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“Shaping the Earth of tomorrow”

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The significance of the subsurface for sustainable development: The European Perspective

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The spoken word is valid.

Esteemed guests,

Dear colleagues, directors of Geological Survey Organizations,

Ladies and Gentlemen,

Thank you very much for the opportunity to address you today in the position of acting President of EuroGeoSurveys, the non-profit organization representing the Geological Survey Organisations of Europe. It is great to be here with you. My talk is about “The significance of the subsurface for sustainable development: The European Perspective”.

We consider sustainability as a state of balance between economic, ecological and societal demands.

You are familiar with the circle diagrams that are in common use to define sustainability. It is the space where three circles representing the economic, the ecological and the societal dimension overlap. This diagram implies that sustainability may be achieved by a natural law. But in real life it is a hard struggle to balance the interests.

We are part of the free world. We live in democratic political systems. Thank you to our fathers and mothers, grandfathers and grandmothers, who fought for it. The people is the sovereign. This fact is worth to be pointed out, especially in these days. I want to focus on the societal aspect of sustainability in my talk.

This morning we have heard about new mines in Europe to secure raw material sourcing under high environmental and social standards. How can we achieve this successfully in European societies, which are detached from mining issues. Societies, which typically object domestic mining, which are in favour of importing minerals from all over the world and tend to salve their conscience by a fair-trade-eco-sticker.

Let me approach the issue under these premises from three perspectives:

- (1) What is the significance of the subsurface for sustainable development? Does the subsurface matter? The answer is yes.
- (2) Do relevant political and societal discourses need geoscientific input with regard to the subsurface? The answer is yes.
- (3) Is there a particular European perspective or even a particular challenge in Europe? The answer is yes, it is. And the answer also is no, it is not.

If the answer to the last questions is “yes”, we have to reflect why Europe has a particular perspective and why it is a particular challenge. Even the “no” has to be spelled out.

(1) What is the significance of the subsurface for sustainable development? Why does the subsurface matter?

I can make it short. We all know. We are the experts.

(2) Why do the subsurface and its sustainable use matter in relevant political and societal discourses?

Several trends, which are recognized in most parts of the world, feed global change. Among them are global population growth, urbanization, rapid economic growth in developing countries and globalization of value chains in industrial production and services. The last one at least until the Covid-19 pandemic. And we will have to see which global influence the Russian war on Ukraine will have. In addition, the world faces climate change, the need for energy transition and increasing migration.

Let me highlight global population growth as a mayor driving force by three key numbers:

- 800 – 1800: a gain of 0.5 billion people,
- 1800 – 1950: a gain of 1.5 billion people,
- 1950 – 2100: a gain of approx. 8.5 billion people.

All these developments lead to an increasing demand for the sustainable and responsible use of natural resources such as minerals, groundwater, soil and fuels, storage capacities – in the subsurface.

In this sense, global population growth and the fight against poverty trigger three major challenges for societies:

- securing the means of livelihood and energy supply,
- turning industrial production into a circular economy,
- managing environmental impacts of human activities on the global scale - far beyond the traditional activities in industrialized countries.

Ladies and Gentlemen,

Exploration, documentation and evaluation of natural subsurface resources are traditional key activities of geologists, especially of geological surveys. Evaluation of the human impact on and the sustainable management of natural subsurface resources have become more and more important over the past decades. It will turn into a key issue in the future. Impacts of human activities can last for decades or centuries or even beyond. This creates a strong need for

- suitable technologies to make reliable prognoses,
- impact assessments of our human activities,
- rising awareness about natural subsurface resources.

A major scientific challenge in this respect is that most of the subsurface properties and processes are heterogeneous, in part anisotropic and scale-dependent. We have to cope with geological uncertainties. This is a clear handicap in political and societal discourses. Uncertainties may be of high interest for scientists. But they are poison for public discourses and decision making.

When it comes to issues of the subsurface: People are not interested in bubbles of scientists, like error bars, probability spans or competing interpretations of various academic schools. People want security. They love everything that implies or pretends security, like exact and reliable numbers.

The scientific paradigm has already shifted from descriptive to predictive science. This is the good message. Parallel to forecasting, we need suitable monitoring technologies. We have to check prognoses and to adjust our human activities wherever and whenever necessary.

