



Climate, Energy and Security: The New Social Contract of Europe and Spain

¹Víctor Rodríguez González, ²Claudio Paya Santos, ³Luigi Martino, ⁴Lenny Liz Rivas, ⁵Luis A. Garcia Segura, ⁶Juan José Delgado Morán

¹Isabel I University, Spain,

Victor.rodriguez.gonzalez@ui1.es, <https://orcid.org/0000-0002-5348-9730>

²(Correspondence Author), Valencia International University, Spain

claudio.paya@professor.universidadviu.com, <https://orcid.org/0000-0002-1908-9960>

³Bologna University, Italy

luigi.martino3@unibo.it, <https://orcid.org/0000-0002-7417-2898>

⁴Valencian university international, Spain

lenny.liz@professor.universidadviu.es, <https://orcid.org/0000-0003-1990-7860>

⁵Nebrija University, Spain

lgarcise@nebrija.es, <https://orcid.org/0000-0001-7074-4396>

⁶Pablo de Olavide University, Spain

jjdelmor@upo.es, <https://orcid.org/0000-0002-9945-8235>

ABSTRACT

In the current context of growing climate instability and geopolitical tensions, the article addresses the critical nexus between climate change, energy security and governance as the basis for a new social contract in Europe and Spain. The approach is based on a central premise: the energy transition and the fight against climate change cannot be addressed in isolation, but must be integrated into a common strategic vision that combines sustainability, social resilience and political autonomy (Mazurier et al., 2020). The work is structured around five thematic axes. First, the conceptual framework of the link between climate and security is examined from the academic literature, highlighting the role of climate change as a risk multiplier (Barnett & Adger, 2007) and the complexity of multilevel governance (Keohane & Victor, 2011). Secondly, the European regulatory framework is analysed, especially the European Green Deal and the Strategic Compass, as pillars that redefine security in integrated terms: energy, climate and civil. Thirdly, the Spanish case is contextualised, emphasising its high energy dependence and climate vulnerability, but also its potential to lead a transition from the local level with renewable energies and decentralisation. Fourthly, the cooperation



mechanisms between the EU and Spain are presented, such as electricity interconnections, green hydrogen alliances and the Just Transition Fund. Finally, key strategic challenges are identified: modernization of electricity grids, adaptation to climate change, technological innovation, geopolitical diversification and citizen participation (Mazurier et al., 2020). The article argues that Spain, thanks to its geographical location, economic structure and European institutional framework, has a historic opportunity to reconfigure its national security by integrating energy, climate and social policies (Luque et al., 2023; Martino, 2024). Through a pragmatic and humanized approach, the importance of multi-level partnerships, sustainable investments, and citizen inclusion to build resilient and equitable security is highlighted. In conclusion, it is proposed that the security of the twenty-first century will only be effective if it is shared, sustainable and people-centered, transforming systemic challenges into opportunities for cohesion and progress (Payá et al., 2018; Payá, 2023).

KEYWORDS: Energy, Geopolitics, Security, Europe, Climate

1. INTRODUCTION

Today, to talk about energy security and climate change is to understand two inseparable facets of our own survival as a nation. On the one hand, energy security reminds us that every home, hospital or factory depends on a constant, accessible and, increasingly, environmentally friendly supply. On the other, the climate emergency confronts us with more violent storms, summers of prolonged drought, rivers that are depleted, and ecosystems that lose their variety of life. Together, these threats not only threaten our infrastructure and economy, but also the social cohesion and well-being of our communities (Liz, 2021).

In the case of Spain, this duality acquires a particularly urgent nuance. We are a country that imports more than 70% of the energy we consume, relying on external sources to heat our homes or move our factories. At the same time, we live under an increasingly harsh Mediterranean sun: record-breaking heatwaves, changes in rainfall patterns that complicate agriculture, and fires that sweep through thousands of hectares each summer. That confluence of "I need energy" and "my environment is becoming increasingly unpredictable" shapes a new security paradigm, in which defense, energy, and environmental policies can no longer walk separately.

Recognising this reality, the new European Commission has elevated energy and climate security to priority axes of the so-called open strategic autonomy. The European Green Deal and the Strategic Compass not only place climate neutrality by 2050 at the heart of the agenda, but also seek to strengthen our infrastructure networks, diversify suppliers and foster cooperation between member states in the face of extreme events. In this chapter, we will take an in-depth look at:



- a) The conceptual basis: how the international literature understands the interrelationship between climate and security.
- b) The EU regulatory framework: the EU laws and programmes that lead the way, and how Spain adapts these guidelines.
- c) Our starting point: the reality of energy dependence in Spain and the vulnerabilities that climate change brings to the territory.
- d) Joint work: the projects and funds that unite Spain and Brussels to tackle these challenges collaboratively.
- e) Looking ahead: the main challenges ahead, the opportunities we can seize and the strategic recommendations to achieve truly sustainable security.

