Natural capital and the Spanish energy sector

The experience of the Work Group on Natural Capital and Energy

Authors:

M.ª Paz Ferrer y David Álvarez, Ecoacsa Reserva de Biodiversidad y Natural Capital Factory.

María José Rubial y Luis López-Cózar, Azentúa (Valor Ambiental y Sostenible, S. L.).

Translation:

Esther León Otegui.

Text revision:

M.ª Paz Ferrer Calvo.

Suggested citation:

Natural capital and the Spanish energy sector. The experience of the Work Group on Natural Capital and Energy (Azentúa, Ecoacsa, Natural Capital Factory, 2022).

November 2022

Index

Executive summary

The constantly changing global scenery we currently live in, with interrelated crisis such as the loss of biodiversity, climate change, the yet ongoing COVID-19 pandemic, pollution, or waste management, has been further destabilized by Russia´s invasion of Ukraine, affecting the geopolitical agenda and the whole world. The current energetic crisis is thus threefold, with an accessibility, security, and sustainability crisis.

The months following Russia´s invasion of Ukrainian territory have permanently altered our vision of energy security. Governments, producers, distributors, and consumers all over the planet must struggle to adapt, whilst they also face an ever-growing pressure to drastically reduce the environmental impact of the energy we use, and a global supply chain crisis.

Guaranteeing energy accessibility, security and sustainability is more complex and decisive than ever. This challenge has its own repercussions, such as supply security and price volatility -regarding both energy and raw materials- which increase the threat of a long-lasting inflation. All of this translates, in turn, into a heightened financial instability, uncertainty regarding global economic recovery and social unease.

The energy sector -as the driving force of our economies and societies- has a crucial part to play supporting countries' efforts to guarantee energy security and independence. This is a turning point in the way we understand energy and the necessary global systems used to obtain, produce, and deliver it, without compromising global objectives regarding decarbonization and the protection of nature.

In this context, the importance of the above-mentioned efforts being compatible with a change of paradigm is reinforced. Companies must change the way they produce, consume, and connect with nature, just as the scientific community has been demanding for decades. This transformation is urgent if we really wish to slow down nature´s destruction and deterioration, mitigate climate change and pollution, and foster a sustainable and fair development.

Transitioning towards this new sustainability model is more urgent than ever and has, during the last years, fostered important multilateral agreements, regulations, plans and legal frameworks. On top of this, there has been a growing

demand for increased business transparency in the disclosure and reporting of all aspects regarding sustainability. Some examples of this are the 2030 Agenda for Sustainable Development[1], the Paris Agreement on Climate Change[2], and the draft, still under discussion, of the post-2020 Global Biodiversity Framework, which will foreseeably be adopted next December in Montreal during the 15th meeting of the Conference of the Parties to the United Nations Convention on Biological Diversity (COP 15 CBD)[3].

The first draft of this universal framework regarding biological biodiversity includes, for the first time ever, a target specifically focused on the business sector and the necessity of reducing negative impacts and increasing positive impacts, as well as reporting on biodiversity. It also incorporates far-reaching targets, goals, and actions to transform society's relationship with biological diversity and guarantee that by 2050 the common vision of "living in harmony with nature" becomes a reality.

At the same time, laws and plans have been passed, such as the European Commission's European Green Deal[4], which establishes an ambitious road to redirect the capital flows towards a sustainable economy. This legislative framework includes the Sustainable Finance Action Plan, within which biodiversity becomes the pivotal axis of the sustainable activities' taxonomy[5]; the ambitious Biodiversity Strategy for 2030[6] and its commitment to the protection and restoration of biodiversity by 2030; and a far-reaching legislation regarding the disclosure of sustainability-related issues, which has been embodied in the Corporate Sustainability Reporting Directive[7] proposal.

Another recent initiative of utmost importance for the market's agents is the Task Force on Nature-related Financial Disclosure (TNFD), which helps companies and financial entities integrate nature in their decision-making processes. Modeled after its analogous climate task force (TCFD), this global initiative is working on the development of a framework to manage and disclose nature-related risks and opportunities, to foster transparency within the business and financial sector concerning their impacts and dependencies on nature[8].

All these agreements, laws, plans, strategies, and initiatives focus on the key role companies and the financial sector play in achieving the common objective of transitioning towards sustainable decarbonized economies and an improved reconstruction, greener and more resilient[9].

The energy sector cannot only finance, but also execute highly complex and technologically challenging projects. For this reason, it's called to be at the heart of the process when facing these challenges, which are taken into serious consideration by the political and investment communities and public alike, as the financial impact of their consequences and associated opportunities cannot be underestimated.

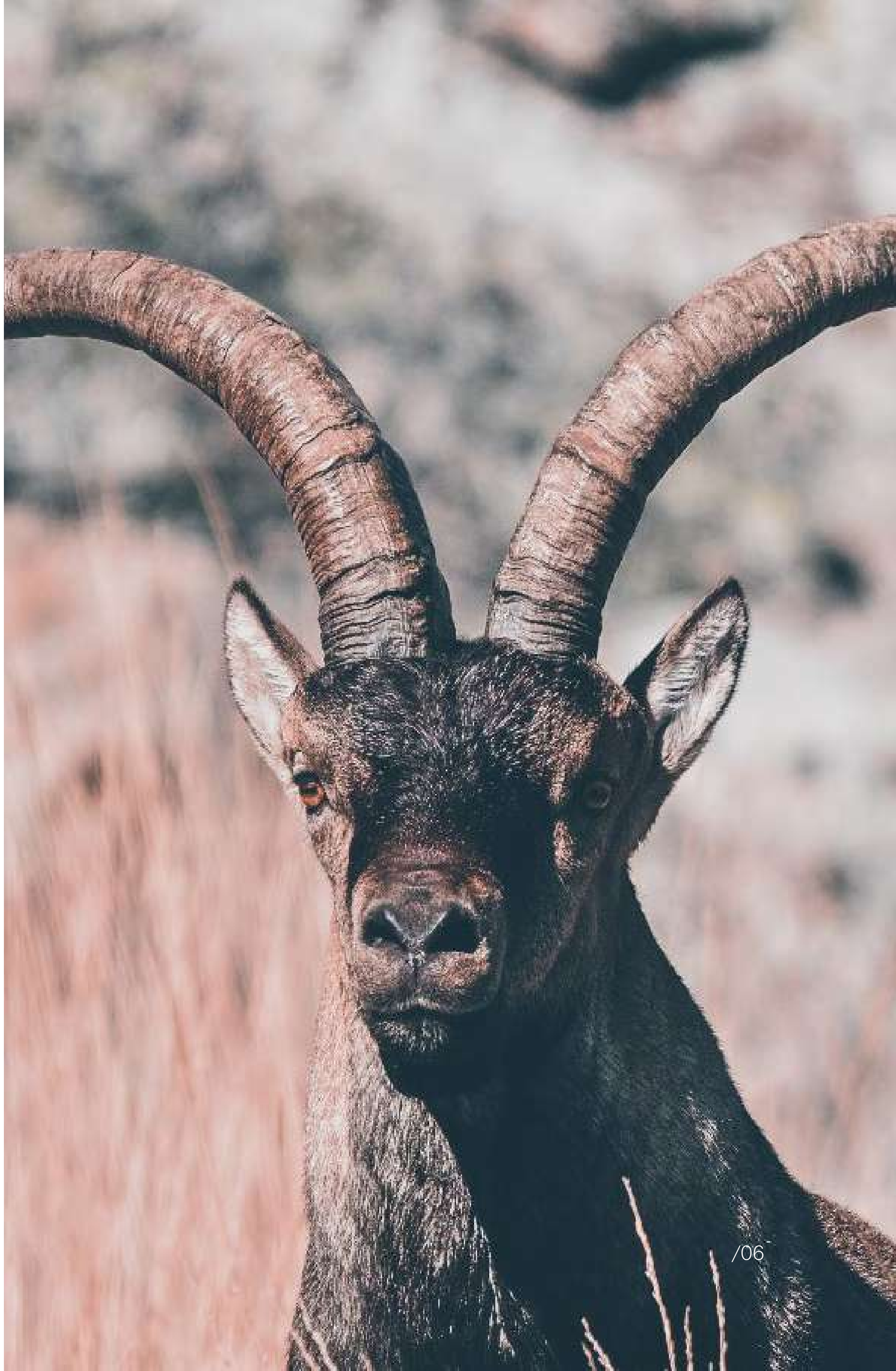
> **“No longer will we allow mindless environmental destruction to be considered as economic progress”**
>
> – Antonio Guterres, UN Secretary-General, on the adoption of UN's SEEA Ecosystem Accounting as an international accounting standard

[1] UN (2015). Transforming our world. The 2030 Agenda for Sustainable Development.
[2] UN (2015). The Paris Agreement on Climate Change.
[3] "The Post-2020 Global Biological Diversity Framework". Distr. Limited. CBD/WG2020/4/L.2-ANNEX (26 June 2022). Available: https://www.cbd.int/doc/c/079d/0d26/91af171843b6d4e-9bee25086/wg2020-04-l-02-annex-en.pdf
[4] European Commission (2019). EU Green Deal.
[5] European Commission (2020). *Taxonomy: Final report of the Technical Expert Group on Sustainable Finance.*
[6] European Commission (2020). *EU Biodiversity Strategy for 2030. Bringing nature back into our lifes.*
[7] European Commission (2021). *Proposal for a Corporate Sustainability Reporting Directive.*
[8] Explore: tnfd.global
[9] European Commission (2018). Action Plan: Financing Sustainable Growth. COM (2018) 97 final/2 (8 March 2018).

A significant loss of biological diversity could result in an estimated cost of USD 125-140 billion (more than 1.5 times global GDP)[10], while fighting the ecological and climate crisis could generate an additional GDP of USD 10 billion and create 395 million jobs in the world by 2030[11], of which USD 3.5 billion and 87 million jobs alone would be generated in the energy and extractive sector.

Aware of the magnitude of these challenges and the complexity of facing them alone, eight Spanish energy companies have been working together since 2018 to better understand their relationship with nature and improve their knowledge regarding natural capital and environmental valuation. This will, in turn, provide them with valuable information which will help protect the natural assets and resources their businesses rely on.

