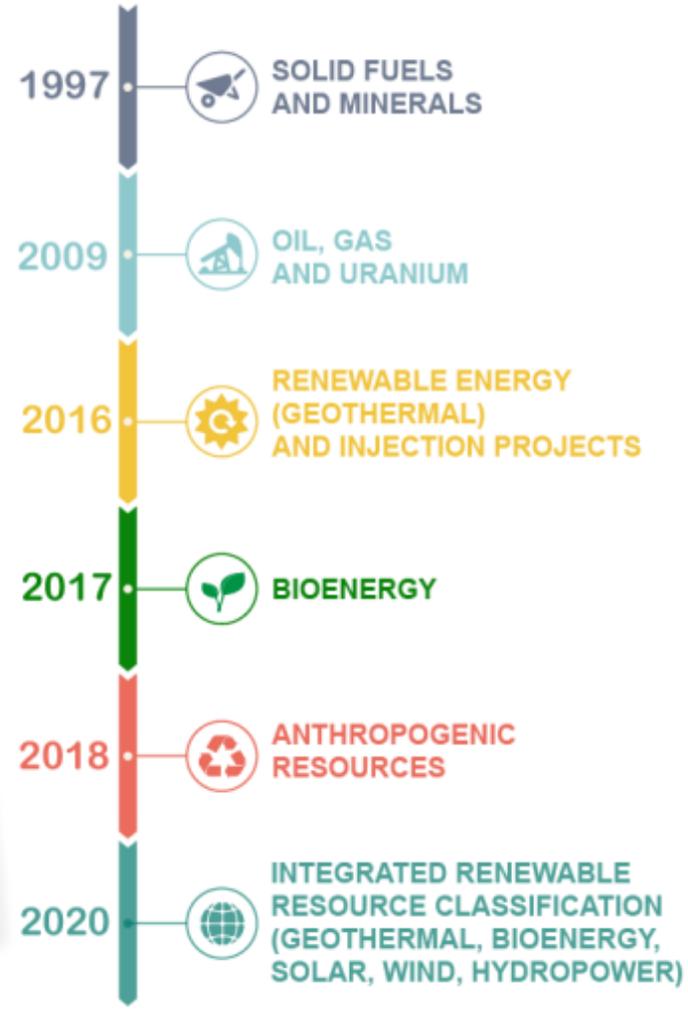- Prognostic Resources

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Transitional stage (1992-1996), Ukraine used ABC classifications

Ukraine was the first among the FSU countries to adapt the national Classification to UNFC 1997

