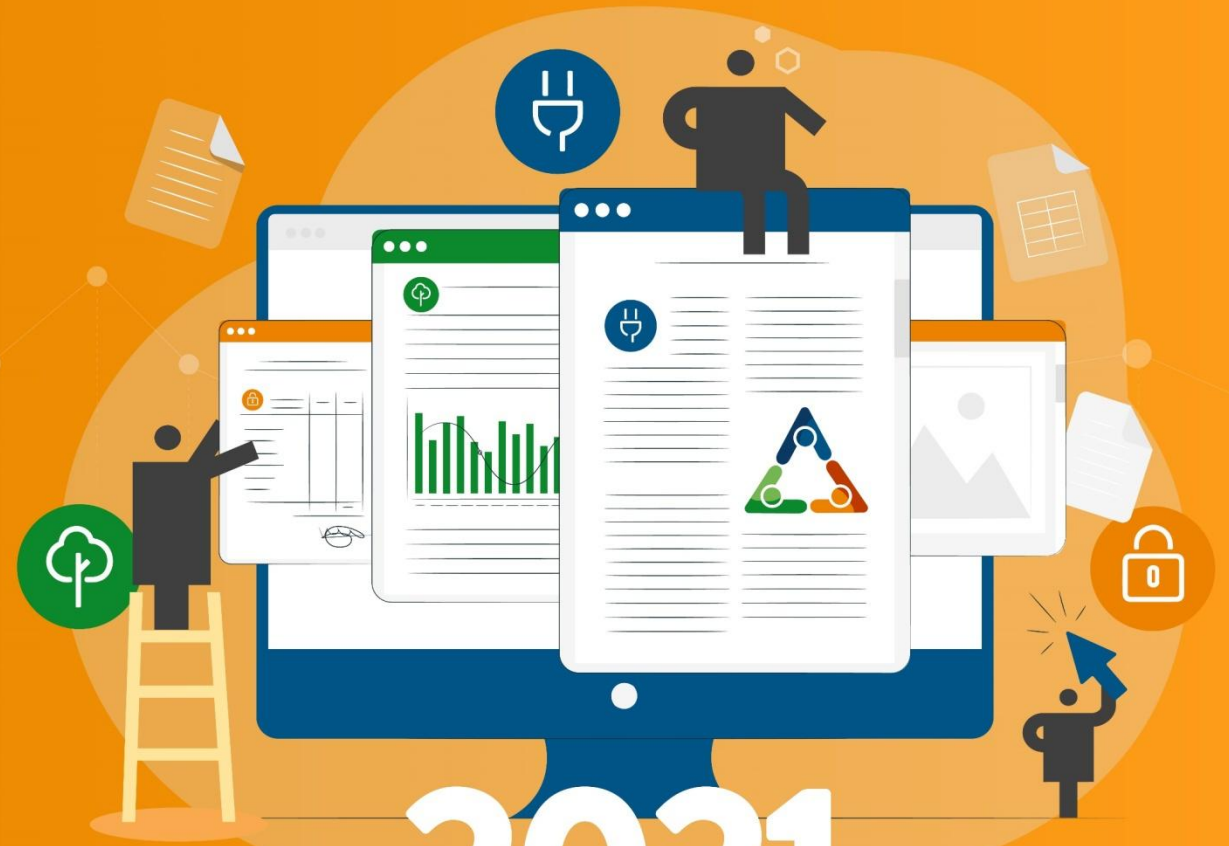
WORLD ENERGY COUNCIL

World Energy **Trilemma Index**



2021

In partnership with Oliver Wyman

WORLD ENERGY COUNCIL

Where the World Energy Trilemma Index fits in

The World Energy Trilemma Index is the only retrospective tool in the unique World Energy Transition Leaders Toolkit.
The other tools support forward pathfinding:

- The World Energy Transition Radar detects real time signals of recovery and transition actions to clarify the speed and direction of global energy transition.
- The annual World Energy Issues Monitor takes a snapshot of the present risk and opportunity landscape.
- The World Energy Scenarios provide new and alternative stories of the future of world energy, which have been co-created by members across the world.

