



**ILUSTRE COLEGIO
OFICIAL DE GEOLOGOS**

PROPOSALS FOR A NATIONAL GEOLOGICAL POLICY SERVING THE CITIZENS

27 PROPOSALS FOR 2027

by the **Spanish Official Professional Association of Geologists (ICOG)** for the political parties of the upcoming 2023-2027 legislature



**ICOG IS A MEMBER OF THE EUROPEAN
FEDERATION OF GEOLOGISTS**

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GEOLOGY AND CITIZENSHIP

Geology is the science that studies the Earth and describes and interprets its composition, structure, evolution, and current dynamics. Geology has always been an important factor in the economic, social, and cultural development of societies. In the 21st century, geology can and should contribute to what society demands in relation to the supply of raw materials, the understanding and management of freshwater resources, the planning, design, and construction of civil works and buildings, the fight against climate change, and the promotion of clean energies such as geothermal energy, among other challenges that need to be addressed. But above all, today the importance of studying active geological processes and the associated risks has been highlighted: seismicity, volcanism, floods, landslides, subsidence, erosion, etc., which pose threats and cause numerous casualties and the destruction of goods and infrastructure.

To tackle these challenges, a better-informed citizenry is needed, as citizen participation is already key in all policies that aim for sustainability. In this regard, we are concerned about the lack of geological knowledge, as there is hardly any time to explain in schools where everything around us comes from. This basic deficiency has negative repercussions both on scientific culture and on the inability to understand the world from a global perspective. Not having an active citizenship has long-term negative effects and represents a waste of enormous potential.

Geoethics is also essential if we want to understand the Earth's ecosystem as a common home for all living beings. This professional body has already incorporated geoethics into its code of ethics as a fundamental basis for addressing any problems that require our knowledge contribution. Beyond professional development, our collective is committed to values that contribute to socio-economic progress. Therefore, it is crucial to apply the principles of precaution to address risks, sustainability for environmentally respectful development, and human security to ensure the improvement of living conditions and the reduction of poverty based on geological resources.

The 2030 Agenda is therefore a global reference and a roadmap that we actively maintain to set goals and indicators with which we can reflect our social and ethical commitment. Acting from prevention must be part of our social and political change. Anticipating plausible scenarios that may occur and, at the same time, taking entrepreneurial action to facilitate the development of sustainable projects will be the best formula for improving the resilience that our professional collective works for every day. We are convinced that the development and implementation of initiatives related to applied geology and geological engineering will help Spain achieve greater social and economic benefits.

Our lives are connected to the planet Earth, and when we understand how it behaves, we have the opportunity to harness its resources and also protect ourselves from the dangers of some of its processes, so that we don't blame nature or any divinity for accidents or natural disasters when scientific knowledge about many of these threatening processes is available.

The development and implementation of initiatives related to these contributions from applied geology and geological engineering will bring greater social and economic benefits to Spain.

It should be noted that Spain is one of the countries in the world that has a better geological infrastructure since the entire Spanish territory has the National Geological Map (MAGNA) at a scale of 1:50,000. This cartography is hosted in a Geographic Information System (GIS) at the Geological Survey of Spain (IGME/CSIC). There are also numerous important geological-mining,

hydrogeological, geothermal, subsurface for underground storage, and natural hazard studies conducted, as well as the corresponding databases held by this institution.

It can be said that our country has sufficient knowledge of its territory to apply it for the economic, social, and environmental development of Spanish citizens, as it is useful in all civil works, groundwater resource management, land use planning, exploitation and management of mining and hydrocarbon resources, energy utilization, soil protection, seismic phenomena, and the study of climate change, among others. Special attention is deserved by the knowledge provided by this information on active geological processes, particularly on geological hazards, for the prevention of natural disasters such as landslides, desertification, floods, seismicity, volcanism, etc. However, this information requires constant updating, as it becomes obsolete otherwise, hence its crucial importance in any geological policy that is intended to be undertaken. At this moment, it is also particularly advisable, given the time elapsed since the existing syntheses, the potential for creating geological knowledge and information by the CSIC and regional research institutions (OPIs), exploration companies, Spanish and foreign universities.

One of the greatest riches of each country is its natural resources, which constitute a unique and non-transferable heritage that the State has an obligation to know and manage within the framework of a sustainable model in economic, social, and environmental aspects. The significant external dependence in obtaining minerals considered "strategic" by the European Union makes it necessary for Spain to have sufficiently studied reserves. In this regard, it would be necessary for Public Administrations to support and develop new policies for research and exploitation of mineral deposits.

Freshwater resources, both surface and groundwater, are a basic and essential asset for people, agriculture, industry, and the environment. The management of groundwater resources and the joint use of surface and groundwater must be based on knowledge of aquifer geometry, hydraulic and hydrochemical properties, proper delineation and characterization of groundwater bodies, their adequate protection, and their relationship with ecosystems and wetlands, also considering the influence of climate change.

In Spain, periods of drought are very frequent, recurrent, and sometimes extreme. Projections made by the Intergovernmental Panel on Climate Change foresee the possibility that these drought situations will increase in the near future, and it is essential to assess the environmental impact and reduction in resource availability that this will entail. To combat them, it would be necessary to optimize their management and, if necessary, have additional freshwater resources.

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Commitments to increasing the use of clean and renewable energies have an impact on the utilization of geothermal resources, both in building (ground-source heat exchange) and in supplying water for heating in urban areas (district heating) and electricity production, as is being done in other countries in our environment.

Some of the activities related to these aspects are starting their development, such as Hydrogen storage technologies, and are in the R&D phase. Spain has signed international agreements on climate change and the reduction of CO₂ emissions and has transposed the Directives published by the EU for this purpose. Since its inception, geologists have been actively involved in the initiatives of the Spanish Technological Platforms for CO₂ (PTECO₂) and Geothermal Energy (GEOPLAT). It is worth noting the organization of numerous training courses and conferences by the ICOG.