In the following pages, we will go through each of these blocks with a practical and human approach, illustrating not only figures and laws, but also stories of coastal towns resisting floods, of municipalities that are committed to solar self-consumption, and of citizen networks preparing for a more uncertain tomorrow. Because in the end, protecting our energy and our climate is, above all, protecting people.

2. THE CLIMATE–SECURITY NEXUS IN ACADEMIC LITERATURE

The intersection between climate change and security has emerged in recent years as an essential field of study to understand how environmental phenomena can undermine social and political stability. Below, we explore three key lines of research that have illuminated this complex relationship.

2.1 Climate change as a risk multiplier

Karen Barnett and Neil Adger (2007) introduced the concept of the "risk multiplier", a powerful and increasingly relevant metaphor for understanding the impacts of climate change on social stability. Far from being a direct trigger for conflict, global warming acts as a silent catalyst: it exacerbates pre-existing vulnerabilities, increases latent social tensions and creates new dynamics of pressure on already fragile communities.

Consider, for example, a rural region whose economy depends almost exclusively on agriculture. Year after year, rainfall begins to become less frequent and more erratic. Crops fail, wells dry up and livestock die. Families, finding themselves without a livelihood, are forced to leave their ancestral lands and migrate to cities that already deal with high levels of poverty and saturated public services (Liz & Delgado, 2019; Rodríguez, 2023). Hospital waiting rooms are full, schools do not have enough space and markets are not enough to supply everyone. In this context, as Barnett and Adger point out, the cumulative pressure on weakened urban infrastructure can act as a spark that ignites a larger conflict.



Climate change, in this sense, does not directly generate violence, but it does create the perfect breeding ground for it to flourish. Persistent droughts, devastating floods and increasingly frequent forest fires force mass population displacements, erode trust in institutions and overwhelm social assistance systems. When access to water, housing, or health care becomes fierce competition, tensions emerge between communities, ethnicities, or social groups. In these scenarios, political stability suffers and civil discontent can easily escalate from unrest to open conflict.

In short, climate change is not simply an environmental problem; it is a profoundly social phenomenon that transforms living conditions, modifies population dynamics and aggravates structural inequalities. Understanding it as a risk multiplier is not only useful from an analytical perspective, but essential for designing prevention policies that integrate climate justice with social cohesion.

2.2 Energy security and governance

When we talk about energy security, it's not just about electricity continuing to flow through our homes or that the car's tank can be filled without any problem. The relationship between energy and security is much deeper and more strategic. As Vivoda (2010) argues, this connection must be understood through three interrelated dimensions that reflect the complexity of the modern energy system: availability, resilience and autonomy.

First, there is availability and access: having a stable supply of oil, gas or electricity. This may seem obvious, but in an interdependent world, achieving it involves international agreements, solid infrastructure, and efficient logistics. It is no coincidence that countries with their own energy reserves or with diversified access to suppliers tend to have greater internal stability.

The second dimension is the resilience of the system. Here we are talking about a country's ability to quickly overcome supply disruptions, whether caused by natural disasters, technical accidents, or geopolitical tensions. A resilient energy system not only prevents blackouts, but also minimizes social and economic impacts when unexpected crises arise.

Finally, Vivoda highlights the importance of technological autonomy, i.e. the extent to which a country can produce, store and manage its own energy without being overly dependent on the outside. In times of international uncertainty, having our own capabilities in sectors such as renewable energy, smart storage or digital grids makes the difference between energy dependence and energy sovereignty.

This three-dimensional approach has been endorsed by bodies such as the International Energy Agency (IEA). Its *Energy Security Index* (IEA, 2022) recognises that countries that best combine supplier diversification, flexible energy grids and strong renewables deployment not only achieve greater stability, but also reduce their costs in the long term.



A very illustrative example is that of Germany and Denmark, which have made a firm commitment to wind and solar energy. Thanks to this transition, both countries have managed to cushion the impact of international crises, such as the increase in gas prices following conflicts in Eastern Europe. Rather than being exposed to the swings of traditional imports, they have reduced their vulnerability through sustained investments in technology and efficiency.

In short, talking about energy security in the 21st century implies talking about anticipation, adaptation and autonomy. It is a key component not only for the economy, but also for social stability and political independence. As the world moves towards an energy transition, understanding and strengthening these three dimensions will be crucial to meet the challenges of the future with guarantees.