Societies everywhere are searching for new and better ways to address globally connected challenges in an era of energy for people and planet, peace and prosperity. New energy developments are changing all our relationships as we recover from crisis, repair the planet, renew the wellbeing of whole societies, and better prepare for future shocks by building in resilience now.

The World Energy Trilemma Index is a trusted tool used by stakeholders across the energy spectrum and can play a vital role in convening impact-orientated conversations around energy.

Humanising Energy – A better way to build forward together!

As the world learns how to navigate the emerging energy–cyber–climate stress nexus and avoid a global winner–takes–all technology race to zero, the World Energy Trilemma framework will continue to evolve into a flexible tool that can be used to improve the quality of policy design at all levels of society and global energy governance matters.

Societies have never built back better. By humanising energy societies can build forward together!

Dr Angela Wilkinson
Secretary General
& CEO

Sir Phillip Lowe
Chair
World Energy Trilemma

A balanced approach to energy policy

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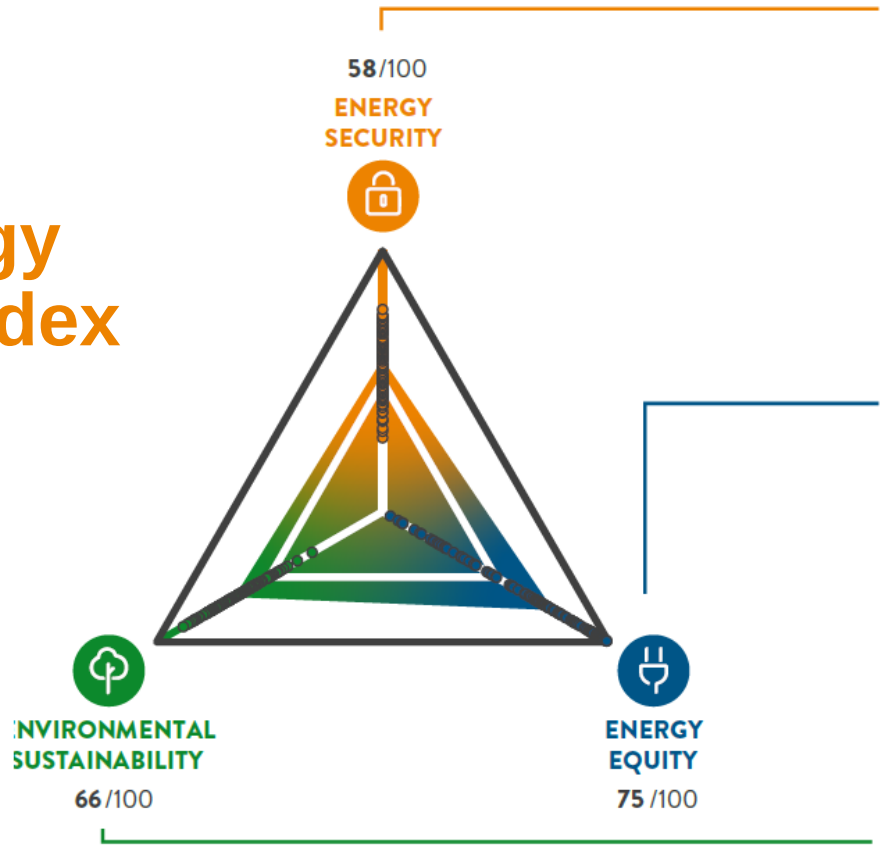
World Energy Trilemma Index