Carrying out adequate geological-geotechnical studies in infrastructure projects represents a significant improvement in the cost-benefit ratio of public works. The importance of geological and geotechnical studies in building construction has recently been confirmed by the influence that the type of terrain has had on the severity of damage caused by earthquakes in Turkey and Syria and in the past in Lorca or Haiti.

It would be desirable for geological-geotechnical studies, including those that are part of building and construction projects, to be approved for the safety of citizens, respecting their specificity as partial projects as provided by the Building Regulation Law. Unfortunately, the requirement for their individual control has been removed by Royal Decree 1000/2010 on mandatory professional certification, so it would be advisable, as provided for in the revision of the aforementioned Royal Decree, to address the reform of this requirement.

Our lives are connected to planet Earth, and when we understand and know how it behaves, we have the opportunity to take advantage of its resources and protect ourselves from the dangers of some of its processes, so that we do not blame nature for accidents or natural disasters when we have knowledge of many of the processes that generate these threats.

This knowledge is highly profitable for the economic development of citizens. For this reason, Spanish geologists, members of the Spanish Official Professional Association of Geologists (ICOG), have prepared this document containing their contributions for the general elections, with the aim of providing our country with a national geological policy for analysis, study, and evaluation by political parties and, where appropriate, enabling its potential inclusion in their respective electoral programs.

EDUCATION AND UNIVERSITIES

PROPOSAL 1: INCLUSION OF GEOLOGICAL SCIENCES AS A MANDATORY SUBJECT IN SECONDARY EDUCATION AND HIGH SCHOOL.

The subject of Biology and Geology should contribute during Secondary Education to the acquisition of basic knowledge and skills that allow students to develop scientific literacy and identify themselves as active agents who recognize that their actions and knowledge will determine the development of their environment, with positive and/or negative consequences. They should know that the future belongs to them and that it depends on them.

During secondary education, the aim is to build upon the knowledge they already have, gradually developing knowledge and skills year by year that will enable them to become respectful citizens, both towards themselves, others, and the environment. They should be responsible and capable of forming their own opinions, while maintaining their interest in continuous learning from the beginning of their early schooling.

Throughout this stage, the central focus should revolve around living organisms and their interaction with the Earth, emphasizing the importance of environmental conservation for all living beings, including themselves. Additionally, the subject should place a strong emphasis on health and its promotion. The objective is for students to acquire the abilities and competencies that enable them to care for their bodies, both physically and mentally, as well as to critically assess information and social attitudes that may have a negative impact on their physical, social, and psychological development. It is important for them to be aware of actions that ensure their daily safety. It is crucial for them to understand and value the importance of preserving the environment due to its implications for their health. They should comprehend the value of research in medical advancements, and learn to be responsible for their daily decisions and the consequences they have on their health and the surrounding environment.

All students should be familiar with the major theories that have contributed to the latest developments in natural sciences: plate tectonics, the cell theory, and the theory of evolution. The study should conclude with an examination of ecosystems, the trophic relationships between different levels, the interaction of organisms with one another and the environment, as well as their impact on the dynamics and evolution of these ecosystems.

This subject in the 4th year of ESO (Compulsory Secondary Education) is currently optional, and many young people finish compulsory education without this geo-scientific knowledge. This content (oceanic expansion, orogeny formation, magmatism, external geodynamics) is postponed, with the bio-scientific subjects being the ones asked in the university entrance exams.

It is proposed to include more mandatory geological content in ESO and high school, as without geo-scientific knowledge, there will be less understanding of what sustainability means, less involvement of citizens in collective challenges, and fewer vocations that will undoubtedly make us miss the train of innovation and development in Earth sciences.

PROPOSAL 2: IMPLEMENTATION OF A PROFESSIONAL ACCESS MASTER'S DEGREE.

In all university degrees, new study plans adapted to the Bologna Process have been implemented, which are shorter than the previous ones. In the case of geology studies, we find that the undergraduate degree does not guarantee sufficient knowledge to practice professionally.

As a reference, the reform applied to lawyers and solicitors responds to the need for citizens to have guarantees that practicing professionals possess the necessary theoretical and practical knowledge to defend their rights and freedoms.

This model, which already applies in many other European countries, is the best way to ensure quality in the exercise of professional activities in which the safety of individuals and their property is at stake, as is the case with the regulated profession of geology.

This model is similar to the system for accessing positions as civil service secondary education teachers. After passing the competitive exam, they must obtain the approval of the school community through specific training and a one-year stay in a public school (unless they have worked as teachers for at least one year), and then take a final exam before an examination board.

For the geologist profession, the proposed model is based on the following stages:

1. Bachelor's degree, the responsibility of universities.
2. Master's degree, the shared responsibility of universities, professional associations, and companies in the sector.
3. Internships, the responsibility of professional associations and companies in the sector.
4. Training courses taught by universities and professional training schools of the professional associations, in accordance with the regulations governing official postgraduate university education, established in Law 34/2006, of October 30, on access to the professions of Lawyer and Solicitor of the Courts.

RISK MANAGEMENT AND CLIMATE CHANGE

PROPOSAL 3: BASIC LAW ON LAND PLANNING AND NATURAL RISK MAPS.

Given the increasing occupation of land, often in an unregulated manner, and the requirement to develop natural risk maps as stipulated in Article 15 of the Land Law, it is necessary to draft and approve a Basic Law on Land Planning that, without interfering with regional competencies,

serves as a universal basic regulation including the development of Natural Risk Prevention Plans by the Autonomous Communities as a foundational document for proper land planning.

PROPOSAL 4: IMPROVEMENT OF FLOOD RISK PREVENTION.