[10] AXA (2019). Biodiversity at risk: *Preserving the natural world for our future.*
[11] WEF (2020). *The Future of Nature and Business.*



The power of collaboration

The complex environment we live in forces companies to consider environmental, social, geopolitical, governance, technological, etc. risks. On top of this, the desired transformation demands they offer solutions, rethink their operating models, and constantly adapt to guarantee long-term success, strategic resilience, and value preservation.

In this scenario, the energy sector has a crucial role to play in the transition towards a net-zero emissions global economy with a positive impact on nature.

Desirous of helping achieve these goals, eight leading companies within the Spanish energy sector - Cepsa, EDP España, Enagás, Endesa, Iberdrola, Naturgy, Redeia (formerly, Red Eléctrica Group), and Repsol - have worked hand in hand to implement a harmonized framework to mainstream the natural capital approach within Spain's energy sector.

The present document showcases the main conclusions of the road travelled so far by the Work Group on Natural Capital and Energy (WGNCE), driven within the framework of the Natural Capital Factory Sector's Groups[12] – Spain's Capitals Coalition hub[13].- Coordinated by Azentúa and Ecoacsa, the work group members have shared their experiences, points of view, challenges, obstacles, and solutions in the most generous, empathic, and constructive manner.

The commitment, professionalism, and shared leadership of the members during this learning process have achieved several important milestones:

— A sectoral document on the connection between natural capital and energy, which can be used as a guide, a practical tool and an inspiration to similar collaborative experiences, companies within the sector and organizations of other sectors.

— An assessment methodology of natural capital's degree of relevance regarding the activities and sub-activities developed by the companies of the Spanish Work Group on Natural Capital and Energy.

— The development of a sectoral qualitative matrix, and segmented by technologies, which measures the impacts and dependencies of the Spanish energy sector on natural capital.

These achievements, coupled with other knowledge gleaned from the experience, aspire to be used as a model, an orientation tool and inspiration to those who are starting to work on the natural capital approach or wish to learn more and make better decisions regarding nature.

If, on top of this, the reader is inspired to start collaborating with professionals -even competitors- in the same field to incorporate natural capital in their decision-making processes, the goal which originated this initiative will have been achieved by far.

Within this work group, we have learned how to think and see the interactions between our activities and nature under a new light. We now approach our businesses from an ecosystem service perspective, identifying the -sometimes not so obvious- impacts and dependencies which our activities have on them. We're prone to identify negative impacts, but we have also learned to identify the positive impacts on ecosystem services through the implementation of good practices, and their contribution to both our business and global sustainability.

[12] Explore: https://naturalcapitalfactory.com
[13] Explore: https://capitalscoalition.org

Natural capital as agent of change

An efficient manner of progressing in the commitment of achieving a more sustainable society and economic development is to include nature in the economic system. To do so, a vital step is to integrate all natural capital factors in economic and financial accounting, at both a national and business scale, so governments and the private sector may have the whole picture of their environmental performance.

The natural capital concept has gained momentum in the last years and supports this objective, as it offers a balanced perspective of natural assets (for example water, soil, fauna and flora species or the sceneries) in ecological terms (quantity, condition, and sustainability) and the social and economic benefits originated from pollination, carbon sequestration, climate regulation and water quality[14].

This unique approach is especially important for the business sector, as it provides a new way of understanding the relationship between business and nature and is heedful of the value natural ecosystems and their services contribute to businesses and society. This represents a change of paradigm, a holistic and integrating vision which acknowledges nature as a form of capital, such as human, social, manufactured, or financial capital.

This vision makes it possible for companies to assess systematically, qualitatively, quantitatively and financially, measure and record nature when planning and investing. Having science-based information regarding the impacts of economic activities on natural capital allows market actors to be aware of the costs and benefits these interactions have on their business and on society over time. Such interactions could lead to risks affecting the economic activity's continuity (for example, financial risks born from chain supply problems arising from natural disasters or regulatory issues for not complying with legislation in force) yet can also translate into opportunities by promoting an increased transparency and resilience.

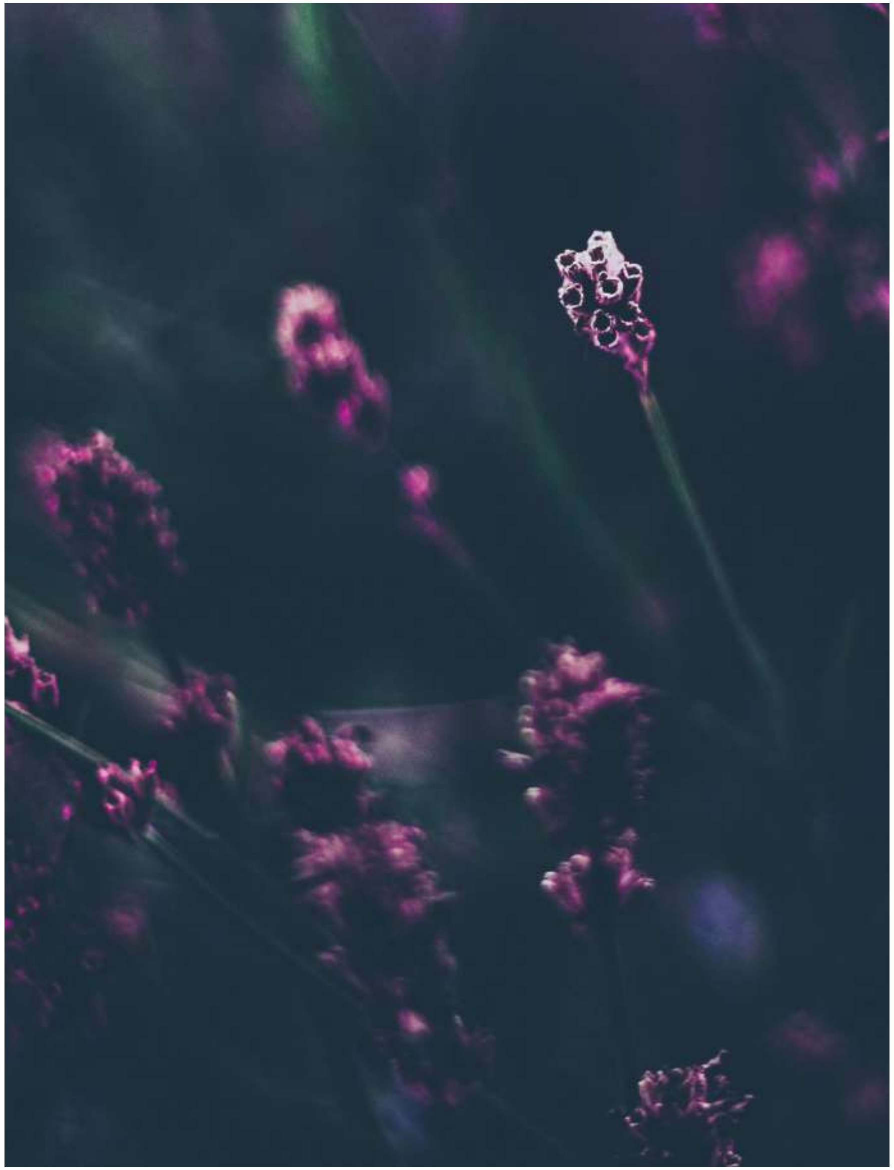
The companies involved in the Work Group on Natural Capital and Energy acknowledge that global economic and social prosperity rely on a healthy natural world, which is why they have embraced the natural capital approach as a crucial tool in their collaborative work. To do so they worked with the *Natural Capital Protocol*[15], due to its widespread acceptance as a global harmonized framework within the business sector, and its applicability to any sector and companies of all sizes worldwide, as well as at multiple organizational levels and different scopes.

> **“Valuing nature and accounting for it helps companies thrive. More and more recognize the importance of natural capital, and we need more frontrunners to boost the correct ambition in the face of the new Post-2020 Biodiversity Global Framework. We cannot protect our nature and biodiversity without them ”**
>
> – Virginijus Sinkevičius, European Commissioner for the Environment

[14] Defra, UK Government (2020). *Enabling Natural Capital Approach: Guidance.*
[15] Natural Capital Coalition [currently Capitals Coalition] (2016). *Natural Capital Protocol.*

Implementing the natural capital approach has allowed the members of the WG to better understand not only how their activities affect nature, but also how nature contributes the natural assets and ecosystem services (ES) their companies need.

This vision has been a turning point in the way companies understand their relationship with the environment, as it acknowledges nature as an asset which generates services flows, which in turn generates benefits. This new outlook has provided an ideal framework within which they can responsibly manage nature while they achieve both their, and society's, goals.



Impacts and dependencies upon natural capital of the Spanish energy sector

Measuring what matters is key to progressing towards the desired social, environmental, and economic resilience

We are living in a complex and deeply interrelated global system and companies are increasingly aware of the risks of incorrectly managing nature, other than the impacts they generate. Their dependency on natural assets, or social and market disruption occasioned by the loss of nature, may lead to physical or market risks to their businesses[16].

Currently, companies must not only provide a description of the risks (impacts, dependencies) associated with their activities and the repercussions on their income statement; society demands to also know how they affect the environment. This approach is known as "double significance" or "double materiality"7. If companies are to manage these risks and their consequences, they must be able to quantify them (financially, as much as possible), as well as identify other related risks by providing comprehensive analysis´s which also include social aspects.

Companies must have the necessary tools and methods to assess, measure and value their environmental performance in terms of impacts and dependencies. These tools and methods must provide them with the required information in an accurate and reliable manner. As such, the natural capital approach is a highly useful tool.

The information extracted from the natural capital assessments enables the companies to know the shape and condition of the natural assets and ecosystem services they interact with over time. A materiality analysis of natural capital allows companies to identify, choose, prioritize, and revise those natural assets and, by extension ecosystem services, which are relevant to their businesses and interest groups.

Identifying which assets and ecosystem services are most important to a company helps improve internal and external reports regarding sustainability issues, which also improves their quality and valuation in the face of their interest groups. On top of this, identifying relevant assets helps develop standards on which monitorization or follow-up processes can be established, and thus reorientate corporate strategies and reports.

The companies which understand their dependencies and impacts on nature and take steps to preserve and improve the natural capital's resilience in the long term will guarantee their continuity and future success.

When based on science and addressed from a shared, collaborative, and sectorial point of view, these challenges can be faced with confidence and credibility, and companies can change the way they integrate the objectives associated with energy transition and the plans to achieve them.