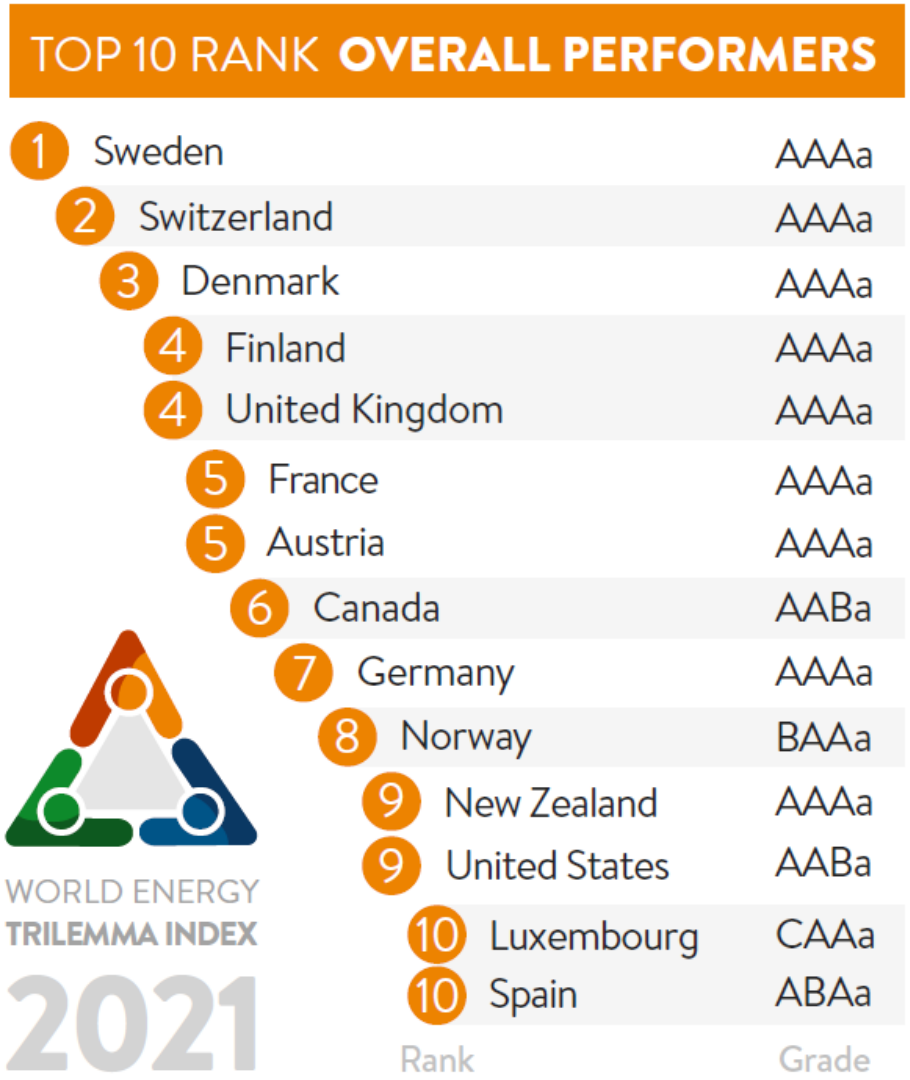
World Energy Trilemma Index

Reflects a nation's capacity to meet current and future energy demand reliably, withstand and bounce back swiftly from system shocks with minimal disruption to supplies.

Assesses a country's ability to provide universal access to affordable, fairly priced and abundant energy for domestic and commercial use.

Represents the transition of a country's energy system towards mitigating and avoiding potential environmental harm and climate change impacts.

Source: World Energy Council



Source: World Energy Council

2021 HIGHLIGHTS

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- Only 9 countries achieve the top AAA balance grade, representing top quartile performance in every dimension.
- This year we have introduced tied ranks due to the closeness of some country scores; for example, Austria and Finland have the same score and are ranked 4th.
- The overall scores top ten ranks remain dominated by OECD countries, with a strong European flavour having Sweden, Switzerland, and Denmark leading the ranking.
- The path followed by the greatest improvers since 2000 reveals the importance of diversifying energy systems and increasing access.