Due to its geographical characteristics and river regime, Spain is a country with a high risk of flooding. According to a study by the Geological and Mining Institute of Spain (IGME) on natural risks, the potential losses from risks for the period 1986-2016 amount to 29.5 billion euros, with 56% of those losses attributed to floods. The same study identifies Andalusia as the most dangerous area with a 22.5% risk of flooding, followed by the Valencian Community with 19.6% and Catalonia with 18.6%. Since flooding is the geological risk that annually causes the most damage in Spain and Europe, structural measures need to be taken to effectively apply Article 11.2 of Law 29/1985, dated August 2, on Water, with the general principle of adapting urban land uses based on the aforementioned natural risk maps. The proposed measures are:

- Adopting an insurance policy that responds to real risk.
- Implementing a policy of compensation for expropriations.
- Investing in flood control structures, such as flood attenuation reservoirs or channelization, even if they are costly or have some environmental impact.

Climate change will exacerbate these catastrophic processes. Investing in these actions will be the only way to increase resilience. Conversely, neglecting to apply expert knowledge when urbanizing will result in greater economic and social costs.

PROPOSAL 5: IMPROVEMENT OF VOLCANIC RISK PREVENTION.

Canary Islands are the only area in Spain with a high volcanic risk, with the islands of La Palma, Tenerife, El Hierro, and Lanzarote having registered recent activity. It is proposed to expedite the procedures for the establishment of a Volcanological Institute to serve as an observatory for the study and research of volcanic activity, centralizing the efforts of various administrations.

PROPOSAL 6: IMPROVEMENT OF SEISMIC RISK PREVENTION.

The areas with the highest seismic activity are the southern part of the Iberian Peninsula, especially the provinces of Granada, Malaga, Almería, Murcia, and Alicante, as well as some areas in the Pyrenees. In these locations, where recurring seismic events have been recorded, regulations must be strictly enforced, and public administrations must verify compliance.

Scientific and technological advances and a better understanding of seismic risks in Spain necessitate the update and improvement of seismic-resistant regulations in the country. Following the Lorca earthquake in 2011, which highlighted this urgent need, the national seismic-resistant regulations have not yet been updated, despite being outdated in terms of hazard maps, application criteria, and the actual importance of the "soil factor" in amplifying damage to people and property.

We cannot predict when an earthquake will occur, but measures can be taken to minimize the damage in case of an occurrence, such as building collapses and resulting fatalities.

A comprehensive plan to prevent seismic risk in Spain is necessary. The government must implement appropriate prevention measures based on studies of seismic hazard and vulnerability. Vulnerability studies should be conducted in Spanish populations at high risk of earthquakes.

It is also necessary to implement and disseminate methodological guidelines for natural risk prevention so that this knowledge is applied by municipal technicians, provincial authorities, autonomous communities, and the general population. Although Spain is at the forefront of legislation, it is not leading in its real and effective implementation. In 2008, the ICOG (Spanish Institute of Geologists) produced a "Methodological Guide for the Development of Natural Risk Maps in Spain" in collaboration with the Ministry of Housing.

PROPOSAL 7: PREVENTION OF RADON INHALATION RISK.

Radon gas is a potential danger in certain areas of the country, particularly Madrid, Castilla-León, Extremadura, and Galicia, as well as in areas where the geological substrate is predominantly granitic. In Spain, the highest concentrations of radon have been detected mainly in the northern zone of Madrid (Guadarrama foothills), the mountain ranges of Galicia and Extremadura, and the western zone of Castilla-León. Radon gas (Rn-222) is odourless, invisible, and its effects only become apparent in the long term. However, these effects are significant and, in many cases, detrimental to health.

Radon is created through the decay of radium and uranium, which naturally occur in soil and rocks, eventually accumulating in indoor air at levels that can pose a serious health threat. The accumulation of radioactive gas in homes increases the risk of lung cancer by sevenfold. Radon gas is responsible for between 3% and 14% of lung cancer cases worldwide, according to the World Health Organization (WHO). The likelihood of radon causing lung cancer in smokers is even higher, as there is a synergistic effect that is considered to multiply the probability by 67 times. This gas is also the leading cause of malignant neoplasms in non-smokers.

The concentration of radon in a dwelling depends on multiple factors. The first factor is the type of soil, as well as its porosity and permeability. Secondly, the choice of construction materials is an important factor: some construction materials easily allow radon gas to pass from the ground into the interior of the building. Cracked walls or small pores in walls constructed with hollow concrete blocks are small openings that allow the gas to enter homes.

General Urban Plans must obligatorily conduct local studies on radon emissions risks in homes to consider this risk in new constructions and recommend rehabilitation measures when advisable for existing buildings.

PROPOSAL 8: REDUCTION OF SUBSIDENCE RISK

In Spain, the presence of soluble materials in the subsurface leads to the progressive or sudden development of subsidence. These processes depend on both climatic conditions and subsurface materials. The presence of limestone in areas with high water availability, as well as the presence of materials with high evaporite content (highly soluble salts), makes Spain one of

the areas with the highest risk of subsidence worldwide. Often, the absence of outcrops of these units creates a false sense of security, as karst processes can develop underground and only become evident when cavities and collapses reach the surface. The development of Cenozoic basins, especially the Ebro and Duero basins, the Tajo fault, or the Guadalquivir basin, has produced large units of highly soluble salts that generate significant geotechnical problems in many cities. Up to 7% of the national territory is characterized by outcrops of evaporitic units, and in many other areas, these units are found at depths close to the surface, typically under non-soluble alluvial and colluvial units.

Given the unique characteristics of this type of risk, it is essential to integrate study methodologies related to the historical and geomorphological perspective of karst risk, the integration of surface, geological, and geotechnical information in risk maps, prevention plans, and urban planning. It is also necessary to create predictive tools for susceptibility to these processes, including their temporal evolution, which, in the case of highly soluble salts, can occur during the lifespan of infrastructure and buildings.

Climate change will bring greater economic and social costs as groundwater levels decrease if preventive action is not taken.

PROPOSAL 9: IMPROVEMENT OF RESPONSE MECHANISMS TO NATURAL DISASTERS

Although notable progress has been made in the field of Civil Protection, we consider it necessary to continue promoting prevention and planning mechanisms for disasters.