In 2018 we added compliance with UNFS 2009 codes
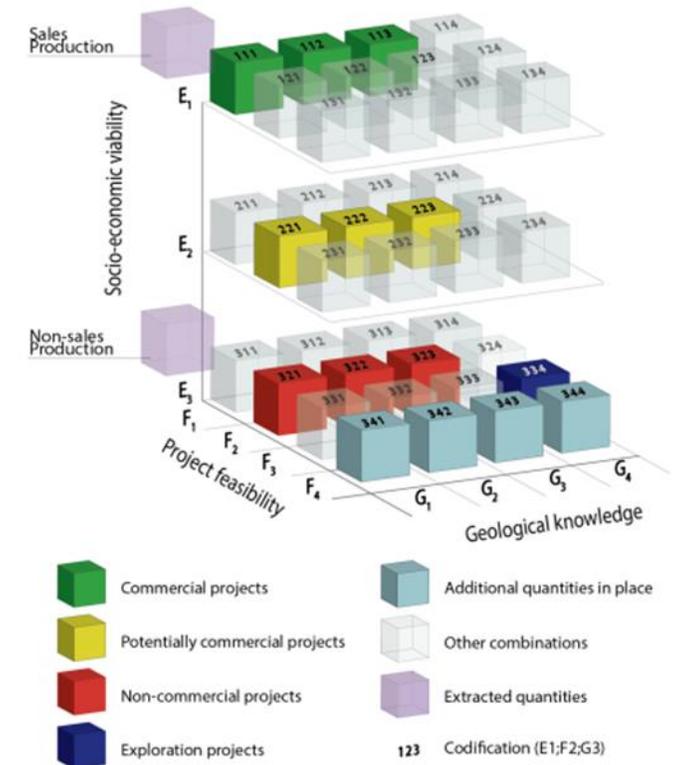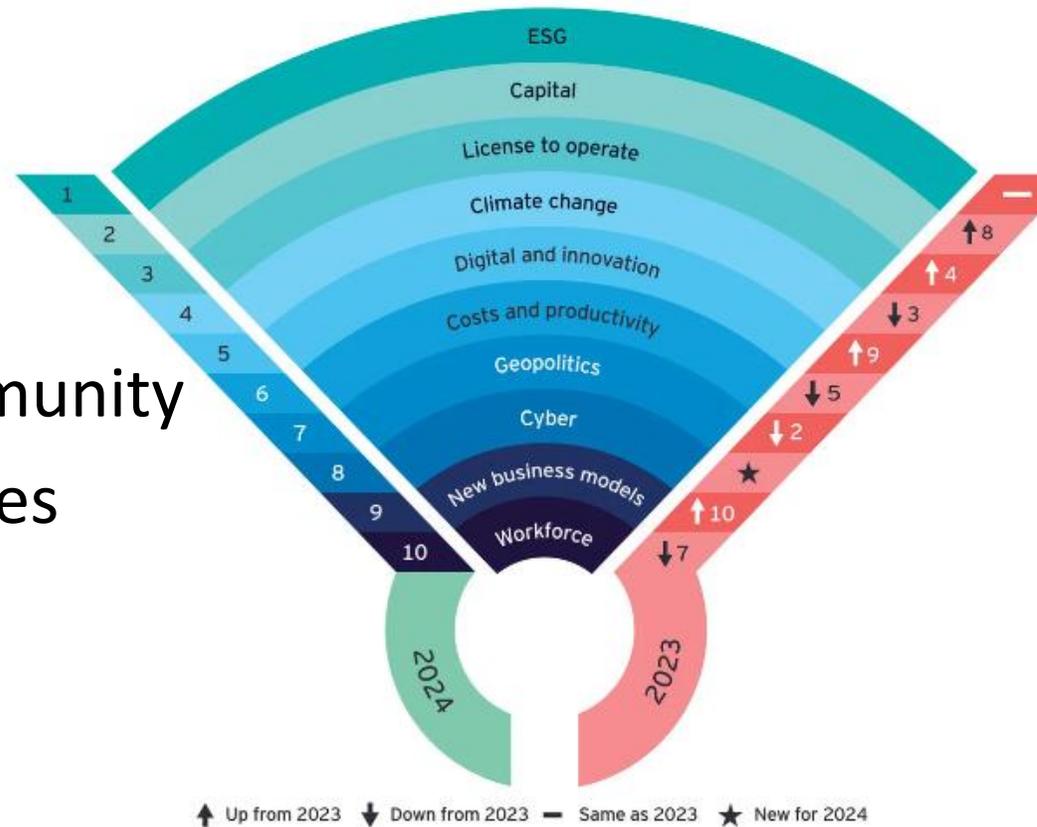
2024 – Projects Classification?

Type of Subsoil Using

Exploration+ Test Mining+ Mining Operation	Mining Operation	Construction and operation of underground structures	Geological Heritage

1997 — SOLID FUELS AND MINERALS

2009 — OIL, GAS AND URANIUM

2016 — RENEWABLE ENERGY (GEOTHERMAL) AND INJECTION PROJECTS

2017 — BIOENERGY

2018 — ANTHROPOGENIC RESOURCES

2020 — INTEGRATED RENEWABLE RESOURCE CLASSIFICATION (GEOTHERMAL, BIOENERGY, SOLAR, WIND, HYDROPOWER)

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Classification of stakeholders and their interests

- Governments
- Industry
- Financial community
- Local authorities
- NGOs
- Academia

ESG
Capital
License to operate
Climate change
Digital and innovation
Costs and productivity
Geopolitics
Cyber
New business models
Workforce

2024   2023

↑ Up from 2023   ↓ Down from 2023   — Same as 2023   ★ New for 2024

Commercial projects
Additional quantities in place
Potentially commercial projects
Other combinations
Non-commercial projects
Extracted quantities
Exploration projects
123   Codification (E1;F2;G3)