If the business sector leads the way towards a positive change regarding nature, especially those actors in strategic industries, such as the energy and financial sector, it can play a decisive role towards achieving the desired social, environmental, and financial resilience.

[16] WEC (2020). *Nature Risk Rising: Why the Crisis Engulfing Nature Matters for Business and the Economy.*

Addressing the natural capital approach in good company

Following three meetings between the participating companies to initiate contact and define the agreement´s scope, terms and conditions, the work methodology has been structured in four phases. During each of these phases other work group meetings were held and during a brief period each company and member of the Coordination Team developed their individual work.

The phases the companies worked through during their learning journey were the following:

Phase 1 | Baseline	The first four steps established in the *Natural Capital Protocol* were accomplished during this first work phase. In addition to introducing the general framework and establishing the communication and information sharing processes, the work was put into context (Why) and the objective was defined and its scope established (What).
Phase 2 | Revision of the reference and terms and methodologies harmonization framework	This process resulted in the natural capital´s qualitative valuation methodology; this is to say, the value which living (biotic ecosystem services) and non-living (abiotic ecosystem services) (through ecosystem services) provide to the activities and sub-activities developed by the WG´s companies.

Phase 3 | The qualitative assessment phase	It had an eminently practical character, in which the qualitative valuation of the materiality of CICES* ecosystem services by sub-activity was carried out. In total 85 ecosystem services were valued, 56 supported by living systems (biotic) and 29 dependent on physical-geophysical processes/systems (abiotic).
Phase 4 | Presentation of results	This phase focused on the discussion, agreement and presentation of the results obtained during the previous work phases. Results obtained per activity were presented and the sector´s global results were discussed and agreed upon.

> “The opportunity of developing a guide adapted to the sector´s needs from within the Spanish energy sector represents an international leadership and positioning opportunity, as well as the opportunity of establishing a harmonized framework regarding the identification of impacts, dependencies, quantification methodologies and valuation
>
> – Mark Gough, Capitals Coalition CEO

* The ecosystem services of CICES (V5.1).

Results

The main tangible and verifiable result has been the development of a qualitative matrix applicable to the sector and segmented by technologies, of the impacts and dependencies of the Spanish energy sector on natural capital: "Natural capital matrix for the energy sector in Spain".

This matrix was developed through a measuring process using two different scales: technology and sector. The process began with 12 matrices segmented by "technology/activity type" (first level), which generated six main matrices by "sector type" (second level) upon which the final o sector matrix (third level) was constructed. A tool was developed to compile the individual results of the 12 matrices assessed in the first level in a final o sectorial matrix. This tool can generate aggregated/disaggregated graphs which combine the assessments obtained in each of these analysis levels and represent them graphically. All results, in terms of both impact (positive and negative) and dependencies, were analyzed with a homogenous criterion regarding all activities and sub-activities.

Each of the matrices obtained generates qualitative results born from a process which identifies, measures, and assesses both the impacts (negative and positive) and dependencies of companies' operations on their natural assets and derived ecosystem services. The ecosystem services which were identified as material were assessed taking into consideration three levels of materiality: high, medium, and low. This was done from an operational point of view, without considering accidental scenarios or actions derived from activities in the construction phase or dismantling of projects.

It´s important to point out that, regarding the impacts, alongside the negative impacts inherent to each of the activities developed and analyzed within the sector´s framework, a significant number of positive impacts were also identified. Here is a summary of the positive and negative impacts on biotic and abiotic ES:

Negative impacts on biotic ES

The results obtained through the qualitative assessment of negative impacts on biotic ecosystem services reveal the WG´s companies´ concern regarding the three main: provisioning, regulation and maintenance, and cultural and recreational.

All three main ecosystem services are assessed with similar degrees of relevance. However, the interactions with the cultural and recreational biotic ES are highlighted, specifically those which allow outdoors activities related to wellbeing (≈good health, recovery from some illness) or its enjoyment through passive interactions or mere observation. For example, plant observation and birdwatching in their habitats, and the sensory perception of other natural features such as its sounds, colours, smells, aesthetics, or others, as the presence of certain infrastructures in the landscape can limit these experiences, diminishing the users´ interest in ecosystem services.

While assessing these ecosystem services, one conclusion stands out; the relevance given to the negative impact on these ES caused by infrastructures associated with conventional electric energy production -but also transportation and distribution- technologies. The same is observed when assessing processing and producing installations which use raw materials. However, except for wind energy, this negative perception does not include most of the generation technologies which use renewable sources, even if the transition towards a low carbon emission future is starting to have its impact on sceneries worldwide as they occupy the land.

This is undoubtedly an interesting issue which we must keep working on, if we do not want to destabilize/unbalance the benefits associated with different ecosystem services (Rodríguez, J.P., *et al.*, 2006)[17]. However, not only are the potential active and passive effects on the use of nature relevant, but also its non-use and legacy value, as well as the value its knowledge and research -even its holy value- provides.

On the other hand, the results also highlight the sector´s concerns regarding the possible negative effects on sensitive species and their maintenance, which are beneficial to society. This apprehension is revealed at two different levels, which link multiple pressures: (1) species' genetic heritage (provisioning ES), and (2) preserving the circle of life, habitat protection and all its environmental issues (regulation ES).

These pressures are visible on the effects they produce on soil, water, and air quality, and though they are kept within the allowed limits, regulated by different legal requirements (keeping in mind that the study´s scope focuses on normal operations), they still entail a decrease in living systems' capacity to, for example:

— Manage toxic residue or substances of an anthropogenic origin (example: bioremediation), soil formation and development, water quality control (example: filtration).

— Climate regulation (example: carbon sequestration).

[17] Rodríguez, Jon Paul, *et al.* "Trade-Offs across Space, Time, and Ecosystem Services." Ecology and Society, vol. 11, no. 1, 2006.

Negative impacts on abiotic ES

As to the perception of the relevance of activities on abiotic ecosystem services, and taking into consideration the working group's approach, the representation of the three main ES -provisioning, regulation and maintenance, and cultural and recreational- also stands out. However, the greatest concern is regarding the provisioning ecosystem services, especially those related to water as a resource for different purposes and those related to raw materials.

As in the case of biotic ecosystem services, the influence of certain activities on the abiotic ES linked to cultural and recreational uses -active or passive- is revealed, such as the encroachment on the territory and the visual impact of infrastructures.

The importance of nature's physical and chemical processes, necessary to maintain vital processes related to the dilution or reduction of the concentration of substances in sweet or marine water and in the atmosphere, are also highlighted.

Positive impacts on biotic ES

This paper would not be complete without also analyzing the positive impacts. On this matter, the largest positive contribution of the sector can be observed in the regulation and maintenance ecosystem services. Issues such as the protection against fire also stand out, as some technologies support or increase the ecosystem service´s capacity to reduce the number, intensity, or speed of fire propagation. Even if the infrastructures are not natural (biotic environment), its implementation in a certain location aids (or increases) the service´s functions, thanks to the barrier effect they generate, as well as to the paths/routes they open in places difficult to access. All this translates into the avoidance of damage (natural and socioeconomic).

For example, the preservation of infrastructures, supply security and the security of the environment´s elements associated with land-based wind energy and aerial transmission and distribution (TD) power lines requires maintenance work, and although they impact negatively on the land and the landscape, they also help open paths firefighters can use.

In line with this idea, the dammed water hydroelectric and nuclear power plants use constitutes a barrier against fire propagation, which in turn reduces the number, intensity, or speed of its propagation due to the ecosystem´s features and mitigates or even prevents potential harm to people[18].

Something else which the sector considers relevant is its capacity to benefit those ecosystem services within which the interactions are direct, in situ and take place in the outdoors. The same goes for the features of the live systems which allows for: (1) scientific research or traditional ecological knowledge, (2) education and training and (3) the protection and improvement of the affected habitats through the implementation of "biodiversity corridors" and reservoirs associated with lineal infrastructures in the territory (security paths and supporting elements).

Another example of this positive influence would be the knowledge generated through the development of environmental baselines, environmental impact studies, biodiversity studies and other specific studies.

On the other hand, although the access routes opened to operate and maintain some installations impact negatively as they occupy the territory and the landscape, and other issues previously remarked upon, thanks to them remote areas can be reached, and research and live system monitoring can be undertaken.

Another issue which is worth mentioning is the positive impact which the change in soil use can sometimes generate. Such is the case of the implementation of photovoltaic energy generation plants. Some studies have already proven that this technology (solar photovoltaic) can sometimes result in other positive impacts due to the disappearance of pressures on specific fauna species and the increase of shelter areas.

[18] Water supply for fire suppression is addressed in the assessment of abiotic ES.

Positive impacts on abiotic ES

The regulation and maintenance ecosystem services, related to the maintenance of the physical, chemical, and abiotic conditions which affect people´s wellbeing or their comfort level, stand out for increasingly using renewable energy technologies. The generation of low greenhouse gas (GHG) emissions and its growing contribution to the mix represents emissions which have been avoided and which, at a local level, contribute to an improved atmosphere for the people who live in the environment.

The production of energy from renewable sources is classified as one of the economic activities with a high potential of contributing to the strategies which mitigate and adapt to climate change. In this same line we can also include the effects of hydraulic centrals´ masses of water, which provide physical conditions which in turn foster the wellbeing of the people who live in the environment or who visit those landscapes for recreational/spiritual/educational purposes, especially during summer (for example: for its thermoregulatory features and for providing abundant water vapour, which lowers the temperature).

This work has identified other positive impacts. Regarding the regulation and maintenance ecosystem services, dams can contribute to the regulation (lamination) of water flow during extreme circumstances, protecting people and decreasing the cost of the renovation works caused by these circumstances. As to the provisioning ecosystem services, the dammed water of hydroelectric power plants or nuclear power plants´ regulation dams constitute an available source in the event of fire extinction.

As to the positive impact of cultural and recreational ecosystem services, it's interesting to observe how, considering the nature (abiotic)-engineering link, the presence of a hydroelectric power plant, though of an anthropic origin, can create large masses of water. These become important centers of attraction at different levels: local, regional, national, and have different goals: tourism/recreational, sports, educational, spiritual and others, which in turn leads to important economic benefits for the nearby population.

Companies which open pathways in hard-to-access areas and undertake species´ monitoring activities enable the development of research projects of the abiotic environment. The same benefits are associated with electric transportation and distribution lines, gas transportation lines, and the pathways created to reach wind generators, among others.

