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Assessment and management of nature-related impacts, risks and opportunities

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Isaac Nájera Cuenca Reads CPO isaac.najera@repsol.com www.readsvalue.com/es/

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About







READS is a digital tool for **assessing and managing nature-related impacts, risks and opportunities**.

READS adheres to the **Natural Capital Protocol and its biodiversity guidance**, as well as to **ISO 14008:2019** concerning the monetary valuation of environmental impacts. It is a recognized tool designed to help evaluate nature-related issues under the **TNFD's LEAP framework**.

We follow **ENCORE** for dependencies.

The READS methodology is licensed under a **Creative Commons License**, for public use. The methodology can be downloaded at Repsol's webpage.

READS is powered by Microsoft technology, and it is commercially delivered as **Software-as-a-Service (SaaS).**

Several companies and institutions support the development and commercialization of READS, including:







Peer reviewed and endorsed by











VNiVERSiDAD DSALAMANCA Taskforce on Nature-related Financial Disclosures

> Universidad de **Cantabria**

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Land

- Extractives and Mineral Processing
- Resource Transformation
- Infraestructure
- Financials



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The valuation method follows a tiered approach...

... to value impacts on



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Identify material environmental aspects and impacts



Physical presence

- Occupation
- Disturbance & nuisances
- Territory fragmentation
- Collisions and electrocutions
- Lighting

Emissions

- Dust
- Combustion processes
- Fugitives
- Venting and flaring

Discharges

- Drainage
- Sewage
- Cooling
- Process and production chemicals

Resources use

- Water
- Energy

Noise

- Transport road, marine, air
- Industrial processes
- Civil works

Materials and waste

- Hazardous
- Non-hazardous
- Contaminated sites



The approach is flexible and configurable. The user selects and combines the environmental aspects and impacts according to the conceptual model of the site.

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Quantify Biophysical Impact Units (BIUs)





Calculations are only for impacts on ecosystem services. Outcomes are based on screening models that estimate upper bound impacts



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Valuation of impacts

Metrics

Natural capital gain/ loss is measured in:

- Environmental Economic Values (EEVs), monetized as US dollars (2022)
- Impact Units (IUs), improve the valuation representativeness by using local adjustments

Metrics are expressed in Net Present Value.

Discount rates are defined by the user, with a default of 3% for natural capital assets.



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Valuation of impacts

Ecosystem Services

Ha-eq of impacted biome with loss of ecosystem services.

READS includes an analysis of the monetary values of ecosystem services provided by the 18 main biomes of the world (\$-ha/y)

- Artificial surfaces
- Barren land
- Crops
- Grasslands
- Shrub-covered areas
- Tropical forests
- Template forest
- Aquatic / regularly flooded areas
- Mangroves

Waterbodies

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- Tundra
- Permanent snow / glaciers
 - Open ocean
- Continental shelf •
 - Coastal
- . Estuaries
- Seagrass / algae beds •
- Coral reefs





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Economic Valuation (\$)

READS Valuation Database Adapted from TEEB Database (2010)

- NPV of reduced ecosystem services per biome, grouped by (20) CICES groups, including Provisioning (8); Regulating (8); Cultural (4)
- Intra-biome adjustment: Net Primary Production and **Population Density**
- Eco-services adjustment: materiality, detraction (%), and recovery time

Impact Units (IUs)

Value

Integration of local context Required

- Biodiversity richness (species #) and risk-status (species / habitats) for genetic pool
- Ecosystem quality and resilience (abiotic) for regulating services
- Social dependence and appreciation for provisioning and cultural services

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Acronyms:

- NPV: Net Present Value
- TEEB: The Economics of Ecosystems and Biodiversity
- CICES: The Common International Classification of Ecosystem Services



The database can be edited, both in timeline and values, allowing the inclusion of site-specific studies. The % detraction of ecosystem services can be adjusted by the user.

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Valuation of impacts

Climate change

Tons CO₂-eq emitted (inc. CO_2 , CH_4 and N_2O)

Water resources

m³ of water used, after water mass balance

Social well-being

Tons of chemicals (metals, salts, hydrocarbons) reaching the air, water, and soil



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Economic Valuation (\$)

Carbon Pricing Social Cost of Carbon (SCC)

 NPV of CO2-eq emitted, considering the full global cost of the damage that it imposes during its lifetime.

Water Risk Pricing Recommended Water Risk Monetizer, Ecolab

 NPV of reduced water abiotic services, including habitat maintenance, recreational use, and chemical regulation.

Environmental Contamination Pricing Adapted from Environmental Prices Handbook, Delft

 NPV of emitted pollutants that may impact human health (social cost) during its time in the environment.