2.3 Integrated approaches: towards a "complex regime" of governance

In an increasingly interconnected world, global challenges such as climate change demand equally complex and collaborative solutions. In this sense, Robert O. and David G. (2011) offered one of the most influential visions on how to address this problem: the idea of a complex climate regime. Against the traditional notion that a single international treaty or a large organization could lead the global response to global warming, these authors proposed a more realistic and decentralized approach, recognizing that no single entity has the capacity or legitimacy to face the magnitude of the climate challenge.

Its model is built on the simultaneous interaction of multiple actors operating at different levels and spheres. Among them are:

- National and local governments, which design and implement policies adapted to their specific contexts.
- International organizations, such as the UN or the European Union, which offer frameworks for coordination, financing and legitimacy.
- The private sector, especially energy, technology and financial companies, which drive key investments and develop innovative solutions.
- Civil society and NGOs, which channel citizen demands, monitor public action and push for greater climate ambition.
- The scientific and academic community, which provides essential data, models and diagnoses for informed decision-making.

All these actors interact within a series of "functional subsystems", such as green finance, clean technologies, carbon markets, food security or natural risk management. This fragmented but



interconnected architecture is not a weakness, but precisely what allows for a more dynamic and adaptive response.

Keohane and Victor call this logic of action a form of meta-institutional governance: a space where energy and climate security policies are not designed in isolation, in silos, but are built in a network, combining financial resources, technical capacities and knowledge shared through multilateral alliances and flexible coalitions.

This framework is particularly relevant for countries such as Spain, which is in a strategic position within the complex climate regime. Actively integrating into this network means not only designing ambitious national plans, such as the National Integrated Energy and Climate Plan (PNIEC), but also synchronising these goals with major European objectives, such as the *Fit for 55* package. It also means participating in cross-border renewable energy projects – such as electricity interconnections with France or Morocco – that strengthen both domestic energy resilience and regional climate cooperation.

In short, this plural and decentralized vision of the climate regime reflects an uncomfortable but hopeful truth: the solution to climate change will not be the work of a lone hero, but the result of an orchestra of actors who, although different, must learn to play in unison.

3. EUROPEAN REGULATORY FRAMEWORK: THE NEW COMMISSION AND THE GREEN DEAL

In recent years, the European Union has radically redefined its approach to climate and energy policies. It is no longer just a matter of reducing emissions or improving efficiency, but of a profound structural change that places environmental sustainability and energy security at the heart of its strategic vision for the future. Under the leadership of President Ursula von der Leyen, the European Commission has driven an ambitious and far-reaching transformation, anchored in two key instruments: the *European Green Deal* and the *Strategic Compass*. These initiatives reflect a determined political will, accompanied by legislative reforms, historic investment funds and a new collective narrative that connects the fight against climate change with social justice and geopolitical autonomy.

3.1 The European Green Deal: more than a policy, a new social contract

Launched in December 2019, the European Green Deal is not simply an environmental strategy. It is, in the words of the Commission itself, a new pact between the European institutions and citizens, a roadmap that aspires to protect the planet, improve public health, guarantee a more inclusive economy and generate new employment opportunities in green sectors (European Commission, 2019). Its most ambitious goal is to achieve climate neutrality by 2050, a commitment that makes Europe the first continent to legally assume this horizon of total decarbonisation.



This transition process is neither theoretical nor symbolic: it has an investment plan of more than 1 trillion euros, specific sectoral policies and mechanisms so that each Member State can adapt the transition to its territorial realities.

- *Fit for 55*: Turning ambition into legislation

One of the pillars of the Green Deal is the *Fit for 55* legislative package, presented in 2021. Its objective is clear: to reduce greenhouse gas emissions by **at least 55% by 2030** compared to 1990 levels (European Commission, 2021). To achieve this, the EU is proposing a thorough review of its regulatory framework: from the EU ETS to regulations on renewable energy, energy efficiency and transport.

It's not just about technical goals: it means rethinking urban mobility, retrofitting buildings, electrifying heavy industry, and dramatically increasing the share of clean sources in the energy mix.

- *Just Transition Fund*: No one left behind

The EU recognises that such a profound transformation entails social risks, especially in regions that have historically relied on coal and other fossil fuels. For this reason, the Just Transition Fund, endowed with 17,500 million euros, seeks to ensure that no one is excluded from the new model (European Commission, 2020).

Territories such as Asturias, Aragon or Silesia have access to these funds to train their workers, attract clean investments, create sustainable employment and diversify their local economies. It is a way of translating climate justice into concrete actions: reconversion, inclusion and development.

- *Hydrogen Strategy*: The Future of Clean Energy

Another key piece is the Hydrogen Strategy, with which the EU wants to position itself as a global leader in the development and use of green hydrogen, which is produced from renewable energy. This technology has enormous potential to decarbonise sectors that are difficult to electrify, such as the steel industry or heavy transport.