As to the dependencies, the importance of natural (biotic and abiotic) resources is revealed in the viability and sustainability of business activities, as is the close relationship between this sector´s activities and those developed by others, especially in the mining/extractive industry.

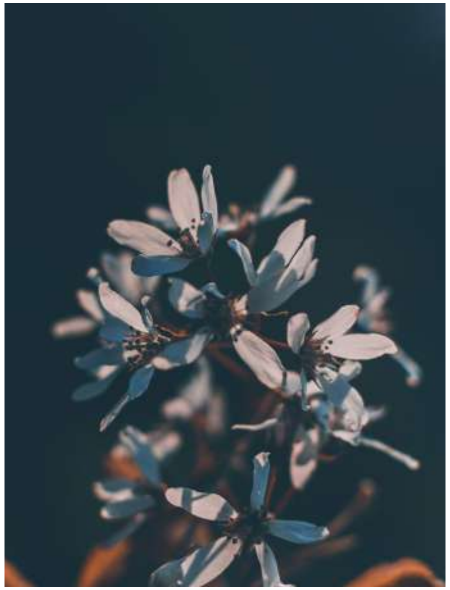
Dependencies on biotic ES

The aquatic ecosystems (rivers, lakes, underground waters, coastal waters, seas, and oceans) support vital provisioning and recreational ecosystem services. Most ecosystem services related to water can be directly appreciated by people and quantified, although some, especially the regulation and maintenance services, are less evident.

The study developed by the WG shows how live systems' capacity for regulation and maintenance is one of the sector's major dependencies.

By qualitatively assessing each of these services at an individual level, it's striking to discover how the main concerns are related to the deeply interlinked regulation and maintenance ES, such as those related to the hydrological cycle: the chemical conditions of sweet water, the oceans and atmosphere, followed by erosion regulation, flow regulation and protection against fire (for example).

All these are key to guaranteeing the safety of the infrastructures and the services supply, as well as the supply of other material and human goods which could be affected by the deterioration of these services. Companies invest in maintenance activities every year to guarantee this security (management context) and thus, preserve these services (conservation context) which responds to different combined values: economic, environmental, and social.



Dependencies on abiotic ES

Relevant aspects regarding the dependencies of ecosystem services provided by nature elements which are supported by physical and geophysical processes have also been identified. In this context, we discover dependencies between sectors throughout the value chain of all analyzed activities. The provisioning ecosystem services of raw materials, and the finished goods they are manufactured from, are the most relevant to the energy sector.

The dependency on, for example, strategic minerals, conventional fuels, and other petroleum derived products is essential to the manufacturing equipment (equipment components) used in the different generation processes, as well as those necessary to transport/ distribute the exploited/generated resources. Without a doubt, this emphasizes the need to continue working on: (1) an improved comprehension of companies' performance within the supply chain and (2) the management and treatment of the residue generated during the operations, as well as at the end of the equipment's useful life, by implementing circular approaches which use the largest quantity of materials during the longest possible time within the production cycles.

Water -superficial and subsurface- also plays a vital role as a strategic resource in the face of climate change (uses/competencies).

Finally, the dependency of processes which contribute to the good quality of the resources present in the different areas of activity is algo recognized as relevant, as they help support these activities and mitigate some of their inherent effects. In this way, two issues stand out: soil's physical-chemical regulation capacity and water's (continental and marine) and atmosphere's dilution capacity.

Conclusions

The road traveled so far has allowed the work group to obtain generic and qualitative results which pave the way for the development of natural capital case studies and organizational assessments.

The results obtained can be considered an initial, qualitative, and agreed-upon approach to natural capital. The metrics and graphics obtained reflect a starting point regarding the sector´s current and potential contribution towards the protection, preservation, and improvement of the natural environment it interacts with, both direct and indirectly (impacts) and on which it depends for the continuity of its activities.

Alongside this, and no less relevant, the following has been achieved:

A whole training, awareness and sensibilization process has been carried out, regarding the concepts associated with the implementation of a natural capital strategy and the assessment of the derived ecosystem services within the sectors activities framework, and their adaptation to the diverse companies and business areas of the participants. This process has led to a change of mindset when facing sustainability and the environment from a "corporate" point of view, by incorporating a systemic and global approach.

By implementing a practical approach when approaching natural resources, and after a learning process (baseline/revision of the reference and terms and methodologies harmonization framework/qualitative assessment/obtaining of results), the participants have agreed upon a common terminology, framework and methodology which can in a practical and efficient manner identify and assess the ecosystem services applicable to the energy sector. The goal was to establish common lines of work between the companies to help incorporate nature in their decision-making processes.

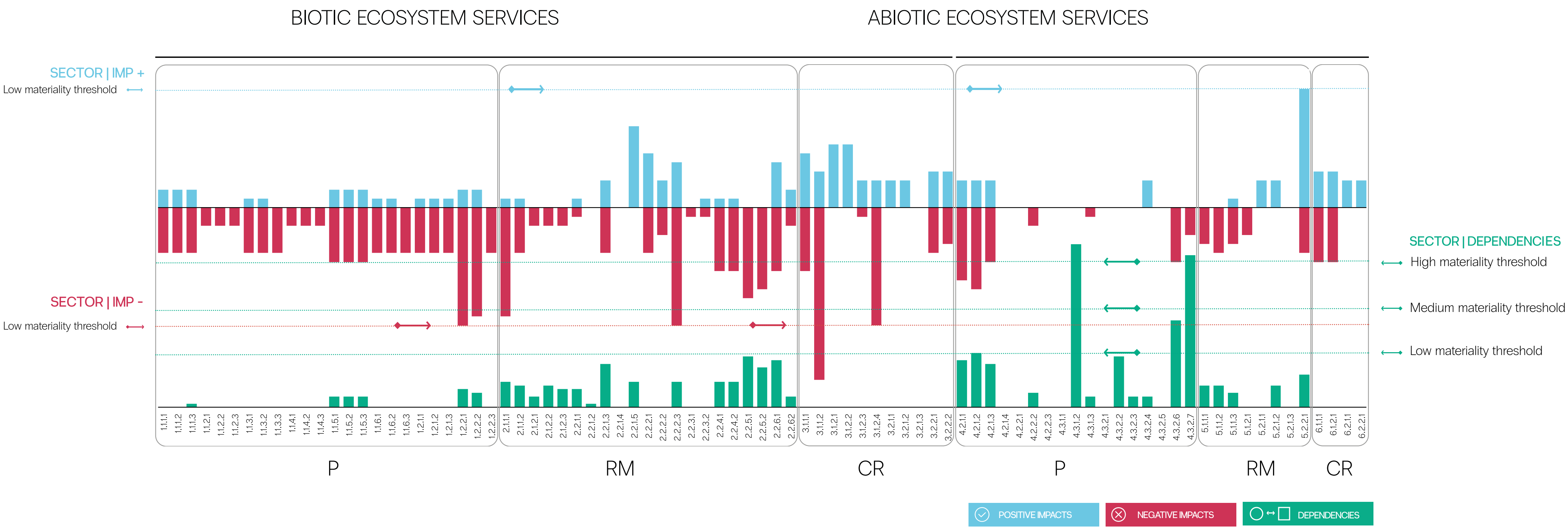
Based on science, a path of communication, learning and agreement has been originated, regarding those natural assets, ecosystem services, impacts and dependencies on the natural capital most relevant to energy companies.

A sectoral document has been written on the natural capital-energy relationship, which will be a guide, a practical tool and an inspiration to other similar collaborative experiences, other companies within the same sector, and to organizations of other sectors.

Thanks to the work developed and the results obtained, common lines of work have been established between the companies, which will help them incorporate nature in their decision-making processes. The learning process puts the Work Group on Natural Capital and Energy companies in a privileged position to continue progressing in their respective experiences in the natural capital approach and opens a new window of potentially important opportunities and initiatives to explore and guarantee the company's future sustainability.

ANNEXES

Natural capital and the energy sector in Spain. Key aspects on the materiality of ecosystem services



This graph shows results that should be understood as a first approximation, qualitative and agreed-upon approach to natural capital. This graph reflects a starting point regarding the sector's current and potential contribution towards the protection, preservation, and improvement of the natural environment it interacts with, both direct and indirectly (impacts) and on which it depends for the continuity of its activities. According to the analysis carried out, the following conclusions can be drawn:

– Despite the negative impacts inherent to the development of each of the activities assessed by the working group, a significant number of positive impacts are also identified, both on living systems (biotic) and on those that depend on processes (abiotic). In particular, in relation to regulation and maintenance services and cultural and recreational services, a significant number of positive impacts are also identified.

– Continuing with the impacts, the result indicates that efforts are still needed to improve performance (as long as it is reasonably feasible). Especially in the impact generated on the regulation and maintenance services, on which the effects inherent to the different activities assessed, and which are subject to regulatory compliance inherent to the different activities evaluated, and which are subject to regulatory compliance in the field of waste management and emissions control (to soil, water, and atmosphere). In this sense, it is interesting to see how these aspects relate to each other in this type of approach, which is closer to reality than when these impacts are treated as watertight compartments.

– This study can be used to outline general and common lines for the sector, although the assessment must be carried out on a case-by-case basis, since it is not possible to deal with issues related, especially with the positive and negative impacts of any of the activities, without a spatial and specific context, which is none other than the place where the facilities are located.