Natural hazard maps provide a competitive advantage in emergency planning processes for earthquakes, floods, landslides, volcanic eruptions, tsunamis, or coastal risks. The role of this discipline in early detection and warning processes for these phenomena is also important.

This would enhance emergency management by establishing more efficient action protocols and integrating all available resources and scientific knowledge through the Operational Coordination Centres. Additionally, the training of personnel should be improved to provide higher quality citizen assistance and enhance the overall operation.

Public education is also crucial in prevention efforts. Education for prevention, as well as a greater culture and awareness of safety among individuals and institutions, is key in managing natural risks.

INFRASTRUCTURE AND LAND PLANNING

PROPOSAL 10: DEVELOPMENT AND IMPLEMENTATION OF THE GEOLOGICAL CARTOGRAPHY PLAN.

The approval of Law 14/2010, of July 5th, on Infrastructures and Geographic Information Services in Spain (LISIGE), marked the first time in history that Geological Cartography was included as one of the official cartographies in Spain. This implies the obligation for administrations to update and maintain it. Currently, cartographic activities of this nature are registered by the Geological and Mining Institute of Spain (IGME) in the National Cartographic System.

With the integration of IGME into the Spanish National Research Council (CSIC), there is a need to establish an organization responsible for developing the Geological Cartography Plan within the framework of the National Cartographic Plan (PCN). The PCN is an instrument approved every four years by the Council of Ministers and should be adequately funded for the update and maintenance of National Geological Cartography, which currently lacks an executing body.

PROPOSAL 11: CREATION OF AN OBSERVATORY FOR GENERAL URBAN PLANNING AND A REFERENCE CENTER FOR NATURAL RISKS.

The increase in damages caused by natural hazards is largely attributed to the growth of population exposed to them. For this reason, these phenomena must be considered in all territorial planning instruments (general urban planning, municipal urban planning, etc.).

It is essential to promote the effective compliance with the Land Law, consolidated in Royal Legislative Decree 2/2008, of June 20th, which established that urban developments must undergo prior environmental assessment and a sustainability report, including a map of natural risks in the area subject to planning, among other contents. A recent study conducted by the Complutense University of Madrid and the Official College of Geologists identified 296 municipalities in Spain with more than 25,000 inhabitants. Among these, 117 municipalities were selected, estimating losses of €900 million per province over a 30-year period (2004-2033). Out of the 117 municipalities meeting these two initial conditions, the urban planning instruments of 54 municipalities approved after the current Land Law came into effect were studied. Of these municipalities with a high natural risk, only 4 have natural risk maps, with significant variation in their work methodology, not adhering to the guidelines established by the Methodological Guide for the Development of Natural Risk Maps, previously published by the Ministry of Housing. Consequently, only 7.5% of Spanish municipalities with a high natural risk comply with the provisions of Article 15(2) of Law 8/2007, of May 28th, on Land, which explicitly requires that "the environmental sustainability report of urban planning instruments must include a map of natural risks in the area subject to planning."

To monitor compliance with the legal requirement of natural risk maps in the General Urban Development Plans (PGOU) of municipalities, established in Article 15.2 of the Land Law, there should be an Observatory for General Urban Development Plans under the jurisdiction of the ministry responsible.

To address potential jurisdictional conflicts, we believe that a Technical Regulation for the development of Natural Risk Maps in the Sustainability Report should be urgently enacted, incorporating the legislative aspects outlined in the aforementioned Guide.

The establishment of a Sectorial Conference on Urban Planning is also important to promote collaboration between the State and the Autonomous Communities in order to fulfil the mandate for the preparation of this type of cartography in General Urban Development Plans.

In future Regulations and Urban Planning Ordinances to be developed in the Master Plans, the realization of geological-geotechnical, hydrogeological, natural risk, and contaminated soil studies, in accordance with current regulations, should be considered and included in various planning figures: Special Plans, Urbanization Projects, Implementation Studies, Partial Plans, Special Protections, prevention areas, etc.

Given the challenge posed by climate change, it is important to establish a Reference Center for Natural Risks to monitor, analyse, and disseminate information and data related to economic, social, environmental, etc., aspects of natural risks. This center, which would coordinate the different technical institutions responsible for each natural risk, could be attached to the Geological and Mining Institute of Spain (IGME), as it currently serves as the national reference center for natural risks within the framework of the European Environment Agency.

PROPOSAL 12: MANDATORY APPROVAL FOR GEOTECHNICAL STUDIES IN BUILDING CONSTRUCTION.

According to available data, the requirement for approval of geotechnical studies for building projects resulted in a reduction of incidents and accidents. However, since its elimination by Royal Decree 1000/2010, dated August 5th, such incidents have increased, negatively affecting public safety.

It is proposed to reinstate the mandatory approval for geotechnical studies in building construction, as previously established in Chapter 3 of the Basic Structural Document Foundations (DBE_C) of the Technical Building Code (CTE) (Annex 1).

Furthermore, considering the existing problems and the expiration of the review period stipulated in Royal Decree 1000/2000, which eliminated the mandatory approval by professional associations, we believe it is necessary to promote the update of the list of professional works subject to mandatory approval, as stated in Article 2 of the decree, clearly including geotechnical studies for building construction in this requirement.

PROPOSAL 13: REFORM OF THE BASIC DOCUMENTS OF THE TECHNICAL BUILDING CODE AND THE GENERAL REGULATION OF THE PUBLIC PROCUREMENT LAW.

The Technical Building Code (CTE) establishes that its documents will be reviewed every five years to adapt to technological advancements, making their adaptation regulatory. It is necessary to revise them to precisely require the mandatory nature of geotechnical studies for all types of buildings, including self-built single-family homes, regardless of whether or not a ten-year structural damage insurance is required, and to enforce control of the geotechnical study by the Technical Control Organization (OCT).