The goal is ambitious: to install 40 GW of electrolyzers and use up to 10 million tonnes of renewable hydrogen per year by 2030 (European Commission, 2020). This is not only an energy revolution, but also an industrial and technological opportunity for Europe.

3.2. Shared governance for a just transition

One of the great strengths of the Green Deal is that it **does not impose a single model**, but coordinates efforts, finances projects and establishes common frameworks that allow each country to develop its own transition strategy. In the case of Spain, this means aligning national plans such as the PNIEC (National Integrated Energy and Climate Plan) with community



initiatives such as *Fit for 55*, and taking advantage of projects such as cross-border hydrogen corridors or electricity interconnections.

In an increasingly complex and unstable international scenario, the European Union's Strategic Compass for Security and Defence represents a qualitative leap in the geopolitical ambition of the European project. Adopted in 2022, this roadmap not only seeks to strengthen the bloc's military capabilities, but also recognises the interdependence between defence, energy, civil resilience and climate change as part of the same comprehensive security system.

The Compass is based on a clear diagnosis: the threats of the twenty-first century are no longer limited to traditional armed conflicts. Today, a war can be fought on the network, through cyberattacks on hospitals or power plants; or manifest itself through a prolonged drought that destabilizes an entire region (Rodríguez et al., 2023). This strategic instrument therefore integrates three key pillars that shape a holistic vision of European security.

A. Strengthening European defence

The first pillar aims to consolidate the EU's joint defence and deterrence capability. This is articulated through initiatives such as Permanent Structured Cooperation (PESCO) and the European Defence Fund (EDF), which allow Member States to co-finance and develop shared military capabilities, from drones and satellites to cyber defence systems and military mobility.

But the vision goes beyond armaments: defence also involves protecting critical infrastructure, many of them related to energy supply. Power plants, pipelines, offshore wind farms or data stations are strategic assets that can be targeted by physical or digital attacks. The Compass recognizes this vulnerability and proposes protective measures that combine surveillance, intelligence and intergovernmental cooperation.

B. Energy security

The second pillar is energy security, understood as an indispensable condition for Europe's strategic autonomy. Russia's invasion of Ukraine in 2022 highlighted the extent to which dependence on external sources, such as Russian gas, can become a tool for geopolitical pressure.

In response, the EU is committed to an approach based on more robust electricity grids, large-scale storage and diversification of sources and supply routes. This vision is aligned with the European Green Deal, reinforcing the transition to renewable energies not only as a climate necessity, but as a security imperative. In other words, energy sovereignty is no longer only environmental, it is also strategic.



C. Civil resilience

The third pillar underlines the importance of civil resilience as a key element in responding to new threats. In a world where risks no longer distinguish between civilian and military, the EU is committed to strengthening capacities for prevention, preparedness and response to emergencies, from pandemics and cyberattacks to forest fires or massive power outages (Delgado et al., 2019).

This implies not only improving coordination between public administrations, but also actively involving citizens, the private sector and the scientific community in response plans. This promotes a culture of shared security, where citizens are not simply recipients of aid, but key actors in the protection of the social and economic fabric in the face of crises.

3.3 A common framework for a safe transition

Together, the Strategic Compass and the European Green Deal constitute an unprecedented political, regulatory and financial framework, redefining the role of the European Union in a multipolar and vulnerable world. For Spain, this strategy is not only an institutional challenge, but also a historic opportunity: to integrate national energy and climate plans (such as the PNIEC) with civil defence and cybersecurity strategies, so that every euro invested simultaneously reinforces environmental sustainability, energy independence and social cohesion (Delgado et al., 2023).

This synergy between defence, energy and resilience not only seeks to protect Europe from external threats, but also to build a more robust, prepared and supportive community. In short, a Europe that is stronger not only on the margins, but also in its heart.

4. SPAIN AT THE ENERGY AND CLIMATE CROSSROADS: FROM CHALLENGE TO OPPORTUNITY

Spain is at a decisive moment in its contemporary history. What used to be warnings from experts or simulations in technical reports, today translates into real situations that directly affect our lives. Energy security and adaptation to climate change are no longer technical debates or promises for the future: they are immediate issues that impact the prices we pay in the supermarket, the quality of the air we breathe and the stability of sectors such as agriculture, tourism or transport.

From the counter of a petrol station in Castilla-La Mancha to the centuries-old olive groves of Jaén, every decision related to energy or climate has tangible consequences for the economy and social cohesion. Therefore, it is not enough to promote isolated measures: we need a comprehensive vision that combines sustainability, territorial justice and resilience. Below, we explore two of the most critical axes of this transformation: external energy dependence and increasing exposure to extreme weather events.