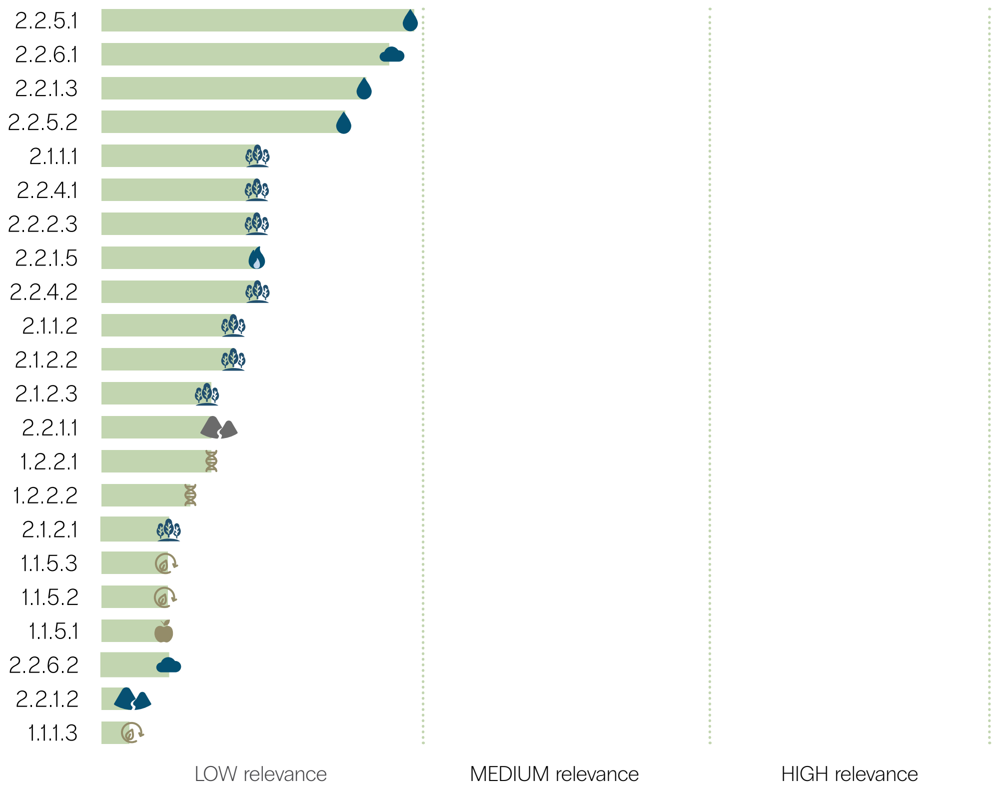
– In terms of dependencies, the close relationship that exists between the activities of this sector and those developed by others, especially with the mining/extractive industry, is evident.

▲

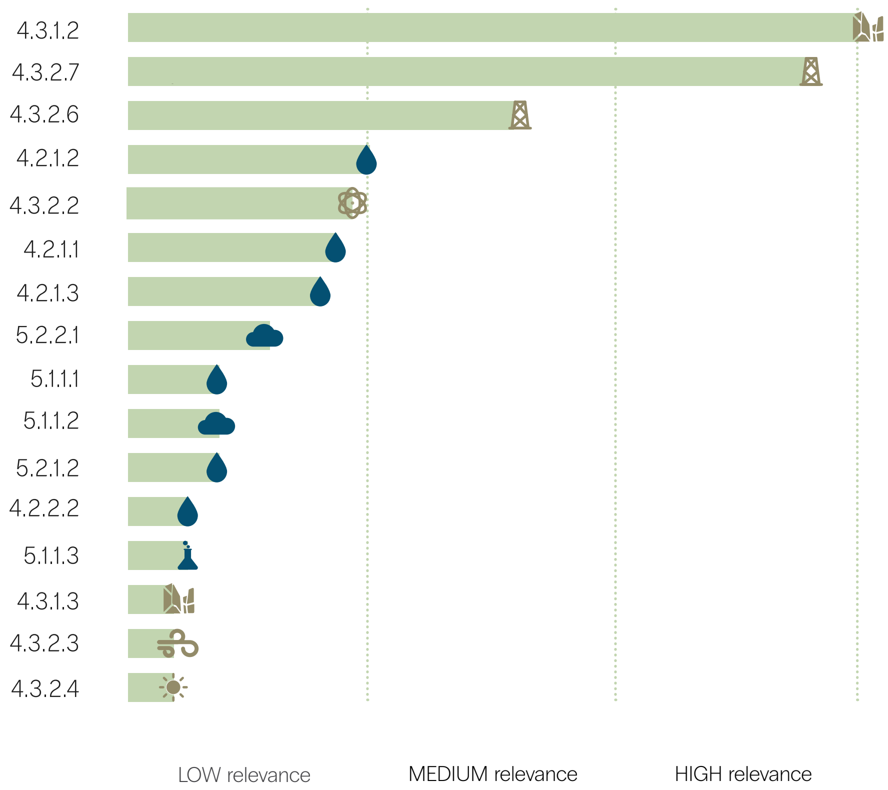
Graphs prepared by Azentúa (2019) based on data obtained during the meetings of the Work Group on Natural Capital and Energy promoted along with Ecoacsa and those provided individually by member companies.

* Numbers of the graphs detailed in the annexes on pages 31-39*. Acronyms meaning detailed in the annexes on page 26.

Global dependencies of the energy sector on biotic ES



Global dependencies of the energy sector on abiotic ES

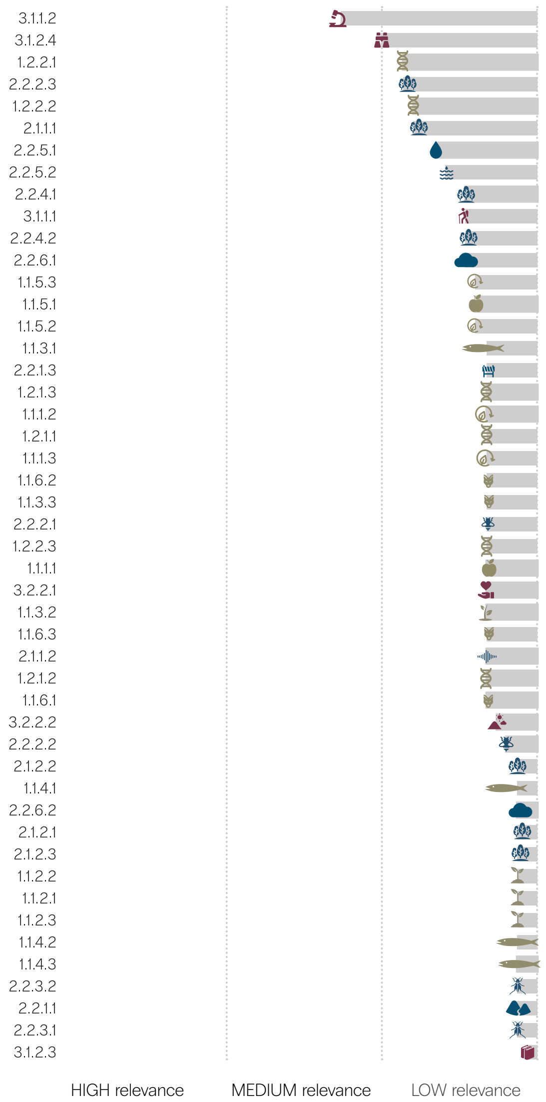


▲

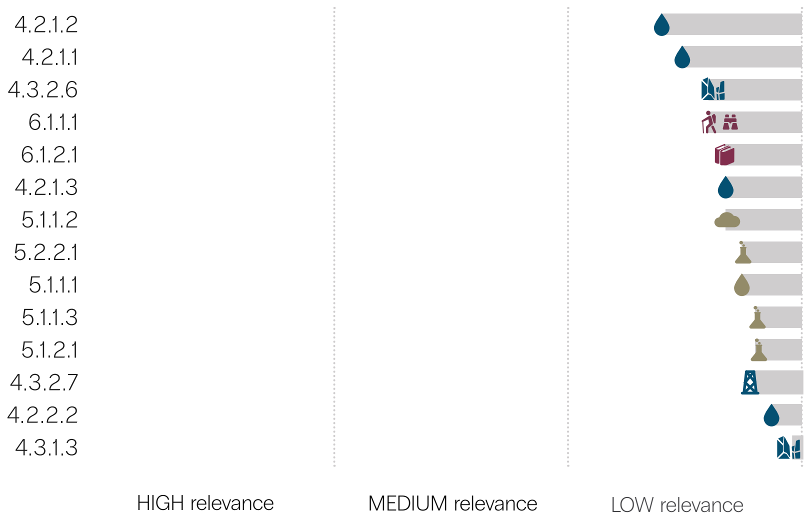
*Graphs prepared by Azentúa (2019) based on data obtained during the meetings of the Work Group on Natural Capital and Energy promoted along with Ecoacsa and those provided individually by member companies.

* Numbers of the graphs detailed in the annexes on pages 31-39*. Acronyms meaning detailed in the annexes on page 26.

Overall negative impacts of the energy sector on biotic ES



Overall negative impacts of the energy sector on abiotic ES

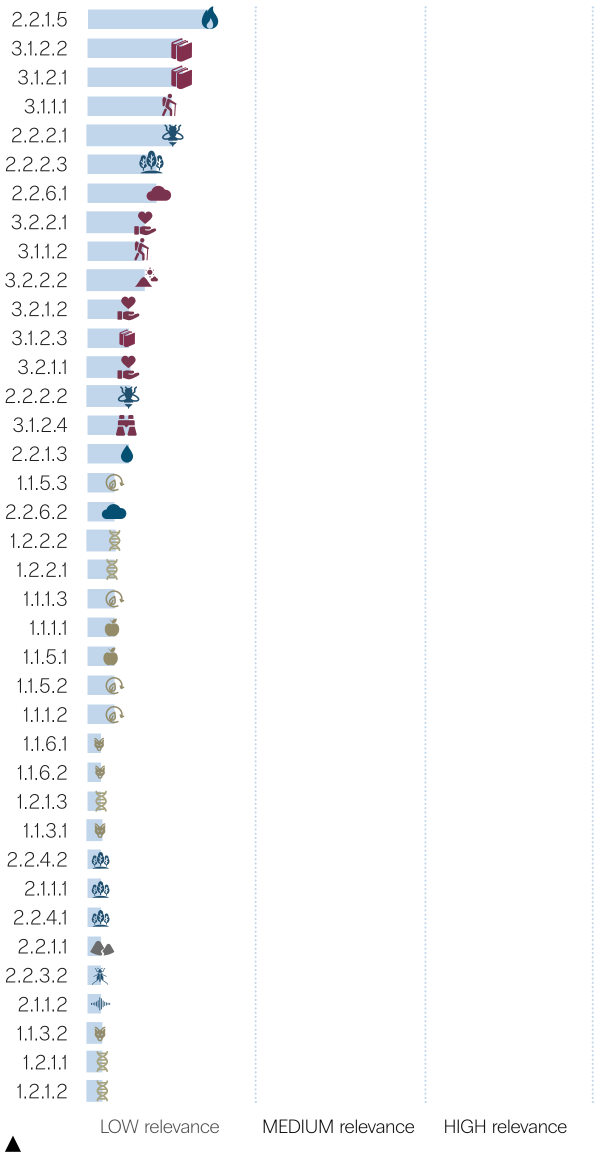


▲

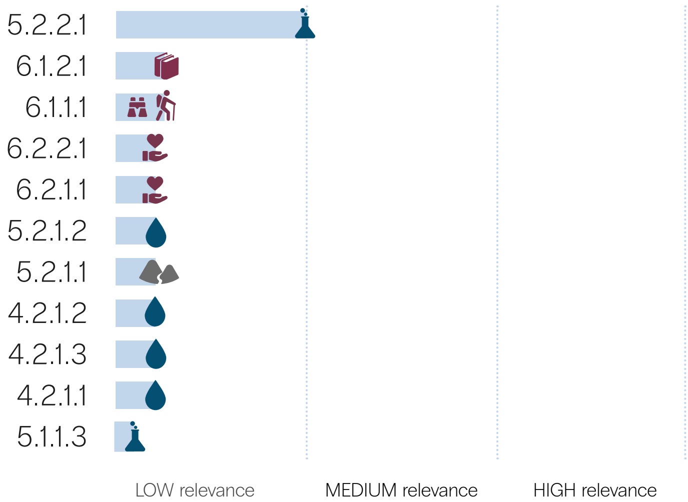
*Graphs prepared by Azentúa (2019) based on data obtained during the meetings of the Work Group on Natural Capital and Energy promoted along with Ecoacsa and those provided individually by member companies.