Typical Cases – Mining Operation

Velika Gleyuvatka
Commodities:
Iron ore BIF
Location:
Kryvyi Rih city, Dnipro Region, South-Eastern part of Ukraine

Project status: *Active Project, Viable Project (In Production)*

Class code UNFC	Category by national reporting code	M, kt	Grade, %	
			Fe_{total},%	Fe_{magn},%
within the design outline of the quarry				
111	B	58 097	33.08	23.89
111	C_1	130 957	32.67	22.49
112	C_2	12 554	36.14	28.56
B+C$_1$+C$_2$		201 608	33.0	23.27
Out of the design outline of the quarry				
332	C_2	377 399	31.63	19.66

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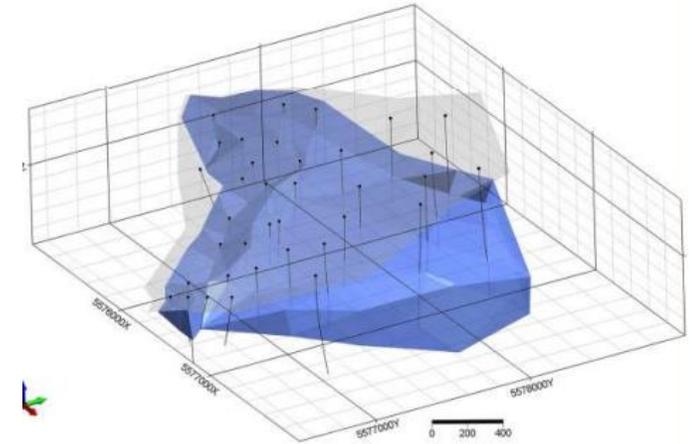GEOLOGICAL SERVICE FOR EUROPE

Typical Cases – Explored Reserves

Prutivka - *The first case when the State Commission Protocol included the classification of resources according to CRIRSCO using a bridge document.*
Commodities: *Ni,* *Cu, Co – as by-products.*
**Location:** *Zhytomyr region, Northern part of Ukraine*
Project status: *Active Project, Prospective Project (Exploration)*

Class	Tonnage, '000 t	Ni, %	Cu, %	Co, %	Ni, t	Cu, t	Co, t	Category CRIRSCO
122	14395	0.376	0.197	0.016	54082	28382	2277	Indicated
333	20447	0.373	0.102	0.015	76174	20782	3105	Inferred
332	3813	0.427	0.380	0.021	16293	14481	797	Indicated
333	1574	0.189	0.095	0.023	2973	1497	359	Inferred
Total	40230	0.372	0.162	0.016	149522	65143	6538	Total

Classification	Tonnage (Mt)	Ni %	Cu %	Co %	UNFC Class
Resources					
Indicated	14395	0,376	0,197	0,016	222
Indicated	3813	0,427	0,380	0,021	222
Inferred	20447	0,373	0,102	0,015	223
Inferred	1574	0,189	0,095	0,023	223