4.1. Dependence on imports and energy transition: building autonomy from the local level

In 2020, Spain imported 73% of the primary energy it consumed. In the case of natural gas, a key source for heating and industry, 92% came from Algeria and Norway (MITECO, 2020). This makes us a country strongly exposed to geopolitical ups and downs. Any disruption to international routes – a conflict, a strike, a technical failure – can lead to sharp rises in energy prices, supply disruptions and instability for thousands of households and businesses.

Faced with this situation, Spain has opted for a more resilient and self-sufficient model. The National Integrated Energy and Climate Plan (PNIEC 2021–2030) outlines an ambitious roadmap with goals such as:

- Reach 42% renewable energy in the electricity mix by 2030.
- Achieve a 74% reduction in emissions in the transport sector.
- Deploy 39 GW of wind power **and** 37 GW of solar capacity.

These objectives are not theoretical: they are already underway. Between 2010 and 2022, the share of renewables in electricity generation rose from 30% to 54% (IEA, 2022). This transition translates into solar panels installed on thousands of rooftops, wind farms managed by local cooperatives, and families now paying less on their bills while reducing their dependence on volatile markets.

Every kilowatt generated locally is less exposure to foreign gas, but also more green jobs, more technological innovation, and more energy justice. Because the transition is not only measured in megawatts: it is measured in dignity, in family savings and in the possibility of building a future with greater control over our resources.

4.2 Exposure to climate risks: living with the emergency

Climate change is no longer a long-term threat, it is a reality that crosses us. It manifests itself in heat waves that do not let up, in increasingly empty swamps, in torrential storms that collapse cities, and in forest fires that devastate ecosystems and homes.

According to the IPCC Report (2022), the Iberian Peninsula will be one of the most affected regions in Europe, with three to five more days of extreme heatwaves each summer by 2050. This was already evident in June 2021, when a heatwave in Andalusia exceeded 45 °C for several consecutive days, causing fires that devastated 350,000 hectares (López-Moreno et al., 2021).

Behind this data are human stories: elderly people suffering from heat stroke, children with respiratory problems, families seeing their crops wither or their homes surrounded by flames. The consequences are multiplying: overflowing hospitals, collapsed irrigation systems,



economic losses and an increase in social unrest that can lead to conflicts if not managed with intelligence and empathy.

That is why civil defence policy must evolve. It is no longer enough to think of fires or floods as sporadic phenomena: we must incorporate climate as a structural dimension of risk. This involves concrete actions:

- Design urban heat maps to act on vulnerable areas with vegetation, shade and reflective materials.
- Develop comprehensive water management plans that protect supply in times of scarcity.
- Establish clear evacuation and health care protocols for at-risk groups during extreme events.

These measures are not a luxury, they are a matter of fundamental rights: the right to water, to health, to a safe environment. And only by placing people – and especially the most vulnerable – at the centre of climate policies can we transform threat into opportunity.

5. EU–SPAIN COOPERATION MECHANISMS

The energy and climate transition requires multi-level coordination that transcends national borders. In this context, collaboration between Spain and the European Union has been articulated through strategic mechanisms ranging from the construction of interconnected infrastructures to the development of emerging technologies such as green hydrogen. These mechanisms not only facilitate the decarbonisation of the economy, but also contribute to ensuring territorial equity and social cohesion within the framework of the energy transition.

5.1 Interconnection and flexibility of electricity grids

The integration of the European electricity system is an essential pillar for achieving a secure, sustainable and efficient energy supply. Interconnection between national grids allows for the sharing of resources, reduces costs and increases resilience against fluctuations in demand or local failures. In this area, the Mediterranean Energy Ring represents a key infrastructure. This project includes the incorporation of 2 GW of additional capacity that will connect Spain with France and Italy, improving the energy exchange capacity between the Iberian Peninsula and the rest of Europe (European Commission, 2021).

The functionality of this network translates into greater stability: when renewable production in regions such as Galicia exceeds domestic demand, that surplus can be exported to other areas of the continent. Conversely, Spain will be able to receive electricity from neighbouring countries during periods of high demand or low local generation. In addition to this framework, the 700 MW interconnection with Morocco is a significant step towards a Euro-African energy



network. This infrastructure will facilitate the two-way exchange of clean energy, strengthening security of supply and promoting international cooperation on energy.

5.2 Alliances for the promotion of green hydrogen

Green hydrogen is emerging as one of the key technologies in the deep decarbonisation process, especially in sectors where direct electrification is not viable. Its production requires a renewable source of electricity, such as solar or wind, which is used to power electrolyzers that separate hydrogen from water.

In this context, the Sudoe Consortium, made up of regions in Spain, France and Portugal, has promoted joint investment in pilot projects through European funds from the Recovery and Resilience Mechanism, with an endowment of 150 million euros (Hydrogen Roadmap Europe, 2020). Among the outstanding initiatives are two located in Extremadura and Andalusia.