2021 World Energy Trilemma Index
RANKING HIGHLIGHTS

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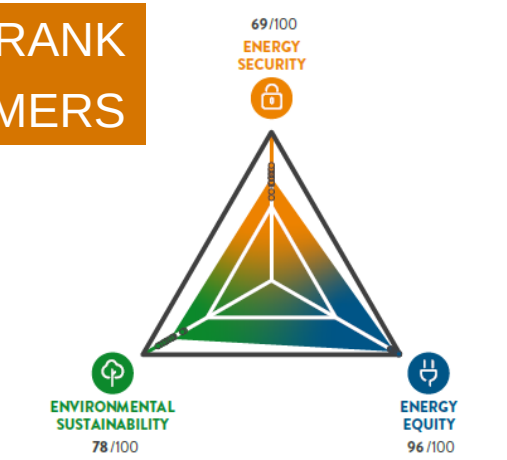
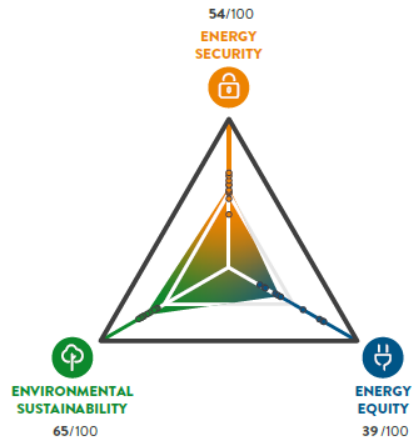
TOP 10 RANK
OVERALL PERFORMERS



Rank		Grade	Score
1	Sweden	AAAa	84.2
2	Switzerland	AAAa	83.8
3	Denmark	AAAa	83.0
4	Finland	AAAa	81.7
4	United Kingdom	AAAa	81.7
5	France	AAAa	81.1
5	Austria	AAAa	81.0
6	Canada	AABa	80.6
7	Germany	AAAa	80.4
8	Norway	BAAa	79.6
9	New Zealand	AAAa	79.1
9	United States	AABa	79.0
10	Spain	ABAa	76.9
10	Luxembourg	CAAa	76.9