On the other hand, geological and geotechnical studies, necessary for the proper design and planning of any infrastructure project, are presented as annexes within the corresponding civil engineering project (either layout or construction), and often are not even signed by the responsible technicians. This results in the geological and geotechnical constraints of the project, which are crucial, being insufficiently considered, as they are considered minor documents lacking binding and contractual character. Additionally, since they are economically dependent on the overall project, they are often the most affected by budget cuts in order to maximize profitability. Therefore, we propose that the current General Regulation of the Law on Public Procurement Contracts, which dates back to 2001 and is outdated and obsolete in relation to the current Law on Public Procurement, be reformed to address these contingencies.

These mandatory geological and geotechnical studies should be tendered and contracted independently from the main project, preferably before and once the alignment (in the case of linear projects) or the design defined by the Information Study is known, with the necessary and sufficient financial resources allocated, and the responsible competent technicians should assume the responsibility, including contractual responsibility, in accordance with the provisions of Article 233 of the Public Procurement Law. This would largely prevent many of the well-known cost overruns, deviations, and project and construction reforms, which are not only economically detrimental but also cause social and media alarm.

ENVIRONMENT AND SUSTAINABLE DEVELOPMENT

PROPOSAL 14: GROUNDWATER PROTECTION PLAN AGAINST CONTAMINATION.

It is necessary to increase economic and human resources dedicated to ensuring water protection, a priority objective in European environmental policy, which establishes a community framework for action to guarantee the protection of its waters (surface, groundwater, transitional, and coastal waters).

Updating the assessment of pressures (potential sources of contamination) on water bodies and enhancing the implementation of measures to protect water intended for human consumption is essential. This can be achieved through appropriate delimitation and implementation of protection perimeters and safeguard zones. Integration into planning instruments and licensing by the competent authorities in land management, urban planning, and hydrological planning is required.

Furthermore, it is important to enhance professionalism among stakeholders involved in water abstraction and exploitation. This can be accomplished by defining the required regulations in collaboration with professional associations. For example, regulations concerning the construction and decommissioning of abstractions should guarantee the competence of qualified professionals. Additionally, no exploration or utilization of water resources should take place without justification supported by a hydrogeological report signed by a competent technician.

PROPOSAL 15: DROUGHT EFFECTS PREVENTION

To effectively address drought, the ICOG considers it crucial to adopt a holistic perspective on water within hydrographic basins. This entails detailed and constantly updated knowledge for water management, in order to understand the dynamics and characteristics of all stages of the local hydrological cycle. Special emphasis should be placed on the strategic role of groundwater and the combined use of groundwater and surface water to address both episodic and structural drought episodes.

PROPOSAL 16: GREATER PROMOTION OF GEOTHERMAL ENERGY FOR ENERGY TRANSITION.

Significant impetus is needed for geothermal energy, given its high long-term value as a renewable energy source with consistent supply. The White Paper on Low-Enthalpy Geothermal Energy should serve as a basis for implementing policies with measurable indicators of generation and energy efficiency, fostering appropriate legislation, and providing financial support (subsidies or loans) for the development of geothermal energy in buildings.

Low-enthalpy geothermal energy for building heating and cooling, which has been successfully used in many European countries (such as Sweden, Austria, Switzerland, Germany, Italy, and Denmark), as well as in the United States and Japan, provides significant energy savings thanks to the significant development of geothermal heat pumps (GHP).

In Spain, the Basque Country, Catalonia, and Valencia are giving greater impetus to the development of this type of energy. Essentially, it harnesses the heat accumulated in the ground as a result of solar radiation. The Earth absorbs and releases heat in a way that maintains a relatively homogeneous temperature in the shallow layers, between 5 and 100 meters deep, throughout the year. Geothermal energy represents savings of up to 80% compared to diesel and 70% compared to gas.

PROPOSAL 17: RESEARCH AND DEVELOPMENT OF H2 AND CO2 STORAGE TECHNOLOGIES.

In the coming years, it will be crucial to develop H2 storage technologies as a priority objective. This would allow these storage facilities to be used as energy reservoirs during periods of overproduction, ensuring the ability to meet the growing electricity demand during times of low production.

Advancements are also necessary in the development of carbon capture and storage (CCS) technologies. This would enable the installation of gas-fired power plants with their own CO2 capture and storage mechanisms. It would ensure the growing electricity demand can be met using fuels such as methane in coal beds with known reserves in Spain, while avoiding CO2 emissions into the atmosphere. The delay in addressing climate change necessitates action through this pathway, making fossil fuel-based energies sustainable.

PROPOSAL 18: RESEARCH AND EXPLOITATION OF NATURAL HYDROGEN RESERVES.

Natural hydrogen will be a future fuel that guarantees sustainability for the system. The recent discovery of a significant natural hydrogen deposit in the province of Huesca necessitates promoting exploration policies for this new resource, which is crucial in the energy transition.

PROPOSAL 19: PROTECTION, USE, AND MANAGEMENT OF GEOLOGICAL DIVERSITY (GEODIVERSITY) AND GEOLOGICAL HERITAGE.

These proposals have already been presented by the Geological Society of Spain and endorsed by the following national laws: Law 42/2007 of December 13 on Natural Heritage and Biodiversity, Law 5/2007 of April 3 on National Parks, and Law 45/2007 of December 13 on Sustainable Development of Rural Areas. They are also supported by the derived regulations, among which the following stand out: Royal Decree 752/2010 of June 4, the first program for sustainable rural development for the period 2010-2014; Royal Decree 556/2011 of April 20, for

the development of the Spanish Inventory of Natural Heritage and Biodiversity, and Royal Decree 1274/2011 of September 16, the strategic plan for natural heritage and biodiversity for the period 2011-2017. The Illustrious Official College of Geologists supports and defends them in their entirety:

- a) The Ministry of Agriculture, Food and Environment must safeguard all natural heritage: biotic and abiotic, including the conservation of geodiversity and its heritage in the same way as biodiversity.
- b) Promote the development and compliance with legislative norms and initiatives, both national and international, aimed at the conservation and sustainable use of geodiversity and geological heritage, specifically:
- c) Ensure effective protection and conservation of geodiversity and geological heritage.
- d) Promote public and private initiatives aimed at studying and cataloging geological heritage, its conservation, and sustainable educational, outreach, and tourism use.
- e) Natural heritage versus cultural heritage. In compliance with Law 42/2007, paleontological heritage is considered natural heritage and not cultural heritage and should be treated and managed accordingly by the competent administration.
- f) Integration of geological heritage in the Environmental Impact Assessment (EIA) of projects.
- g) Regulation of collecting, looting, and exploitation of geological sites.