* Numbers of the graphs detailed in the annexes on pages 31-39*. Acronyms meaning detailed in the annexes on page 26.

Overall positive impacts of the energy sector on biotic ES



Overall positive impacts of the energy sector on abiotic ES



*Graphs prepared by Azentúa (2019) based on data obtained during the meetings of the Work Group on Natural Capital and Energy promoted along with Ecoacsa and those provided individually by member companies.

* Numbers of the graphs detailed in the annexes on pages 31-39*. Acronyms meaning detailed in the annexes on page 26.

GLOSSARY OF ABBREVIATIONS

ABBREVIATION	TERM
P	Provisioning
RM	Regulation and Maintenance
CR	Cultural and Recreational

GLOSSARY OF TERMS

Term	Definition
Abiotic	From a-2 and biotic. 1. adj. Biol. Of an environment: which lacks living things. Abiotic Ecosystem[19]. 2. adj. Biol. Specifically regarding an environmental factor: Lifeless. Non-living parts of the ecosystems which contribute to human wellbeing, and which depend on (are supported by) physical-geophysical processes.
Asset (natural, from nature)	Natural capital assets are specific elements from nature which provide goods and services, upon which the economy relies[20]. Living and non-living natural Earth components which can provide benefits to humanity, and which usually provide resources which are used in the economic activity[21]. Resource which provides a flow of benefits during a certain period[22].
Biodiversity	Diversity of all living organisms, including terrestrial, marine and other aquatic ecosystems and the ecological environments they are part of. Biodiversity includes diversity within each species, between species and between ecosystems[23]. Biodiversity can be quantified in terms such as rich, rare, and singular[24].
Biotic	From the late Latin biotcus 'of the ordinary life', and the Greek biōtikós 'of the living things', 'of life'. 1. adj. Biol. Characteristic of living things or in reference to them. 2. adj. Biol. Belonging or relative to the biota[25].
Natural capital	Nature´s contributions which a person or company relies on. This includes, for example, flow regulation, water quality, hazards such as fires or floods, pollination, or carbon sequestration[15].

[19] Royal Spanish Academy.
[20] Natural Capital Alliance, UNEP-WCMC. Data and methodologies. Assets (ENCORE).
[21] SCAE (2012).
[22] Defra, UK Government (2020). *Enabling a Natural Capital Approach Guidance*.
[23] Convention on Biological Diversity.
[24] Springer Open (2013) *Urbanization, biodiversity and ecosystem services*: Challenges and opportunities. A global assessment.
[25] Natural Capital Coalition [currently Capitals Coalition] (2016). *Natural Capital Protocol*.

Dependency (on natural capital)	Nature's contributions which a person or company relies on. This includes, for example, flow regulation, water quality, hazards such as fires or floods, pollination, or carbon sequestration[26].
Ecosystem	A dynamic group of living things (animals, plants and microorganisms) and its physical environment, which interact as a functional uni[t27].
Natural capital approach	The natural capital approach integrates the concept of natural capital in the decision-making process. Thinking in terms of "capital" allows to compare many changes and decisions at the same time. The natural capital approach uses information garnered from many existent analytical and environment management approaches, and supplies resources[28]. A means of identifying, measuring and valuating the ecosystem services, which leads to an improved decision-making process to manage, preserve and restore the natural environments[29].
Environmental Impact	A company's (or some other players') positive or negative contribution to nature's condition. This includes air, water and soil pollution, the fragmentation or variation of the ecosystems and their state and the (non-human) species' habitats[28].
Direct Impact	The result directly attributable to a defined action or project activity (frequently defined also as primary impact)[30].
Indirect Impact	Effect triggered by the presence of a project, instead of being directly caused by the project's operations[30].
Material Matrix	A tool, frequently used in valuations to identify and prioritize problems, risks and opportunities as it converts them into a graph according to their relevance to an organization and its interested parties. The result is a graph with analyzed issues/aspects[31].

[26] Science Based Targets Network (2020). *Science-based Targets for Nature. Initial guidance for business.*
[27] CBD.
[28] Natural Capital Coalition [currently Capitals Coalition] (2019). *What is a natural capital approach?*
[29] International Institute for Sustainable Development (2008). *The Natural Capital Approach.*
[30] Business and Biodiversity Offsets Program (2012). *Guidance notes to the standard on biodiversity offsets.*
[31] Adapted from ACCA/Fauna & Flora International/KPMG. *Identifying natural capital risks and materiality.*

Loss of biodiversity	The loss of biodiversity usually occurs as one or all of the following: (1) a small area occupied by people, species and other communities, (2) loss of population and the genetic diversity which contributes to all species and (3) decrease of abundance (of populations and species) or condition (of communities and ecosystems). The probability of any persistent biodiversity component (the probability of its continuity) in the long-term decreases as the abundance and genetic diversity do, and the habitat areas shrink[32].
Ecosystem services	Benefits which people obtain from ecosystems. These include provisioning services such as food and water; regulation services such as flood, drought, soil depravation and diseases regulation; support services such as soil formation and nutrients' cycle; and cultural services such as recreational, spiritual, religious, and other non-material benefits. Contributions of the ecosystems to human wellbeing, other than those goods and benefits people subsequently obtain from them. There are three types of services: provisioning; regulation and maintenance; and cultural[33]. Benefits people obtain from the ecosystems. The Millennium Ecosystem Assessment divides the ecosystem services in four categories: support, regulation, provisioning and cultural. However, this classification is no longer used in the IPBES assessments as it has been substituted by the "nature's contribution to people" system. This is because IPBES believes many services fit in more than one of the four categories. For example, food is both a provisioning as well as a cultural (and predominantly so in many cultures) service[34].
Provisioning services	Products obtained from nature. For example, genetic resources, food and fiber and sweet water[34].
Cultural services	Non-material benefits of nature (for example spiritual, aesthetic, recreational and others)[34].
Regulation services	Indirect benefits of nature created through the regulation of ecosystems services' (for example, carbon sequestration to mitigate climate change, water filtration through wetlands, erosion control and protection against storm surges through vegetation, crop pollination by insects)[34].

[32] IUCN (2021). *Guidance for planning and monitoring corporate biodiversity performance.*
[33] Haines-Young, R. and M.B. Potschin (2018) *Common International Classification of Ecosystem Services (CICES) V5.1 and Guidance on the Application of the Revised Structure.*
[34] Translated from e IBPES. Glossary. Ecosystem services. https://ipbes.net/glossary

Sustainability	Feature or state which satisfies the current population´s needs without compromising future generations´ capacity of satisfying their own needs[35]. In the 21st century, business sustainability must be understood in a context of environment, economic development, human rights, women´s empowerment, and the rule of law. Smart businesses are incorporating these broader sustainability principles in their decision-making processes, while also developing practical standards and metrics to help put these principles into practice. These steps maximize opportunity and minimize the negative impact of their main business operations on the environment, the community, and the economy where they operate[36].
Valuation	Process which assesses natural capital´s relative importance, value or utility to people (or a company) within a certain context. It may use quantitative, qualitative, or monetary approaches, or a combination of all of them[28].

[35] Hassan R, Scholes R, Ash N (eds) (2005) *Millenium Ecosystem Assessment: Ecosystems and Human Wellbeing, Volume 1, Current State and Trends*. Island Press, Washington.
[36] WBCSD (2014). *White Paper on Business Sustainability: What it is and why it matters.*

CODE	SECTION	DIVISION	GROUP	CLASS
1.1.1.1	Provisioning (biotic)	Biomass	Cultivated terrestrial plants for nutrition, materials or energy	Cultivated terrestrial plants (including fungi, algae) grown for nutritional purposes
1.1.1.2	Provisioning (biotic)	Biomass	Cultivated terrestrial plants for nutrition, materials or energy	Fibres and other materials from cultivated plants, fungi, algae and bacteria for direct use or processing (excluding genetic materials)
1.1.1.3	Provisioning (biotic)	Biomass	Cultivated terrestrial plants for nutrition, materials or energy	Cultivated plants (including fungi, algae) grown as a source of energy
1.1.2.1	Provisioning (Biotic)	Biomass	Cultivated terrestrial plants for nutrition, materials or energy	Plants cultivated by in- situ aquaculture grown for nutritional purposes
1.1.2.2	Provisioning (biotic)	Biomass	Cultivated terrestrial plants for nutrition, materials or energy	Fibres and other materials from in-situ aquaculture for direct use or processing (excluding genetic materials)
1.1.2.3	Provisioning (biotic)	Biomass	Cultivated terrestrial plants for nutrition, materials or energy	Plants cultivated by in- situ aquaculture grown as an energy source
1.1.3.1	Provisioning (biotic)	Biomass	Reared animals for nutrition, materials or energy	Animals reared for nutritional purposes
1.1.3.2	Provisioning (Biotic)	Biomass	Reared animals for nutrition, materials or energy	Fibres and other materials from reared animals for direct use or processing (excluding genetic materials)
1.1.3.3	Provisioning (biotic)	Biomass	Reared animals for nutrition, materials or energy	Animals reared to provide energy (inclu-ding mechanical)
1.1.4.1	Provisioning (biotic)	Biomass	Reared aquatic animals for nutrition, materials or energy	Animals reared by in-situ aquaculture for nutritional purposes