Ladies and Gentlemen,

The use and consumption of natural resources has always served as a primary supply of human needs. However, human needs can also be impaired by the use and consumption of subsurface resources. Land use demand for mining or the application of fertilizers for food production versus securing a drinking water supply highlight classical conflicts.

We face an increasing demand and utilization of subsurface resources. This demand requires planning, in particular the identification of conflicts and synergies. This can end in a dilemma, which cannot be resolved on the scientific level only and requires a societal discourse and political decision making. Because we live in democratic European societies. Freedom of speech, open societal and political discourses and decision making by majorities are the heart of democracy.

With regard to the sustainable use and management of natural subsurface resources, my clear message is: The subsurface and geoscientists matter! But geoscientists can't do it alone. Science, society and politics depend on each other.

(3a) Yes, there is a particular European perspective and a particular challenge in Europe – because of Europe's (political, cultural, economic and social) diversity.

Public decision making in politics and administration takes place on several levels: the level of the EC, on the national level of the member states, on the regional to local levels within the member states. Each level represents own and specific competencies and responsibilities, regulations, participation schemes and traditions. In the end, we face an entire kaleidoscope of various settings.

How to provide geological expertise successfully? Taylor made for every addressee. To address geological issues e.g. for a quarry extension in a small municipality in the countryside is different from input for a pan-European regulation on the treatment of mining waste. Legal procedures, stakeholders, the consideration of pros and cons, the appraisal of sustainable action and more aspects distinct the addressees.

Ladies and Gentlemen,

Let me touch a historical and cultural aspect: European nations developed their individual geological framework over the last 150 years. We have developed our national – sometimes even regional – geology schools. Geological descriptions, maps, 3D-models, even evaluations and appraisals on this basis may differ from country to country. This is sufficient for planning and decision making on the local and regional scale.

But it fails to contribute successfully to the pan-European perspective. It fails even more to contribute successfully to pan-European discourses. The handicap of scattered knowledge bases leverages the handicap of geological uncertainties. This is the point where our joint effort, the Geological Service for Europe comes in.

(3b) No, it is not a particular challenge in Europe – it is the same challenge as everywhere in the world.

What does this challenge look like? Geoscientists have to talk to people outside their scientific community or scientific bubble! The people (outside that community) do not understand the scientific slang. They are not interested in scientific details. Whereas geologists are! It is simply their job.

Most important is: Typically, people do not judge an issue by scientific means, whether it is correct or incorrect. They judge it by their interests. Is it good or is it bad for me and for my family? The question is not: Is a subsurface project scientifically well designed? It is like: Will the project in general be good or bad for my job and for my family?

There is not only one who judges that way, there are millions of people. We end up in a bunch of various individual interests, that have to be investigated, reflected, discussed, assessed and lead to a justified political decision.

Unfortunately, in a lot of cases it summarizes in the formula:

$$A = D^2 / DP$$

It reads like: Agreement (to a subsurface project) equals Distance (between me and the project) to the square divided by the Damage Potential (of the activity). Here we typically end up with the classical NIMBY (Not In My Backyard) effect.

Ladies and Gentlemen,

How may the way ahead look like? Geologists have to be aware that political and societal discourses are not like natural science or mechanical engineering. Decision making in this field often is not a rational process. We may ask the question: Is there any subject at all where decision making is a rational process? Is buying a car a rational process? Ask yourselves!

Simple people may have their fixed view of the world. If any fact – a geological fact or another – supports their interest and goals, they will agree. If not, they will object. My experience tells me that there is also a sphere beyond. We see many people, who are interested in facts and knowledge about facts. If we as scientists want to catch their thoughtfulness, we are well advised to respect the following rules:

- address them right in the beginning of a discourse when most minds are open,
- be transparent and comprehensible,
- use sound and publicly accessible scientific data and information,
- provide neutral advice at the highest scientific level,
- communicate, communicate and communicate!

We have seen outstanding examples of subsurface issues in the presentations today, that highly matter in society and politics. For this reason let me repeat a crucial phrase at the end of my talk:

Science, society and politics depend on each other. No community can do it successfully by itself.

Thank you for your attention.