EXPLORATION AND EXPLOITATION OF NATURAL RESOURCES

PROPOSAL 20: LEGAL CHANGES FOR SUSTAINABLE MANAGEMENT OF NATURAL RESOURCES.

The mining industry worldwide, and particularly in Spain, has undergone radical changes in recent decades. The current Mining Law, dating back to 1973 and being pre-constitutional, has become obsolete for the current reality. Therefore, it is necessary to develop a new Mining Law to address the new challenges of our mining industry (streamlined project processing, legal certainty, competition from other countries, ornamental rocks, quarry products, gravels and aggregates, carbon capture and storage, natural hydrogen, etc.).

The last Government proposed an Agenda for sustainable exploitation of natural resources, which ICOG fully supports.

The fundamental pillars of this agenda were also 27:

1. Geological and mining exploration by the Geological Survey of Spain (now under the CSIC).
2. Adaptation of the pre-constitutional Mining Law to the state of the autonomous communities.
3. New regulation on Mining Safety.
4. Legal framework for the restoration of mining operations.
5. Improvement in mining statistics.
6. Review of the objectives of the Circular Spain 2030 for raw materials.
7. Utilization of mining waste.

8. Rehabilitation of abandoned mining spaces and facilities.
9. Enhancement of mining cavities.
10. Improvement of the mining cadastre.
11. Statistical studies on the present and future supply and demand of mineral raw materials.
12. Analysis of critical raw materials for the Spanish industry.
13. Promotion of industrial value chains.
14. Improvement of mining productivity. Circular economy.
15. Development of policies for good governance, transparency, ethics, and regulatory compliance.
16. Promotion of talent and employment with a gender equality perspective in the mining industry. Enhancement of training. Digitalization.
17. Promotion of European industrial alliances.
18. Design of financial instruments to support the extractive industry.
19. Best available techniques for reducing environmental impact and emissions.
20. Recycling of waste.
21. Emission reduction. Support for more sustainable processes.
22. Improvement of infrastructure.
23. Marketing and internationalization of mining, auxiliary, and service companies.
24. Just transition.
25. Impact of mining on depopulated areas in Spain.
26. Support for research.
27. National Geothermal Research Plan (already developed by IDAE).

Furthermore, in order to streamline project processing, the agenda or a new law should include the unification of the permit acquisition processes (mining and environmental) into a single procedure managed by a mining permit office that handles all procedures and forwards applications to the relevant centres with substantive competence.

It is crucial for the law to establish principles of sustainable mining management, circular economy, and corporate social responsibility in mining companies. It should also clearly define the competencies of all different stakeholders (state, autonomous communities, municipalities, etc.).

The current maximum surface area for exploration permits is excessive given the existing knowledge of national geology, and it is proposed to reduce it to 600 mining grids.

The current mining law and its regulations establish different types of resources that are not in line with the reality of national and global mineral resources. It is necessary to align these definitions with current knowledge and technological advancements.

It is proposed to exclude low and very low enthalpy geothermal resources from the scope of mining legislation, and only include medium and high enthalpy resources that require drilling deeper than 200 meters.

The current legislation does not allow the free registration of areas where a previous permit existed, even if it has been cancelled. It is suggested that once a permit is cancelled, the area should automatically become open for registration.

Similar to the regulations for hydraulic fracturing projects, it is proposed that local communities with mining operations receive additional benefits beyond those already established by law.

Regarding professional competencies, the repeal of the Complementary Technical Instructions of the General Regulation of Basic Mining Safety Standards is proposed, as these instructions limit professional competencies against what is established in the current law and its regulation. It is suggested that professional competencies established by law take into account not only academic training but also professional experience, as is already the case worldwide, following the liberalizing trend of the European Union and based on the principle of "competence for the competent," allowing the market to determine which professionals are qualified for specific tasks while ensuring the safety of goods and people.

PROPOSAL 21: ROADMAP FOR A NATIONAL MINING POLICY.

Spain lacks a national mining policy that is included within the framework of the EU Raw Materials Initiative. Spain has significant mining potential that could contribute to development, employment, and improvement of the national standard of living. Achieving this requires a new Mining Law and adapting legislation related to territorial planning and the environment.

Territorial planning should consider the potential existence of mineral resources before prioritizing specific land uses to avoid sterilization of mineral resources due to other territorial uses. Therefore, municipal urban planning should include a map of mineral resources in the municipality, prepared by the mining authority in collaboration or under the supervision of the Geological and Mining Institute of Spain. These maps should be considered when establishing future land uses.

Another essential aspect is the need to develop comprehensive mining exploration plans that consider specific objectives based on the country's needs, such as critical minerals for the industry. Therefore, it is necessary to understand these needs through life cycle studies of materials and circular economy models, which could be conducted by the Geological and Mining Institute of Spain. The importance of mineral resources may not be evident to the general public, so it is proposed to include educational outreach programs about these aspects at schools and high schools as part of the mining policy.

The efficiency of mining exploration, exploitation, and production is crucial for the sustainable development of the national mining industry. Therefore, the mining policy should include a technological research plan in mining financed by the relevant Ministry and led by the Geological and Mining Institute of Spain and other related institutions to enhance research and technological development capabilities in this field. The plan should establish proper relationships with industry stakeholders, following the European model of the European Technology Platform on Sustainable Mineral Resources (ETPSMR), creating a similar instrument as proposed by CONFEDEM.