In Extremadura, a pilot project uses a large-scale photovoltaic solar plant to power electrolyzers. The hydrogen generated is used to supply refineries and public transport using fuel cells. This initiative demonstrates the feasibility of integrating sustainable energy production in rural areas with low industrial density, contributing to local economic development. For its part, in Andalusia, a technological innovation node has been established around hydrogen, which acts as a platform for vocational training, technological entrepreneurship and the recruitment of young talent linked to the energy transition.

Both cases illustrate how multilateral alliances allow not only to advance technological innovation, but also to generate economic and social opportunities that reinforce territorial cohesion in regions with structural needs for productive reconversion.

5.3 Just Transition Fund: Leaving No One Behind

Decarbonization is not just a technical transformation, it is a human transformation. It involves closing mines, shutting down gas turbines and reorienting entire industries towards new horizons. But behind every chimney that stops are people: workers who need to relocate, families who rely on jobs in declining sectors, and communities that for decades have sustained the country's energy and industrial engine. To ensure that this transition does not become an abyss for those who have sustained our development, the European Union has created a key mechanism: the Just Transition Fund (JTF).

This fund was born with a clear objective: to ensure that no region, company or worker is left behind on the path to climate neutrality. It is a public policy that explicitly recognises that the green transition will not be successful if it is not also socially just. In other words, it is not enough to change energy sources: historical inequalities must be repaired, real opportunities must be created and the human fabric of the most vulnerable territories must be protected.



In the case of Spain, the JTF has become an essential instrument to accompany regions whose economy is still largely dependent on fossil fuels. Communities such as Aragon, Castilla-La Mancha or Castilla y León – which were once the mining and industrial heart of the country – now receive specific resources to reimagine their future.

These funds are allocated, among other things, to three fundamental lines:

- **Worker training:** Specialized programs are developed to reorient traditional job profiles towards emerging sectors. Courses for solar panel installers, wind turbine maintenance technicians or specialists in industrial digitalisation allow workers not only to keep their jobs, but also to improve their qualifications in an increasingly competitive market.
- **Investment in clean energy:** Specific projects such as small hydroelectric power plants on mountain rivers, biogas plants that recover livestock or agricultural waste, and even microgrids that supply entire villages with local renewable sources are financed. These investments not only generate energy, but also jobs, innovation, and community pride.
- **Reconversion of the productive fabric:** Many local SMEs, with technical and financial support from the JTF, are transforming their business models. A workshop that previously manufactured parts for coal-fired boilers can now be converted to produce wind turbine components, positioning itself in global value chains without leaving its locality.

These initiatives not only mitigate the social impact of the transition, avoiding phenomena such as mass unemployment or rural depopulation, but also strengthen territorial cohesion. Regions that for decades sustained the country's growth with their efforts now have the opportunity to lead a new production model, based on sustainability, innovation and equity.

Beyond the facts and figures, what emerges is a new collective story: that of communities that are moving from nostalgia for what has been lost to hope for what is to come. A story where green is not a privilege, but a shared opportunity to rebuild prosperity with local roots and a vision of the future.

6. CHALLENGES AND OPPORTUNITIES

Thinking about national security today means looking to the future with humility and courage. Spain, immersed in the energy transition and the climate challenge, faces a crossroads where each step can open up new possibilities or reveal old vulnerabilities. Below, we delve into five key areas that aim to transform threats into opportunities to move towards a more sustainable, just and resilient society.

6.1 Modernising the electricity grid: towards a flexible and participatory system

Imagine the power grid as a giant living organism: until now, much of its energy flowed in only one direction, from large power plants to our homes. The challenge is to turn it into a smart, bidirectional grid, capable of integrating thousands of small renewable sources – rooftop



solar panels, community wind turbines – and storing the surplus in batteries or even converting it into green hydrogen for use when the sun is not shining or the wind is not blowing (IEA, 2022).

The digitalisation of demand adds another dimension: if household appliances, electric cars and air conditioning systems communicate in real time with the grid, we will be able to schedule their consumption when renewable energy is abundant, reducing costs and maximising reliability. This change requires public and private investment in sensors, smart meters and collaborative management platforms, but promises a system that is more resilient to peak demand and extreme weather incidents.

6.2 Adaptation versus mitigation: reducing emissions is not enough

We often talk about mitigation – starting to emit less CO₂ – but adaptation is its inseparable complement. Building dams and reservoirs capable of regulating floods and droughts, designing smart irrigation systems that take advantage of every drop of water, and strengthening coastal infrastructure against extreme waves are investments that save lives and economies (IPCC, 2022).