TOP 10 COUNTRIES
OVERALL IMPROVERS SINCE 2000



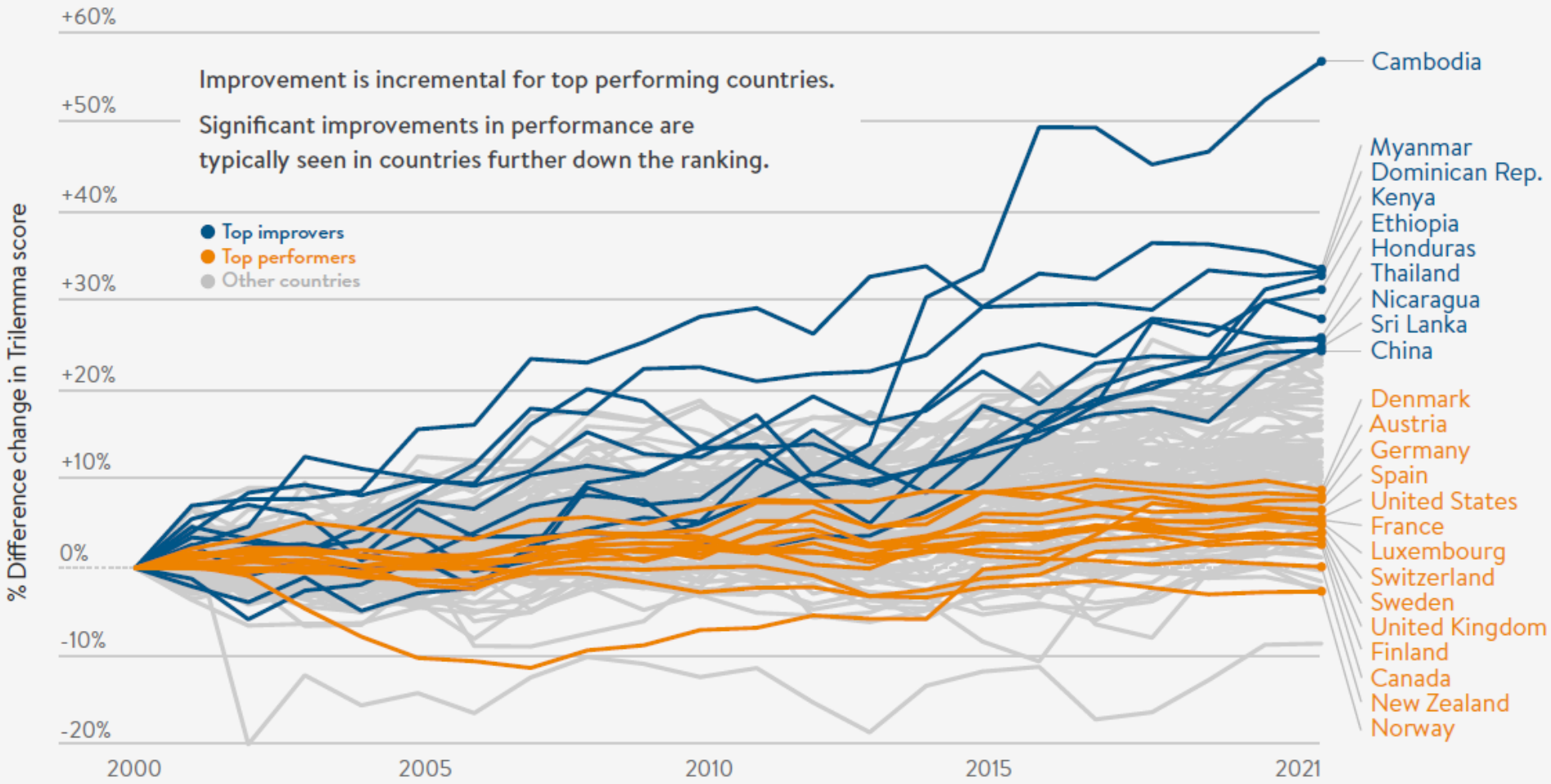
Rank		Grade	Score	Improvement since 2000
82	Cambodia	CDDd	47.5	57%
83	Myanmar	BDCd	47.4	34%
59	Dominican Rep.	DCBc	60.7	33%
80	Kenya	BDBc	50.7	33%
88	Ethiopia	DDCd	42.1	31%
76	Honduras	CDBd	52.5	28%
53	Thailand	CCCb	62.7	26%
78	Nicaragua	CDBd	51.7	26%
60	Sri Lanka	CCBc	60.1	25%
51	China	BBDb	64.0	25%

Source: World Energy Council
Score is rounded to one decimal point. Countries share a rank if difference in their score is less than 0.1.

2021 World Energy Trilemma Index

INDEXED TRENDS SINCE 2000

WORLD ENERGY COUNCIL



Source: World Energy Council

What does the country's performance show?

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GRADE

Range of values: A (best), B, C, D (worst)
Example: AAAa, ABAc, BCDb, DCDd
Meaning: A grade is given for performance in three main dimensions (1st letter for Security, 2nd Equity, 3rd Sustainability) which cover 90% of the overall grade and an additional dimension
(4th letter for Country Context) which covers the remaining 10%. The value of the grade depends on which quartile the country's score falls into:

- Grade A: top 25% countries
- Grade B: between top 25% and 50%
- Grade C: between 50% and 75%
- Grade D: between 75% and 100%

RANK

Range of values: 1 (best) ... 101 (worst)
Example: Shared rank 4 determined by the 4th best score value of 81.7
Meaning: The rank provides only a very short and limited information about a country's performance – it only informs where the country lies in the full Index, therefore the grade, the score, the context and especially the full indexed history of the country's performance should be taken into account when comparing with other countries.
We have used a dense ranking approach
because some scores are tied at one decimal place.