Consequently, the priority of the National Mining Policy should have two objectives: improving accessibility to known existing national resources for both national and foreign investors, thus promoting the exploration and exploitation of our mineral resources, while also improving the relationship between the mining industry and the society it serves by exploring and exploiting these resources in a sustainable and environmentally acceptable manner.

PROPOSAL 22: REGULATION OF HYDRAULIC FRACTURING AND HYDROCARBON PROSPECTING.

According to Article 8.1 of the Climate Change and Energy Transition Law, "no new authorizations will be granted for activities related to the extraction of hydrocarbons that involve the use of high-volume hydraulic fracturing." However, in order to create strategic reserves for emergency situations, exploration authorizations and research permits should be allowed based on social and economic interests or the absence of technological alternatives. National Defense and Public Security interests should also be considered.

The ban, as demonstrated by the war in Ukraine, causes serious harm to the national industry, and hydraulic fracturing (fracking) should be authorized as long as it is executed based on the precautionary and preventive principles outlined in Article 191.2 of the Treaty on the Functioning of the European Union, through an appropriate Environmental Impact Assessment (EIA), in accordance with Legislative Royal Decree 1/2008, of January 11, approving the consolidated text of the Environmental Impact Assessment Law for Projects, and Law 6/2010, of March 24, amending the same, as well as the rest of the current regulations at the European, national, and regional levels that are applicable, in order to avoid any type of impact on people, property, and the environment.

Research and exploitation projects should be carried out by a team of specialists in the natural environment and mining research and exploration through drilling. They should oversee the drilling process, monitor it properly, and adequately control any potential consequences for the environment.

It is evident that the country's natural resources (in this case, shale gas) must be well understood. Therefore, the State must expand the existing inventory of available resources, and once these are known, the appropriateness of their exploitation can be assessed based on economic and geopolitical circumstances. Delaying the exploitation of our resources is reasonable when circumstances allow it, but not knowing what we have can have serious consequences. It is important to conduct studies that facilitate decision-making when it becomes essential to guarantee energy supply and ensure economic stability.

The Spanish Geological Society proposes reconciling the country's economic development with environmental protection, without dismissing techniques that can promote our energy self-sufficiency.

The Spanish State must regulate the exploitation of unconventional hydrocarbons through hydraulic fracturing within the framework of its competencies, considering the need to establish strategic environmental planning within the national territory, as well as the unconventional nature of this technique and the environmental limitations that must be addressed.

Similar to hydraulic fracturing, exploration and research permits for hydrocarbons should be allowed with the aim of creating strategic reserves as previously indicated. Spain has a strong dependence on hydrocarbon imports, so existing geological and geophysical indications within the country for finding oil traps should be investigated. It is necessary to advance the research of these geological explorations through environmentally controlled drilling in the sea. Spain is a country with a high energy dependency, with almost all oil and gas coming from abroad.

A comprehensive State Pact should be proposed among all political groups and social actors to reduce Spain's energy dependence, as economic development and environmental protection can be reconciled. It is a mistake to focus the debate solely on "prospecting yes or no." Two legal goods must be protected: economic development and the environment.

ENERGY POLICY

PROPOSAL 23: RADIOACTIVE WASTE LAW.

Given the possibility of extending the lifespan of nuclear power plants, it is essential to update studies on geological risks, considering the potential effects of climate change such as droughts, floods, and other extreme phenomena.

However, radioactive waste is the major problem that needs to be managed, and a definitive solution for the management of high-level waste is not yet being pursued. It is crucial to establish a stable regulatory framework that allows for the construction of a Deep Geological Repository (DGR) as the only viable solution, preceded by an underground laboratory. The Centralized Temporary Storage (CTS) project should be seen as an intermediate but time-limited stage, constructed with the necessary research and development (R&D) tasks in mind. During this period of analysis and evaluation, it is essential to have underground facilities.

Having a long-term National Energy Plan, agreed upon by different political parties, is crucial to ensure the economic performance of investments and the safety of all nuclear sites. Shifting energy policies are not suitable as they hinder the necessary investments in plants, which has a negative impact on nuclear safety.

Once again, we emphasize the need to conduct site characterization studies with the highest quality guarantees and to consider their results in decision-making processes. Geological and geotechnical risks can make the safety of a nuclear facility unfeasible.

PUBLIC ADMINISTRATION

PROPOSAL 24: LAW ON SERVICES AND PROFESSIONAL ASSOCIATIONS: PROFESSIONAL STATUTE.

A Law on Services and Professional Associations is needed, in accordance with Article 36 of the Spanish Constitution. This law should harmonize the attributions of different regulated professions at the national level, assigning shared responsibilities when necessary. This would promote constitutional principles of equal opportunities and a unified market for professional practice.

The current Law on Professional Associations from 1974 is outdated and requires a unified and coherent adaptation to the regulatory framework of regulated professions.

The law should determine which professions should be subject to mandatory membership in professional associations. The significance of this issue in the service market, not only nationally but within the European framework, necessitates addressing it from the perspective of Community Law. The elimination of barriers to the free movement of people and services among the Member States of the European Union is one of the objectives of the European Community,

as stated in Article 3.1.c of the Constitutive Treaty. This elimination provides nationals of Member States with the ability to practice a profession, whether self-employed or employed, in a Member State different from the one in which they acquired their professional qualifications. To achieve this, Article 47.1 of the Treaty establishes that Directives shall be adopted for the mutual recognition of diplomas, certificates, and other qualifications.

Directive 2005/36/EC, relating to the recognition of professional qualifications, constitutes the reference framework in this matter. Article 3.1.d) of the Services Directive has established the primacy of the Professional Qualifications Directive. The aforementioned Directive 2005/36/EC has been incorporated into Spanish Law through Royal Decree 1837/2008.