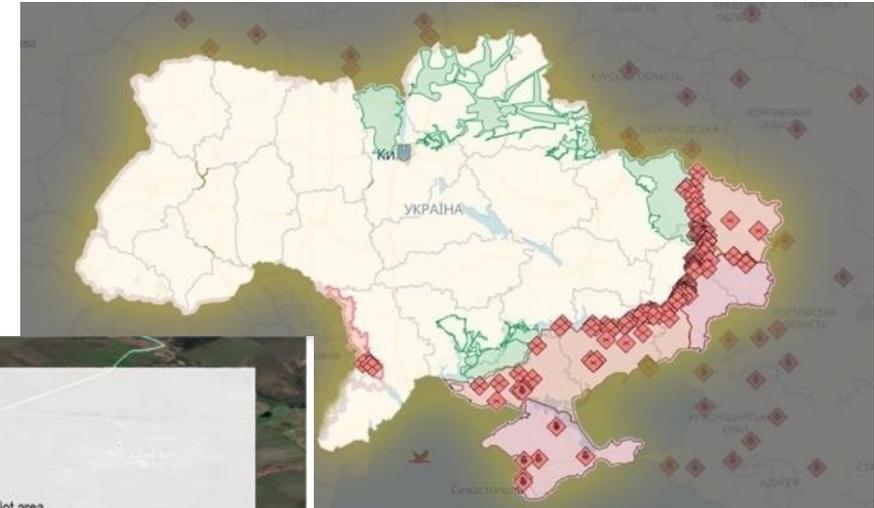**Block Model and Resource Estimation**

https://prutivka.com/
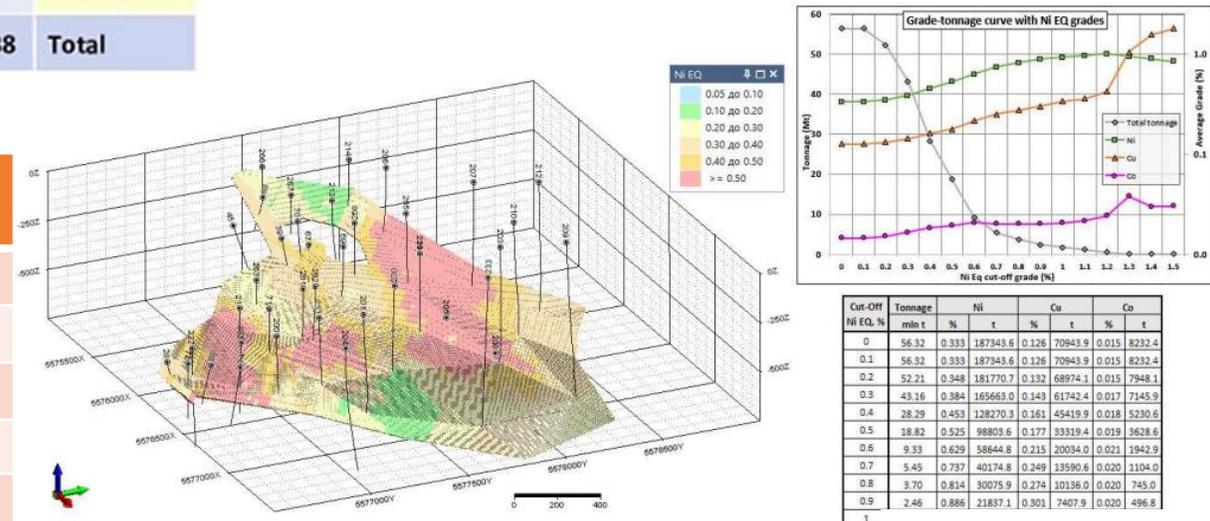
Not Typical Cases – Unavailable Resources/Reserves

Anadol deposit
Commodities: *REE*
Location: *Donetsk region, Eastern part of Ukraine*
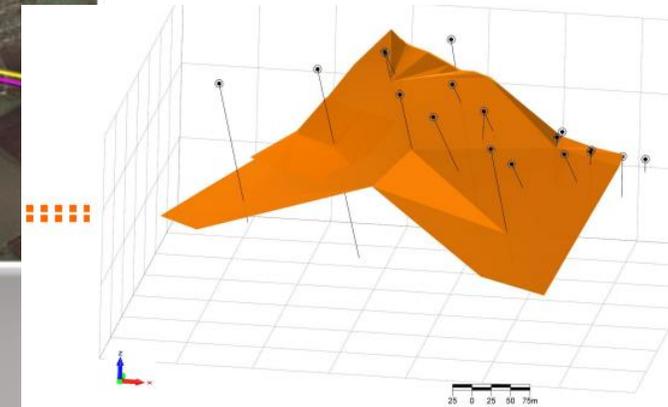**Project status:** *?*

The license area location

Location

The licensed area is located in Volnovaha district of Donetsk region,

2.5-3.0 km north-east of **Anadol** village

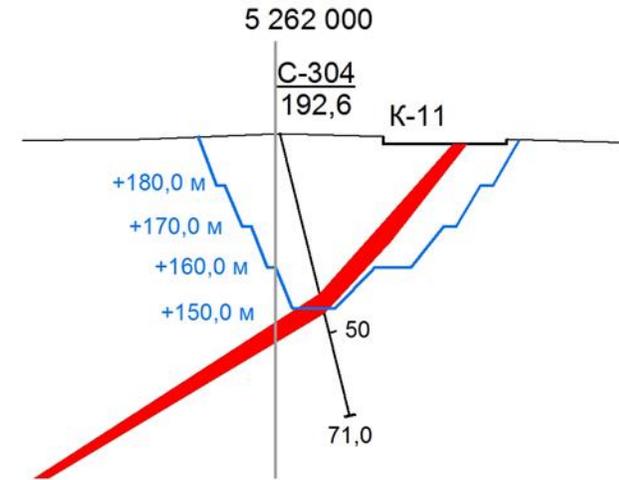### Licensed area – 16.2 ha
Owned land area – 34 ha