SCORE

Range of values: 100 (best) ... 0 (worst)
Example: 84.3, 53.4, 32.1
Meaning: A score value is given for overall performance as well as for each dimension (Security, Equity, Sustainability, Country Context) determined by country's performance in the indicators.
The score can change even if the underlying data did not change, reflecting performance changes of other countries, who may have improved in a given indicator.

Please note that because the Methodology has evolved direct comparisons of ranking, grades and scores to previous reports is not possible. Historical performance has been recalculated using the same revised Methodology back to the Index year 2000.

World Energy Trilemma Index: Regional challenges

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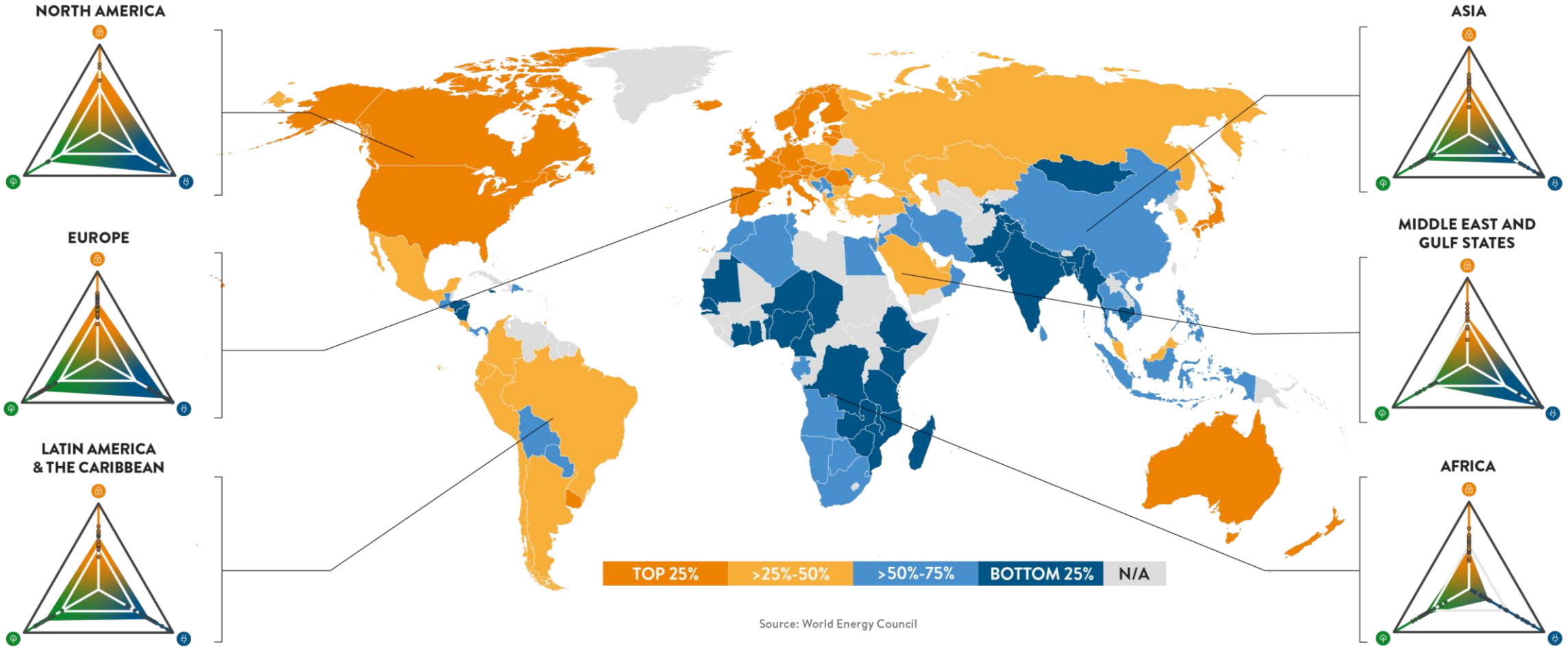