This legislation already provides a definition of "regulated profession" as "the professional activity or set of professional activities for access, exercise, or mode of exercise of which the possession of specific professional qualifications is required, either directly or indirectly, by virtue of legal, regulatory, or administrative provisions."

Science professions should be regulated through the development of the regulation governing the curriculum for these professions.

On the other hand, the Professional Union proposes the enactment of a Professional Statute that aims to give a nature charter to the concept of a profession in order to converge on an identifiable and recognizable concept that values the professional category.

The Professional Statute would apply to all regulated professions, i.e., those that share the following essential principles:

- a) Relevant/adequate qualifications given the provision of services of marked intellectual nature, as well as continuous training, continuous professional development, recognition and validation of professional competence.
- b) Independence of professional judgment or professional autonomy in the context of professional practice, in any field of activity, including those based on public and private employment relationships.
- c) Responsibility of the practicing professional as a result of their professional freedom to act according to their knowledge and conscience.
- d) Control of professional practice by an independent, autonomous, and impartial body endowed with public powers to regulate the profession and carry out the ethical function.
- e) Action based on the impact on the general interest/in the interest of the client, patient, or user, of quality and with a commitment to strict and precise respect for professional ethics and norms.

A characteristic element of all these professions is the professional act, that is, the professional practice has a direct or indirect effect on those who use or benefit from the services provided by the professional, affecting or potentially affecting the fundamental rights of those users of the services. That is why every professional must adhere to ethical rules and be subject to control of their professional practice by an independent body. The enabling degree and membership in a professional association are indispensable elements in this context that emanate from the Spanish Constitution itself.

This statute will revolve around the following main aspects:

- a) General principles of professional practice. Autonomy, independence, good practice, continuous professional development, competence, registration of membership, incompatibilities, continuous training, principles of professional ethics, professional career.
- b) Modalities of practice: public, private (freelance, corporate, ...), multidisciplinary teams, contracted, voluntary/volunteering, online services.
- c) Control/Guarantee of professional practice. Ethical function, disciplinary authority, responsibility, liability insurance, service quality.
- d) Obligations and rights. Fees, informed consent, professional engagement, data handling.
- e) Advertising regulations.
- f) Professional registry.
- g) Relations with the administration.
- h) International relations.

PROPOSAL 25: CREATION OF THE NATIONAL GEOLOGICAL INSTITUTE.

The ICOG proposes the creation of a National Geological Institute with the rank of General Directorate, with the following functions:

- Development of the Geological Mapping Plan within the framework of the National Cartographic Plan (PCN), an instrument approved by the Council of Ministers every 4 years, endowed with the appropriate budget for the update and maintenance of the National Geological Mapping, which currently lacks an executing body.
- Integration of competencies in volcanic and seismic risks (including the seismic network of the National Geographic Institute (IGN)) into the National Geological Institute to facilitate the management of emergency situations and natural disasters, such as the Lorca earthquake or volcanic eruptions on the islands of La Palma or El Hierro.
- Integration of the competencies of the National Geological and Mining Service of the extinct Geological and Mining Institute in the fields of Mining, Groundwater, Geological Hazards, and Geological Heritage.

A National Geological Institute operating similar to the United States Geological Survey (USGS), one of the most prestigious institutions in the world in the study of earthquakes and volcanic eruptions, and in the geological knowledge of the territory and its dissemination.

PROPOSAL 26: MORE GEOLOGISTS IN THE PUBLIC SECTOR.

The ICOG denounces the extremely low presence of geology professionals in public administrations. Discrimination is observed in the requirements of public employment calls; whose resolution often seems predetermined before the competition.

The bidding documents for many contracts in the Public Sector require specific professional qualifications (generally civil or mining engineers) for the development of a specific activity, which prevents the participation of geologists or geological engineers in certain functions for which, according to Article 21 of Royal Decree 1378/2001 (BOE 19-12-2001), we have recognized competences and attributions. This constitutes a restriction on access to economic activity in accordance with Article 5 of Law 20/2013, of December 9, on Guarantee of Market Unity (LGUM). In this regard, the National Commission of Markets and Competition has supported us in a claim filed against a tender by ADIF, where we considered that the rights and legitimate interests of geology and geological engineering professionals were being violated.

There is a need for a greater presence of new constitutional professions in the Staffing Structures (RPT) of public administrations. Currently, the presence of new constitutional professions (such as geologists, hydrogeologists, physicists, biologists, graduates in environmental sciences, etc.) in employment and civil servant positions in public administrations is still minority. The collaboration of these professionals is decisive for the proper application of all legislation, regulations, planning, and execution of projects related to natural sciences. For this reason, it is necessary to substantially increase the offers of new constitutional professions in the Staffing Structures (RPT) of Public Administrations to meet the citizens' demands for sustainable development.

The presence of specialists in natural sciences is highly necessary in the management bodies of protected natural spaces, regardless of their degree of protection, in order to guarantee the proper application and development of Law 42/2007 on Natural Heritage and Biodiversity.

The entry into force of the Technical Building Code and the Land Law makes it necessary for the competent authorities in housing and construction to have an adequate number of specialists in geotechnical studies in their staff to develop technical regulations, control the quality of geotechnical studies, incorporate the latest technologies, etc.

The principle of equal opportunities must be guaranteed, and professional practice should be based on professional competences, rather than being based on a unilateral and arbitrary decision of a public corporation.

PROPOSAL 27: ORGANIC LAW ON GENDER PARITY REPRESENTATION IN DECISION-MAKING BODIES.

The ICOG approves the enactment of the aforementioned law and supports its aspirations. Concerning the published draft, the following claims are raised and should be addressed:

The expression contained in the first point of Article 15, "regulated professions," should be replaced with "professional associations."

Situations where objectively achieving the established parity result may be impossible should be considered.

It is necessary to include a transitional provision that allows for a minimum adaptation period of one year for councils and professional associations to modify their bylaws to comply with the new regulation, with the obligation of the relevant ministries to approve them.