Infrastructure

The licensed area is located in an region with good transport infrastructure and near the railway

Legend
- Main roads
- Railway
- Local road
- Settlements
- Owned land plot area

Ukraine

Composition Σ(TR)O - **La₂O₃ – 22.4%, Ce₂O₃ – 50.02%, Pr₂O₃ – 4.22%. Nd₂O₃ – 20.05%.**

Composition $\Sigma(TR)O$ - La_2O_3 – 22.4%, Ce_2O_3 – 50.02%, Pr_2O_3 – 4.22%. Nd_2O_3 – 20.05%.

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Not Typical Cases – Unavailable Resources/Reserves

Ore reserves (category C_2) ... 635 221,9 t

Resources (category P_1) ... 200 044 t

Average grade ΣTR_2O_3 of reserves and resources ... 3,47 %

5 262 000
C-304
192,6
K-11
+180,0 м
+170,0 м
+160,0 м
+150,0 м
50
71,0

Commercial value	Degree of technical and economic investigation	Degree of geological exploration	Class code
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1. Balance reserves	EGE-2	Explored (proved) reserves	121
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	EGE-3	Prospective resources	333
	EGE-3	Prognostic resources	334

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Not Typical Cases – Mixed Projects
Assessment object - Project
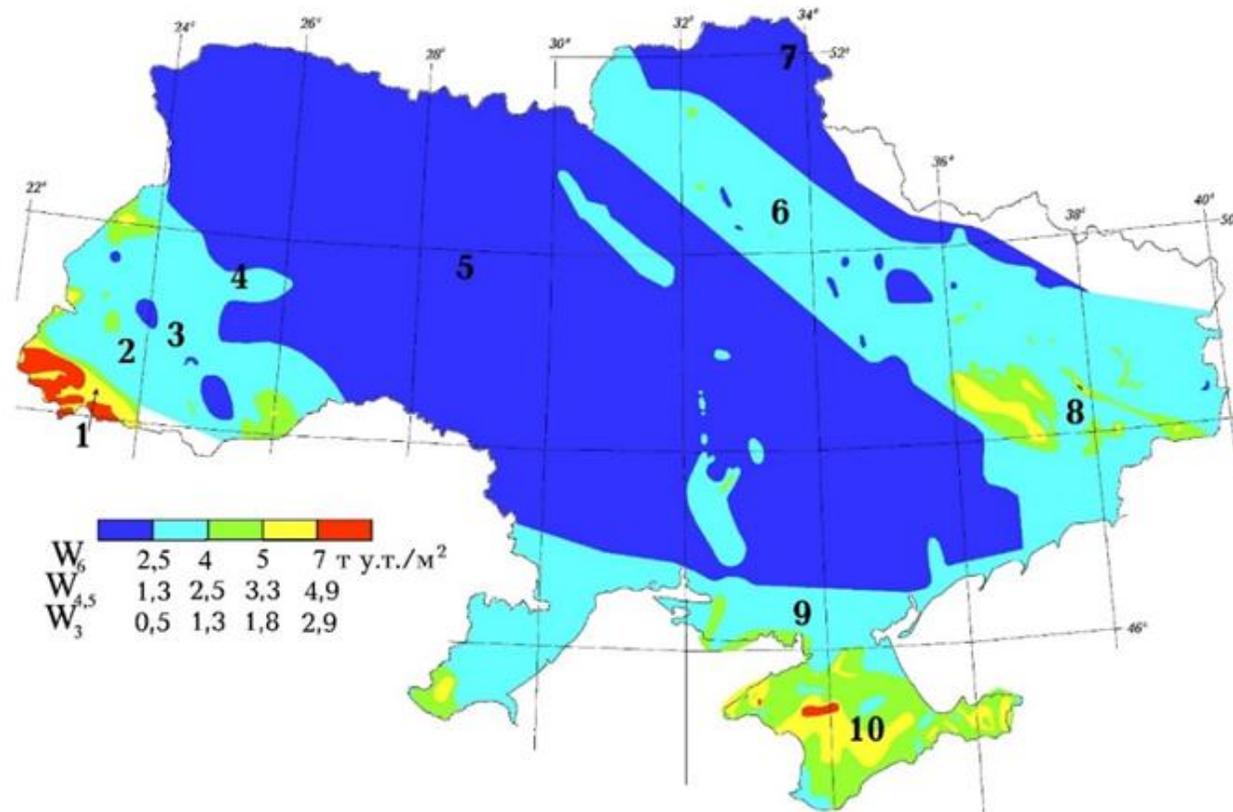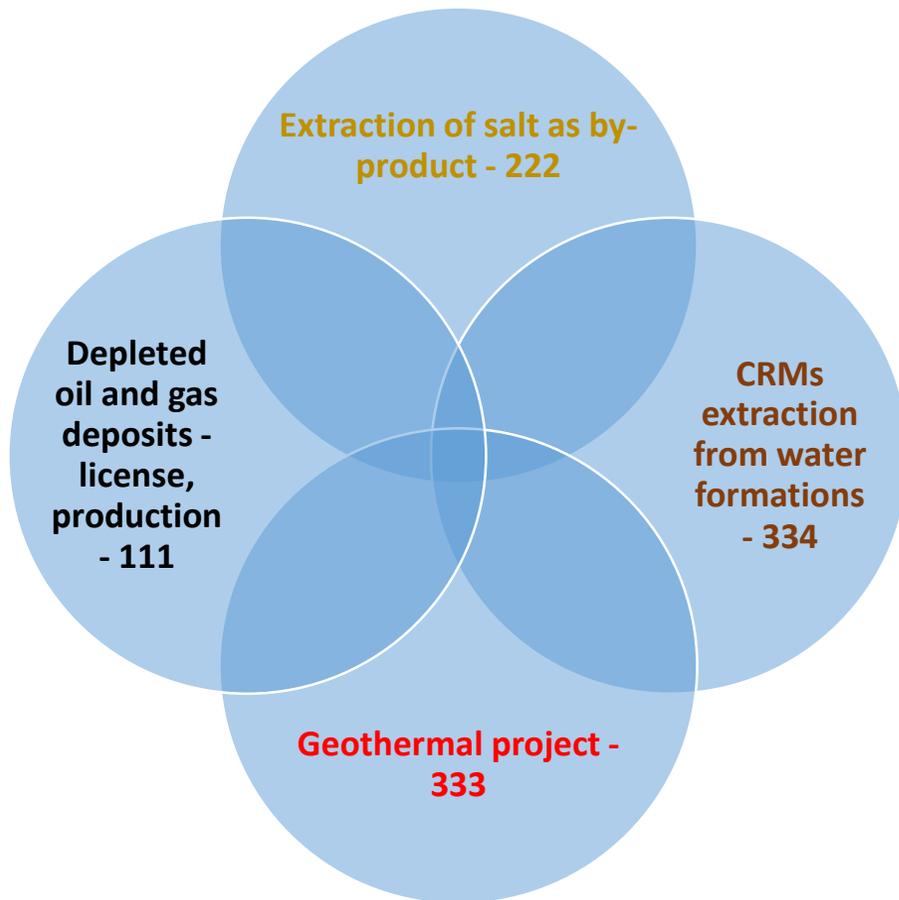
+ Easy understanding of UNFC classification due to long use of the code

+ Long period of using multiple classification systems

+ Introduction of UNFC terms in areas where there are no internal practices

Dynamics of changes in regulatory

Differences in tools and terms of the past and present

Difficult accounting of resources and inventories

SWOT

Using bridges between all classifications = understanding of all stakeholders

Implementation of terms and methodology in the fields of geothermal resources and hydrogen

Mixture of codes and terms

Multiplicity of geological information as input data

Partial data unavailability

Little experience of competent persons in assessing resources