Source: World Energy Council

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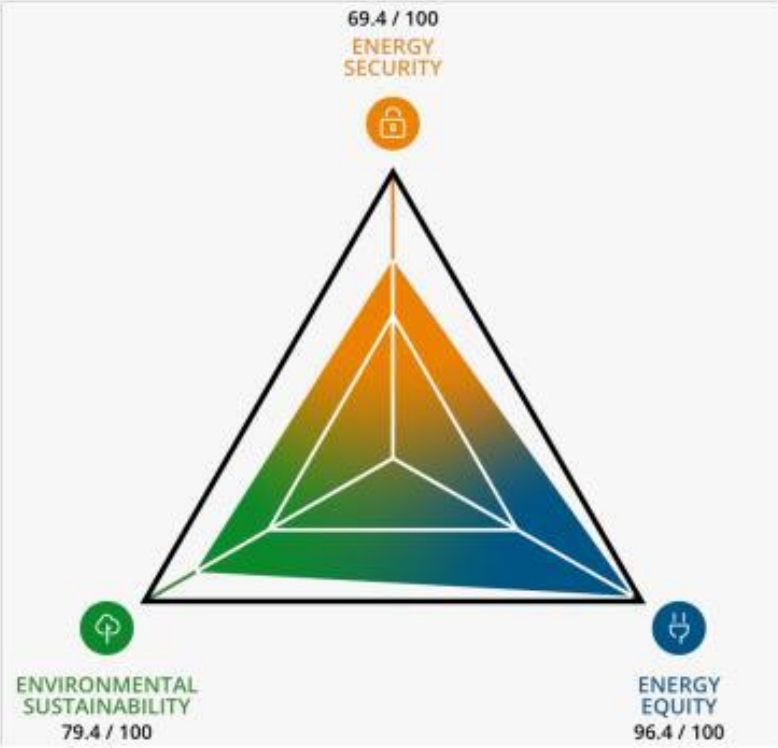
ANNEX I

National profile

Austria

Trilemma Score	Balance Grade	Trilemma Rank
81	AAA	# 5



Introduction

Austria maintains its position in the top 10 global ranking at number 5. Excellent performance in all trilemma dimensions results in a very well-balanced profile of AAA. Scores for Security have remained stable over the past five years, indicating that Austria has been able to manage the reliability and safety of imported supplies. The Equity index shows that Austria's energy supply is of a high quality and at affordable prices. Sustainability is driven by the reduction of CO_2 intensity, which has decreased by 57.0% since 2000.