Impact Units (IUs)

Integration of local context Not Required

Global effect

Integration of local context				
 Scarcity 	Demand	•	Dependency	

Integration of local context

Baseline levels

- Dispersion conditions
- Affected population

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The database can be edited, both in timeline and values, allowing the inclusion of site-specific studies.

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Valuation of impacts

Biodiversity

READS produces biodiversity-inclusive natural capital assessments as follows:

A direct valuation relationship is established between the impact on ecosystem services, water resources and/or climate.

- Ecosystem services for three (3) provisioning and four (4) regulating services. Follows CICES 5.1
- Water resources: variable for surface and groundwater resources.
- Climate: fixed at global scale

Valuation results are modulated according to

- 1. Specific biodiversity features such as the Species Threat Abatement and Restoration Metric (STAR), that accounts for the number of species, their extinction risk and their population, presence of protected areas, and presence of key biodiversity areas.
- 2. Specific freshwater local features such as physical and chemical water risks.



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Mitigation Measures		Effectiveness %	Expenditure (k\$)	Expenditure NPV (k\$)	IUs Saved (NPV)	Js vs Expenditure (NPV)
Simulated						
Off Spec/ Excess gas - Flaring Mngt. Pre	ogram (LNG Plant)	75.00 %	4,750.0	0 6.195.49	3.875.563.59	625.55
Gas Recovery - Venting Mngt. Program	(LNG Plant)	100.00 %	3,620.0	0 4,757.84	11,180,548.62	2,349.92
Offset Agricultural to Rainforest Habita	t (ES Generation)		3,015.0	0 2,259.07	110,217,473.08	48,788.94
Offset Agricultural to Rainforest Habita	t (GHG Capture)		3.015.0	0 2,259.07	220,168,689.03	97,460.01
Applied						
Bird flapper/ Diverter (Power Line - Sec	tion 1)	70.00 %	1,800.0	0 1,980.00	24,719,496.44	12,484.59
Low-NOx Burners (LNG Plant)		74.00 %	1,575.0	0 2,061.27	65,458,651.37	31,756.47
LDAR - Fugitives Mngt. Program (LNG F	Plant)	98.92 %	1,195.0	0 942.65	81,726,476.24	86,698.29
Habitat Restoration (Power Line - Section	on 1)	65.35 %	90.0	0 84.34	13,126,667.19	155,648.15
elect mitigation measure			Select the per	iod of data		
			Start year I	End year		
All		\sim	2004	2074		
			2001	2071		
IUs	EEVs	J				
_	Pasalina		Curre		Cimul	Intian
Immediate a second	Baseline		Curre	nt	Simul	lation
Impact IUS (NPV)	517,193,130		332,161	,839	-13,28	0,436
_	Current vs Baseline		Simulation v	s Current	Simulation	vs Baseline
Impact IUs saving (NPV)	185 031 291		345 443	274	530.47	73 566
	105,051,251		545,442	,214	550,41	15,500
	Current (k\$)		Simulatio	on (k\$)	Total	(k\$)
Measures Investment (NPV)	5,068.26		15,471	.47	20,53	39.73
	Current vs Baseline		Simulation v	s Current	Simulation	vs Baseline
Measures Efficiency (%)	25 70 %		10.4.00	0.0/	102.1	7.0/
weasures Efficiency (%)	35.78 %		104.00) %	102.:	57 %
	Current vs Baseline		Simulation v	s Current	Simulation	vs Baseline
Measures ROI (IUs vs k\$)	36,507.86		22,327	7.70	25,82	26.71
SUMMARY KPIs						
			_			
Hydrocarbon production (Mboe)	∨ (Year) (Accum)			
		Tot	al			
	• M	etric	- Current Simulatio			
			\			
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2041 (IUS RPW)						
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Cost-Benefit Analysis for Impact Mitigation/Compensation

Natural Capital

Apply Mitigation Hierarchy.

 Reads estimates offsets, including potential CO₂ capture (according the Tier of the Intergovernmental Panel on Climate Change (IPCC) - United Nations) ecosystem services generation.

Assign Performance

• Expressed as impact reduction (%) or net gain

Include Cost

NPV corrections are made for CAPEX and OPEX

Appraise **KPIs**

o Cost-Benefit Analysis and Net Environmental Benefit Approaches

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Details

Two production pads (5 wells) connected to a central production facility thought 72 km of aboveground flowlines in Amazonia. Compressed gas in exported. Only fluvial and air logistics.