However, the boundary between the two strategies can be blurred: a well-designed dam not only controls flooding, but, if it incorporates turbines, produces clean energy. Thus, every euro invested in adaptation can catalyze emission reductions, generating a virtuous circle where protecting ourselves from extreme weather goes hand in hand with slowing down global warming.

6.3 Multilevel governance: weaving alliances from the local to the European level

Spain is diverse: from Andalusia to Galicia, each territory experiences a different climate and challenges. To face climate and energy emergencies, it is essential to coordinate at European, national and regional levels (Keohane & Victor, 2011).

- In Brussels, goals and funds are set (Fit for 55, Just Transition Fund).
- In Madrid, they are translated into national plans (PNIEC) and legislation.
- In the communities, they are adapted to local characteristics: drought plans in Murcia, treatment strategies in the Basque Country, fire protocols in the Sierra de Gredos.

This multi-level fabric must be supported by data exchange platforms, joint drills and flexible budgets that allow rapid resources to be allocated where they are needed most. Only in this way will the response be coordinated, efficient and sensitive to the peculiarities of each region.



6.4 Technological innovation: from the laboratory to the village

Science and technology may seem far away when we talk about policy, but they are the forces that move change. Promoting R+D in CO₂ capture and storage, in transport electrification (buses, regional trains, municipal fleets) and in microgrids (local networks that can operate in isolated mode after a blackout) is not only a luxury, but an urgent need.

Financing university laboratories, supporting startups with scholarships and connecting these projects with companies from sectors as varied as agriculture or hospitality will allow innovation to flourish not only on academic campuses, but also in the towns and neighborhoods that will be its first beneficiaries.

6.5 Geopolitical dimension: diversifying to gain autonomy

The experience of recent decades, with tensions in the gas markets and unpredictable price rises, reminds us that energy security is also geopolitical (Delgado et al., 2019; 2023). Therefore, diversifying suppliers of hydrogen, lithium, cobalt, and other critical minerals for renewables is essential (Vivoda, 2010).

Spain can lead responsible extraction and refining projects in Europe, while fostering agreements with partners in the Mediterranean and West Africa. In this way, we reduce external dependencies and contribute to the economic development of our neighbours, generating a circle of trust that reinforces regional stability.

7. CONCLUSIONS

Spain is at a decisive moment to redefine its national security, including energy and climate security. The new European Commission offers unprecedented tools and funding; Its implementation requires:

- Integrated strategic vision: uniting defence, energy and climate under one security umbrella.
- Public-private collaboration: partnerships with technology and social companies to accelerate the transition.
- Citizen participation: fostering community resilience and climate awareness.

Only through coherent policies and European cooperation will Spain achieve sustainable security, capable of facing the threats of the 21st century.



REFERENCES

1. Barnett, J., & Adger, W. N. (2007). *Climate change, human security and violent conflict*. *Political Geography*, 26(6), 639–655. <https://doi.org/10.1016/j.polgeo.2007.03.003>
2. Council of the European Union. (2022). *A Strategic Compass for Security and Defence*. <https://www.consilium.europa.eu/media/54773/a-strategic-compass-for-security-and-defence.pdf>
3. Delgado Moran, J. J., Mazurier, P.A., & Payá Santos, C. A. (2019). The race to securitize the arctic in a post-cold War scenario. *Revista de Pensamiento Estratégico y Seguridad CISDE*, 4(1), 59-64. <http://hdl.handle.net/10272/17180>
4. Delgado Morán, J. J., Payá Santos, C. A., & Sanz González, R. (2023). China's Borderless Expansionism. Could Be a Threat to International Security?. In: Cayón Peña, J., Ramírez, J.M. (eds) *Threats to Peace and International Security: Asia versus West. Advanced Sciences and Technologies for Security Applications*. Springer, Cham. https://doi.org/10.1007/978-3-031-28336-9_5D
5. European Commission. (2019). *The European Green Deal*. https://ec.europa.eu/info/sites/default/files/european-green-deal-communication_en.pdf
6. European Commission. (2020). *A hydrogen strategy for a climate-neutral Europe*. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0301>
7. European Commission. (2020). *European Defence Fund (EDF)*. https://defence-industry-space.ec.europa.eu/eu-defence-industry/european-defence-fund-edf_en
8. European Commission. (2020). *Just Transition Mechanism: making sure no one is left behind*. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2020%3A22%3AFIN>
9. European Commission. (2021). *Fit for 55: delivering the EU's 2030 Climate Target on the way to climate neutrality*. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52021DC0550>
10. European Commission. (2021). *Just Transition Mechanism*. https://ec.europa.eu/commission/presscorner/detail/en/ip_21_6697
11. European Commission. (2022). *A Strategic Compass for Security and Defence – For a European Union that protects its citizens, values and interests and contributes to international peace and security*. https://www.eeas.europa.eu/eeas/strategic-compass-security-and-defence_en
12. European Defence Agency. (2022). *PESCO - Permanent Structured Cooperation*. <https://www.eda.europa.eu/what-we-do/our-current-priorities/pesco>
13. Hydrogen Roadmap Europe. (2020). *A European Hydrogen Strategy*. European Clean Hydrogen Alliance.