1.1.4.2	Provisioning (biotic)	Biomass	Reared aquatic animals for nutrition, materials or energy	Fibres and other materials from animals grown by in-situ aquaculture for direct use or processing (excluding genetic materials)
1.1.4.3	Provisioning (biotic)	Biomass	Reared aquatic animals for nutrition, materials or energy	Animals reared by in-situ aquaculture as an energy source
1.1.5.1	Provisioning (biotic)	Biomass	Wild plants (terrestrial and aquatic) for nutrition, materials or energy	Wild plants (terrestrial and aquatic, including fungi, algae) used for nutrition
1.1.5.2	Provisioning (biotic)	Biomass	Wild plants (terrestrial and aquatic) for nutrition, materials or energy	Fibres and other materials from wild plants for direct use or processing (excluding genetic materials)
1.1.5.3	Provisioning (biotic)	Biomass	Wild plants (terrestrial and aquatic) for nutrition, materials or energy	Wild plants (terrestrial and aquatic, including fungi, algae) used as a source of energy
1.1.6.1	Provisioning (biotic)	Biomass	Wild animals (terrestrial and aquatic) for nutrition, materials or energy	Fibres and other materials from wild animals for direct use or processing (excluding genetic materials)
1.1.6.2	Provisioning (biotic)	Biomass	Wild animals (terrestrial and aquatic) for nutrition, materials or energy	Fibres and other materials from wild animals for direct use or processing (excluding genetic materials)
1.1.6.3	Provisioning (biotic)	Biomass	Wild animals (terrestrial and aquatic) for nutrition, materials or energy	Wild animals (terrestrial and aquatic) used as a source of energy
1.2.1.1	Provisioning (biotic)	Genetic material[1]	Genetic material from plants, algae or fungi	Seeds, spores and other plant materials collected for maintaining or establishing a population
1.2.1.2	Provisioning (biotic)	Genetic material[1]	Genetic material from plants, algae or fungi	Higher and lower plants (whole organisms) used to breed new strains or varieties

[1] Genetic material from all biota (including seed, spore or gamete production).

1.2.1.3	Provisioning (biotic)	Genetic material[1]	Genetic material from plants, algae or fungi	Individual genes extracted from higher and lower plants for the design and construction of new biological entities
1.2.2.1	Provisioning (biotic)	Genetic material[1]	Genetic material from animals	Animal material collected for the purposes of maintaining or establishing a population
1.2.2.2	Provisioning (biotic)	Genetic material[1]	Genetic material from animals	Wild animals (whole organisms) used to breed new strains or varieties
1.2.2.3	Provisioning (biotic)	Genetic material[1]	Genetic material from organisms	Individual genes extracted from organisms for the design and construction of new biological entities
2.1.1.1	Regulation & Maintenance (biotic)	Transformation of inputs[2]	Mediation of wastes or toxic substances of anthropogenic origin by living processes	Bio-remediation by micro-organisms, algae, plants, and animals
2.1.1.2	Regulation & Maintenance (biotic)	Transformation of inputs[2]	Mediation of wastes or toxic substances of anthropogenic origin by living processes	Filtration/sequestration/storage/accumulation by micro-organisms, algae, plants, and animals
2.1.2.1	Regulation & Maintenance (biotic)	Transformation of inputs[2]	Mediation of nuisances of anthropogenic origin	Smell reduction
2.1.2.2	Regulation & Maintenance (biotic)	Transformation of inputs[2]	Mediation of nuisances of anthropogenic origin	Noise attenuation
2.1.2.3	Regulation & Maintenance (biotic)	Transformation of inputs[2]	Mediation of nuisances of anthropogenic origin	Visual screening
2.2.1.4	Regulation & Maintenance (biotic)	Regulation of physical, chemical, biological conditions	Regulation of baseline flows and extreme events	Wind protection

[2] Transformation of biochemical or physical inputs to ecosystem.

2.2.1.5	Regulation & Maintenance (biotic)	Regulation of physical, chemical, biological conditions	Regulation of baseline flows and extreme events	Fire protection
2.2.2.1	Regulation & Maintenance (biotic)	Regulation of physical, chemical, biological conditions	Lifecycle maintenance, habitat and gene pool protection	Pollination (or 'gamete' dispersal in a marine context)
2.2.2.2	Regulation & Maintenance (biotic)	Regulation of physical, chemical, biological conditions	Lifecycle maintenance, habitat and gene pool protection	Seed dispersal
2.2.2.3	Regulation & Maintenance (biotic)	Regulation of physical, chemical, biological conditions	Lifecycle maintenance, habitat and gene pool protection	Maintaining nursery populations and habitats (Including gene pool protection)
2.2.3.1	Regulation & Maintenance (Biotic)	Regulation of physical, chemical, biological conditions	Pest and disease control	Pest control (including invasive species)
2.2.3.2	Regulation & Maintenance (biotic)	Regulation of physical, chemical, biological conditions	Pest and disease control	Disease control
2.2.4.1	Regulation & Maintenance (biotic)	Regulation of physical, chemical, biological conditions	Regulation of soil quality	Weathering processes and their effect on soil quality
2.2.4.2	Regulation & Maintenance (biotic)	Regulation of physical, chemical, biological conditions	Regulation of soil quality	Decomposition and fixing processes and their effect on soil quality
2.2.5.1	Regulation & Maintenance (biotic)	Regulation of physical, chemical, biological conditions	Water conditions	Regulation of the chemical condition of freshwaters by living processes
2.2.5.2	Regulation & Maintenance (biotic)	Regulation of physical, chemical, biological conditions	Water conditions	Regulation of the chemical condition of salt waters by living processes
2.2.6.1	Regulation & Maintenance (biotic)	Regulation of physical, chemical, biological conditions	Atmospheric composition and conditions	Regulation of chemical composition of atmosphere and oceans

2.2.6.2	Regulation & Maintenance (biotic)	Regulation of physical, chemical, biological conditions	Atmospheric composition and conditions	Regulation of temperature and humidity, including ventilation and transpiration
3.1.1.1	Cultural (biotic)	Direct, in-situ and outdoor interactions [3]	Physical and experiential interactions with natural environment	Characteristics of living systems that that enable activities promoting health, recuperation or enjoyment through active or immersive interactions
3.1.1.2	Cultural (biotic)	Direct, in-situ and outdoor interactions [3]	Physical and experiential interactions with natural environment	Characteristics of living systems that that enable activities promoting health, recuperation or enjoyment through active or immersive interactions
3.1.2.1	Cultural (biotic)	Direct, in-situ and outdoor interactions [3]	Intellectual and representative interactions with natural environment	Characteristics of living systems that enable scientific investigation or the creation of traditional ecological knowledge
3.1.2.2	Cultural (iotic)	Direct, in-situ and outdoor interactions [3]	Intellectual and representative interactions with natural environment	Characteristics of living systems that enable education and training
3.1.2.3	Cultural (biotic)	Direct, in-situ and outdoor interactions [3]	Intellectual and representative interactions with natural environment	Characteristics of living systems that are resonant in terms of culture or heritage
3.1.2.4	Cultural (biotic)	Direct, in-situ and outdoor interactions [3]	Intellectual and representative interactions with natural environment	Characteristics of living systems that enable aesthetic experiences
3.2.1.1	Cultural (biotic)	Direct, in-situ and outdoor interactions [3]	Spiritual, symbolic and other interactions with natural environment	Elements of living systems that have symbolic meaning

[3] Direct, in-situ and outdoor interactions with living systems that depend on presence in the environmental setting.

3.2.1.2	Cultural (biotic)	Indirect, remote, often indoor interactions[4]	Spiritual, symbolic and other interactions with natural environment	Elements of living systems used for entertainment or representation
3.2.1.3	Cultural (biotic)	Indirect, remote, often indoor interactions[4]	Spiritual, symbolic and other interactions with natural environment	Elements of living systems used for entertainment or representation
3.2.2.1	Cultural (biotic)	Indirect, remote, often indoor interactions[4]	Other biotic characteristics that have a non-use value	Characteristics or features of living systems that have an existence value
3.2.2.2	Cultural (biotic)	Indirect, remote, often indoor interactions[4]	Other biotic characteristics that have a non-use value	Characteristics or features of living systems that have an option or bequest value
4.2.1.1	Provisioning (abiotic)	Water	Ground water for used for nutrition, materials or energy	Surface water for drinking
4.2.1.2	Provisioning (abiotic)	Water	Ground water for used for nutrition, materials or energy	Surface water used as a material (non-drinking purposes)
4.2.1.3	Provisioning (abiotic)	Water	Ground water for used for nutrition, materials or energy	Freshwater surface water used as an energy source
4.2.1.4	Provisioning (abiotic)	Water	Ground water for used for nutrition, materials or energy	Coastal and marine water used as energy source
4.2.2.1	Provisioning (abiotic)	Water	Ground water for used for nutrition, materials or energy	Ground (and subsurface) water for drinking
4.2.2.2	Provisioning (abiotic)	Water	Ground water for used for nutrition, materials or energy	Ground water (and subsurface) used as a material (non-drinking purposes)

[4] Indirect, remote, often indoor interactions with living systems that do not require presence in the environmental setting.