Area of Influence Impacts:

- 1 Biodiversity Area (KBA)
- 3 protected areas,
- 4 Endangered IUCN Red List
- 27 Vulnerable IUCN Red List

Oil & Gas E&P Production Onshore – Gas Execution phase





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Impact	EEVs NPV	IUs NPV
Hering	2,249.11	2,198.37
🗄 Dust	95,071.35	96,166.51
Non-hazardous solid waste	195,565.19	195,565.19
Physical presence	1,144,155.60	1,315,555.05
🗄 Light	2,009,654.08	2,113,219.05
Water depletion/abstraction	3,221,630.32	2,577,304.26
Acoustic	19,980,775.78	20,431,203.20
Physical disturbance	22,692,932.98	23,320,273.69
Hazardous waste, materials and products	73,652,251.43	73,652,251.43
Exhaust/Combustion Emissions	91,072,049.64	89,053,969.84





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https://www.repsol.com/es/sostenibilidad/estrategia-sostenibilidad/contribucion-ods/casos-exito-repsol-ods/proyecto-sagari-proteccion-biodiversidad/index.cshtml

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Oil & Gas E&P

Execution phase

Production Onshore - Gas

Details

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Details

Simulated measures:

- Avoid sensitive areas
- Install canopy bridges
- Rescue and relocation of flora
- Fauna repelling
- Drilling waste injection
- Accelerated restoration
- Helicopter routes change
- Change diesel for produced gas
- LDAR programs

Net impact reduction of 149 MMIUs (abatement of 70%) for 22 years of operation (at a discount rate of 3%). Class 3 Cost Estimate (Level of Accuracy of +30% to-20%)

Oil & Gas E&P Production Onshore – Gas Execution phase





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	Simulation
Impact IUs (NPV)	65,066,126
	Simulation vs Baseline
Impact IUs saving (NPV)	149,000,210
	Total (k\$)
Measures Investment (NPV)	22,701,457.55
	Simulation vs Baseline
Measures Efficiency (%)	69.60 %
	Simulation vs Baseline
Measures ROI (IUs vs k\$)	6.56

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https://www.repsol.com/es/sostenibilidad/estrategia-sostenibilidad/contribucion-ods/casos-exito-repsol-ods/proyecto-sagari-proteccion-biodiversidad/index.cshtml



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2022

TNFD Adopters

Energy Value Chain

Explore the full list of organisation who have committed to start making TNFD-aligned disclosures

Natural Capital Assessment Repsol Portfolio 2022 (key assets)

Details

Portfolio assessment Yearly Updates

- Upstream
- Refining
- Chemicals
- Lubricants
- Combined-Cycle Gas
- Green Hydrogen
- Wind Energy
- Solar Energy
- Hydropower
- Geothermal
- Mobility

Image: construction of the state o

Natural Capital: Inherent in all our decisions

As a TNFD Early Adopter, Natural Capital is inherent in all our decisions.

Goal: Measure the impact on Natural Capital of a portfolio of 40 energy producing assets, including:

- Oil & Gas assets (34), majority of the operated portfolio.
- Power assets (6), minority of the operated portfolio. Still work in progress.

What for

- Make informed decisions to minimize negative impacts and optimize sustainability investments.
- Understand the impact materiality to inform current reporting requirements, including TNFD and EU CSRD.

Energy Value Chain 2022

https://doi.org/10.2118/220247-MS



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SCOPE

40 Assets

- E&P fields (5)
- Refineries (6)
- Chemical plants (3)
- LPG plants (12)
- Sp. petroleum (8)
- CC Power plants (2)
- Windfarm (2)
- Photovoltaic (1)
- Hydro (1)

Low-Carbon Power Generation asset under assessment include a minor % of the portfolio.

Assets in Spain, Norway, United States of America, Peru, and Bolivia



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Energy Value Chain 2022



Category	Impact		
Watar Pasauraas	Groundwater use	0,0	
water Resources	Surface water use	0	
	Physical occupation		
	Physical disturbance		
	Wildlife mortality		
Faagyatama	Visual impact	\heartsuit	
ECOSYSTEMS	Noise		
	Waste management		
	Wastewater management		
	Reduced activity (e.g. fishing)		
	Combustion (processes)		
Climate Change	Combustion (transport)	<i>ф</i> Э́:-	
	Fugitives, flaring, venting		

CONCLUSIONS

Results of impacts of 40 energy producing assets with 2022 data:

- Total Impact ranking (IUs), only for Oil & Gas assets
 - Refineries > Chemical > E&P > LPG > Petroleum other
- Impact Intensity ranking (IUs/GJ), all assets
 - CC Power > Chemical > Renewables > Refineries > E&P
- Impact by category (IUs/GJ), all assets
 - Climate: CC Power > Chemical > Refineries
 - Water: Chemical > Refineries > CC Power
 - Ecosystems: Renewables > E&P > Petroleum other

Global results are being used to report and manage our impacts on nature, following the TNFD framework, and to inform future disclosure of the EU CSRD.