14. Intergovernmental Panel on Climate Change. (2022). *Climate Change 2022: Impacts, Adaptation and Vulnerability*. Cambridge University Press.
15. International Energy Agency. (2022). *World Energy Outlook 2022*. OECD Publishing. <https://www.iea.org/reports/world-energy-outlook-2022>
16. Keohane, R. O., & Victor, D. G. (2011). The regime complex for climate change. *Perspectives on Politics*, 9(1), 7–23. <https://doi.org/10.1017/S1537592710004068>
17. Liz Rivas, L. (2021). Geopolítica hidro-hegemónica china en la cuenca del río Mekong. *URVIO. Revista Latinoamericana de estudios de seguridad*, (30), 108–120. <https://doi.org/10.17141/urvio.30.2021.4770>
18. Liz Rivas, L., & Delgado Morán, J.J. (2019). Women’s Media Narratives in Migration, in: “Los nuevos escenarios en las relaciones internacionales: retos, amenazas y oportunidades” Thomson Reuters/Aranzadi, pp. 283-297. <https://doi.org/10.5281/zenodo.14559630>
19. López-Moreno, J. I., et al. (2021). Climate change impacts on hydrological extremes in Mediterranean basins. *Water Resources Research*, 57(11), e2020WR027243. <https://doi.org/10.1029/2020WR027243>
20. López-Moreno, J. I., Vicente-Serrano, S. M., Zittis, G., & Bachner, S. (2021). Climate change amplifies the heat wave of June 2021 over western Mediterranean. *Environmental Research Letters*, 16(11), 114077. <https://doi.org/10.1088/1748-9326/ac2db3>
21. Luque Juárez, J. M., Payá Santos, C. A., & Arenas Morales, F. (2023). Contexto de las políticas de seguridad ciudadana. *Cuadernos de RES PUBLICA en derecho y criminología*, (2), 69–82. <https://doi.org/10.46661/respublica.8293>
22. Martino, L. (2024). International Law, State Sovereignty and Competition in the Digital Age. *Rivista di filosofia del diritto internazionale e della politica globale*, Vol. 21, N°. 2, 2024. <https://dialnet.unirioja.es/descarga/articulo/10098952.pdf>
23. Mazurier, P. A., Delgado Morán, J. J., Payá-Santos, C. A. (2020). The meta-tragedy of the Commons. Climate change and the securitization of the Arctic region. En J. Ramírez & J. Biziewski (Eds.), *Security and Defence in Europe. Advanced sciences and technologies for security applications*. (pp. 63-74). Springer. https://doi.org/10.1007/978-3-030-12293-5_5
24. Ministry for the Ecological Transition and the Demographic Challenge. (2020). *Energy balance of Spain 2020*. <https://www.miteco.gob.es>
25. Payá Santos C., Delgado Morán J. J., & Mazurier P. A. (2018). Individual terrorism as a response to the distorted phenomenon of cultural identity. En J. Ramírez & G. Abad-Quintanal (Eds.), *Cross-cultural dialogue as a conflict management strategy. Advanced sciences and technologies for security applications*. (pp. 34-45). Springer. https://doi.org/10.1007/978-3-319-77231-8_4



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26. Payá Santos, C, A; Delgado Morán, J, J; Martino, L; García Segura, L, A.; Diz Casal, J, & Fernández Rodríguez, J, C. (2023). Fuzzy Logic analysis for managing Uncertain Situations. *Review of Contemporary Philosophy*. Vol 22 (1), 2023 pp. 6780 -6797. <https://doi.org/10.52783/rcp.1132>
27. Rodríguez González, V., Payá, Santos, C, A., & Peña Herrera, B. (2023). Estudio criminológico del ciberdelincuente y sus víctimas. *Cuadernos de RES PUBLICA en Derecho y criminología*, (1) 95-107. <https://doi.org/10.46661/respublica.8072>.
28. Rodríguez González, V. (2023). Implicaciones psicosociales del riesgo de victimización de las mujeres migrantes marroquíes en España. *Cuadernos de RES PUBLICA en derecho y criminología*, (V 2). 57-68. <https://doi.org/10.46661/respublica.8294>.
29. Vivoda, V. (2010). Evaluating energy security in the Asia-Pacific region: A novel methodological approach. *Energy Policy*, 38(9), 5258–5263. <https://doi.org/10.1016/j.enpol.2010.05.028>