4.2.2.3	Provisioning (abiotic)	Water	Ground water for used for nutrition, materials or energy	Ground water (and subsurface) used as an energy source
4.3.1.1	Provisioning (abiotic)	Natural ecosystem[5]	Mineral substances used for nutrition, materials or energy	Mineral substances used for nutritional purposes
4.3.1.2	Provisioning (abiotic)	Natural ecosystem[5]	Mineral substances used for nutrition, materials or energy	Mineral substances used for material purposes
4.3.1.3	Provisioning (abiotic)	Natural ecosystem[5]	Mineral substances used for nutrition, materials or energy	Mineral substances used for as an energy source
4.3.2.1	Provisioning (abiotic)	Natural ecosystem[5]	Non-mineral substances or ecosystem properties used for nutrition, materials or energy	Non-mineral substances or ecosystem properties used for nutritional purposes
4.3.2.2	Provisioning (abiotic)	Natural ecosystem[5]	Non-mineral substances or ecosystem properties used for nutrition, materials or energy	Non-mineral substances used for materials
4.3.2.3	Provisioning (abiotic)	Natural ecosystem[6]	Non-mineral substances or ecosystem properties used for nutrition, materials or energy	Wind energy
4.3.2.4	Provisioning (abiotic)	Natural ecosystem[6]	Non-mineral substances or ecosystem properties used for nutrition, materials or energy	Solar energy
4.3.2.5	Provisioning (abiotic)	Natural ecosystem[6]	Non-mineral substances or ecosystem properties used for nutrition, materials or energy	Geothermal

[5] VNon-use value is a value that is not linked to the use, consumptive or non-consumptive, present or future, of the good. For example, people who do not use it directly or indirectly (they are therefore not users of it), nor do they plan to do so in the future, but who value positively the simple fact that the good exists (for example, out of benevolence, sympathy, inheritance, symbolic value). Its disappearance, therefore, would mean a loss of well-being for them (Azqueta, D., 2007. Introduction to environmental economics. 2nd edition. Madrid, Mc. Graw-Hill. ISBN: 978-84-481-6058-6).
[6] Non-aqueous natural abiotic ecosystem outputs.

4.3.2.6	Provisioning (abiotic)	Natural elements [6]	Other mineral or non-mineral substances or ecosystem properties used for nutrition, materials or energy	Hydrocarbons, including oil, natural gas (thermogenic) for the production of other products/materials
5.1.1.1	Regulation & Maintenance (abiotic)	Transformation of biochemical or physical inputs to ecosystems	Mediation of waste, toxics and other nui-sances by non-living processes	Dilution by freshwater and marine ecosys-tems
5.1.1.2	Regulation & Maintenance (abiotic)	Transformation of biochemical or physical inputs to ecosystems	Mediation of waste, toxics and other nui-sances by non-living processes	Dilution by atmosphere
5.1.1.3	Regulation & Maintenance (abiotic)	Transformation of biochemical or physical inputs to ecosystems	Mediation of waste, toxics and other nui-sances by non-living processes	Mediation by other chemical or physical means (e.g. via Filtration, sequestration, storage or accumulation)
5.1.2.1	Regulation & Maintenance (abiotic)	Transformation of biochemical or physical inputs to ecosystems	Mediation of nuisances of anthropogenic origin	Mediation of nuisances by abiotic structu-res or processes
5.2.1.1	Regulation & Maintenance (abiotic)	Regulation of physical, chemical, biological conditions	Regulation of baseline flows and extreme events	Mass flows
5.2.1.2	Regulation & Maintenance (abiotic)	Regulation of physical, chemical, biological conditions	Regulation of baseline flows and extreme events	Liquid flows
5.2.1.3	Regulation & Maintenance (abiotic)	Regulation of physical, chemical, biological conditions	Regulation of baseline flows and extreme events	Gaseous flows
5.2.2.1	Regulation & Maintenance (abiotic)	Regulation of physical, chemical, biological conditions	Maintenance of physical, chemical, abiotic conditions	Maintenance and regulation by inorganic natural chemical and physical processes

6.1.1.1	Cultural (abiotic)	Direct, in-situ and outdoor interactions[7]	Physical and experiential interactions with natural abiotic components of the environment	Natural, abiotic characteristics of nature that enable active or passive physical and experiential interactions
6.1.2.1	Cultural (abiotic)	Direct, in-situ and outdoor interactions[7]	Intellectual and representative interactions with abiotic components of the natural environment	Natural, abiotic characteristics of nature that enable intellectual interactions
6.2.1.1	Cultural (abiotic)	Indirect, remote, often indoor interactions[8]	Spiritual, symbolic and other interactions with the abiotic components of the natural environment	Natural, abiotic characteristics of nature that enable spiritual, symbolic and other interactions
6.2.2.1	Cultural (abiotic)	Indirect, remote, often indoor interactions[8]	Other abiotic characteristics that have a non-use value	Natural, abiotic characteristics or features of nature that have either an existence, option or bequest value

[7] Direct, in-situ and outdoor interactions with natural physical systems that depend on presence in the environmental setting.
[8] Indirect, remote, often indoor interactions with physical systems that do not require presence in the environmental setting.

WG´s agents of change

The members of the Work Group on Natural Capital and Energy of the Natural Capital Factory Sector´s Groups are Sustainability, Environment, Security Quality and Regulation Area Managers of the leading companies within Spain´s energy sector. They all have different degrees of knowledge regarding the natural capital approach, and their companies develop activities as diverse as electricity generation, petroleum (and derivatives) and gas extraction and marketing, global operation of electricity and telecom transportation and distribution infrastructures, and the operation and management of gas network infrastructures.

CEPSA

Juan Carlos Galván Badillo

Health, Security, Environment and Quality Deputy Director

Lucía Santolaria Canales

Cepsa Foundation

Alba Zamora Uruñuela

Brand Planning and Coordination

Marién Benavente Queiro

Corporate Environment Department

edp

Sonia Blanco Murcia

Head of Natural Capital

Yolanda Fernández Montes

Director for Environment, Sustainability, Innovation and Climate Change

Ana Álvarez Arias de Velasco

Manager of Environmental Development

enagas

Elena Blanco Lozano

Environment and Sustainability Manager

Laura Trapote Girón

Management Systems Coordinator

endesa

Alejandro Rodríguez Palao

Environment Department, General Directorate for Regulation and Institutional Relations redeia

Irene Gómez Barrio

Head of Sustainability

Ángel Salinas de Ugarte

Sustainability Department Technician

Mercedes Gil Pozo

Sustainability Department Technician

Vicente González López†

Head of the Sustainability Department during the project's development

Naturgy

Nieves Cifuentes Valero

Corporate Environment and Sustainability Manager

Lourdes Gómez de la Vega

Environment and Renewables Manager

Yliana Fernández Arroyo

Environment and Renewables

María Mangas Fernández

Environment and Electric Networks UFD

Amado Gil Martínez

Environment and Sustainability

Emilio Puelles Izquierdo

Security and Environment UFD Distribución Electricidad

IBERDROLA

Emilio Tejedor Escobar

Head of Environment and Quality

Isabel Tomé Esteban

Head of Biodiversity

REPSOL

Ángel Bueno Sánchez-Luengo

Environmental Development Senior Analyst

Carolina Ibáñez Cacho

Environmental Development Manager

Coordination Team

Luis López-Cózar
Managing Director

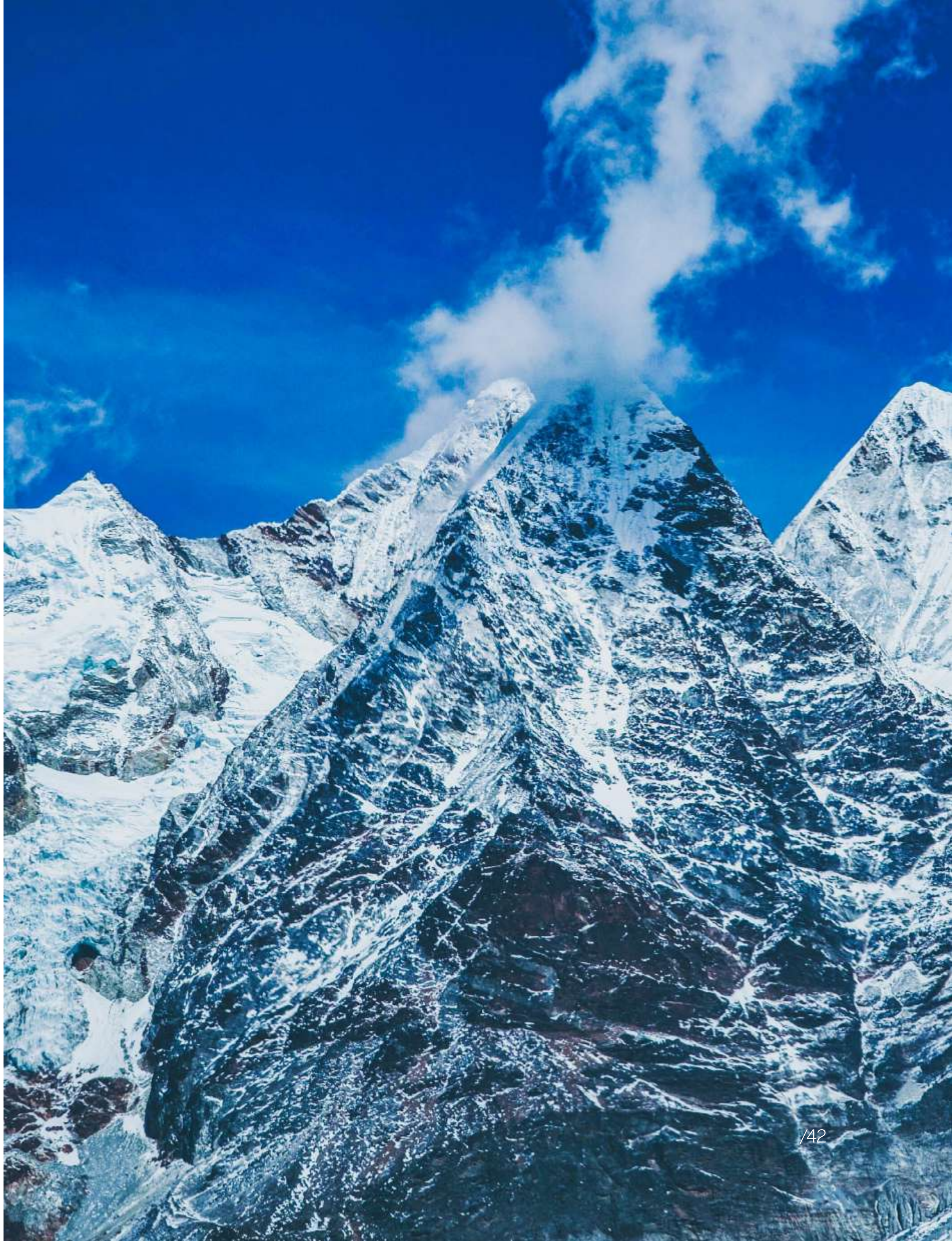
María José Rubial
Operations Manager

David Álvarez García
Executive Director

M.ª Paz Ferrer Calvo
Communications Officer

Jesús Carrasco Naranjo
*Technical Director during the project's development**

* Currently Sustainability and Natural Capital Technical Director at NTT Data



Work group

Coordination team

Participants