Austria

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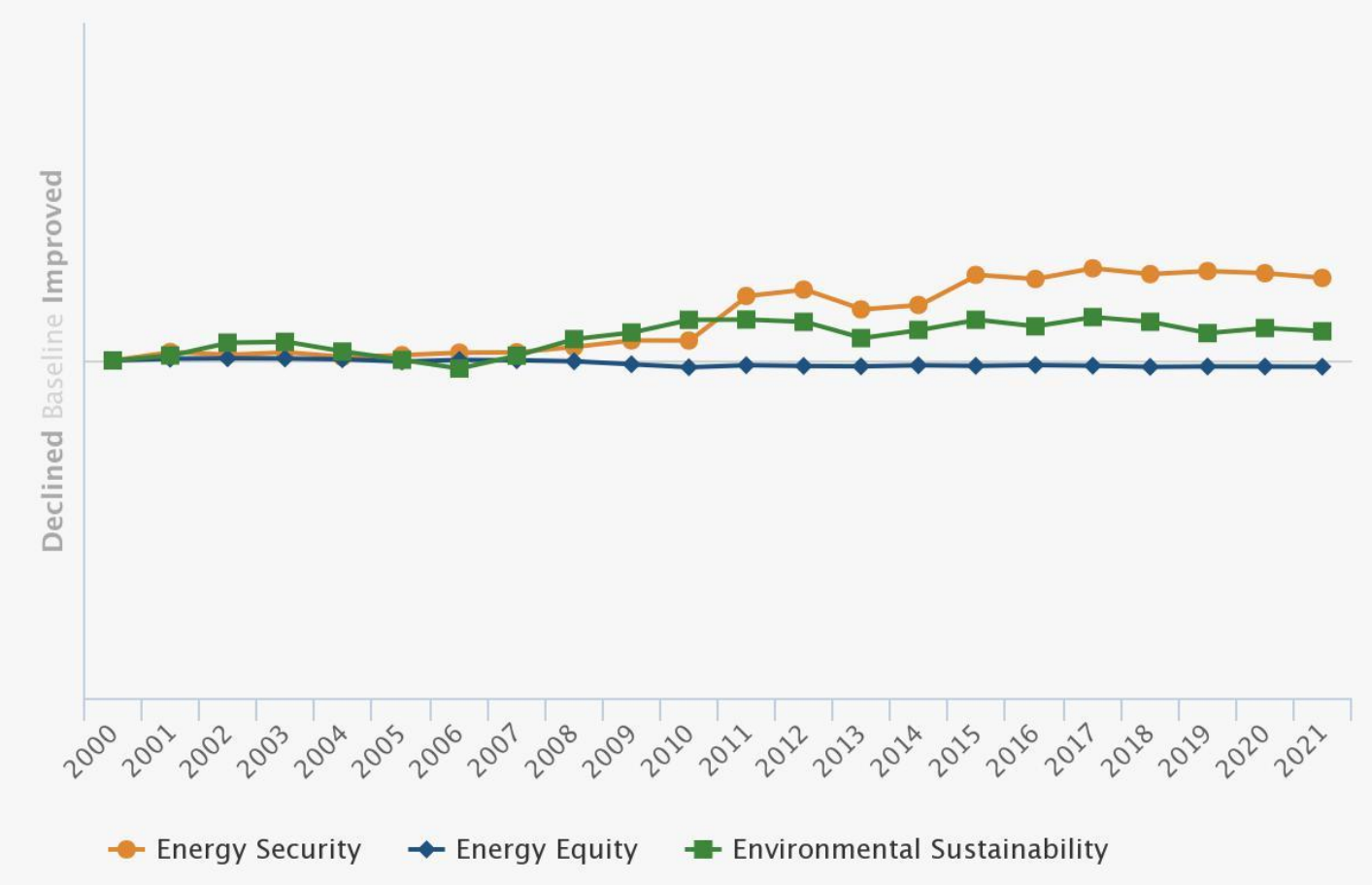
Historical Trilemma Score



Austria

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Trends and Outlook

According to initial preliminary calculations, Austria's energy consumption fell by around 7% in 2020. This is primarily due to the effects of the Corona pandemic. Travel restrictions and increased activity in the home office resulted in a sharp drop in demand for energy sources in the transport sector (-18%). Energy use in the service sector declined by -4%, as did that in the manufacturing sector (-1%). Only private households required a similar amount of energy in the pandemic year as in the previous year.

In the pandemic year 2020, coal and oil have lost market share, mainly in favour of renewables. Nevertheless, a broad energy mix remains characteristic. Coal, oil and gas accounted for 64 % of domestic energy consumption in 2020.

The Austrian federal government is committed to the Paris Agreement and to European climate change policy and has set ambitious targets, with the aim of positioning Austria as a pioneer of climate protection in Europe. The government’s policy programme for 2020 to 2024 (Austrian Federal Chancellery: Out of a Sense of Responsibility for Austria) includes its stated objective of achieving climate neutrality for Austria by 2040. The planned measures include phasing out the use of fossil fuels for building heating from 2021 onwards, '1 million roofs' photovoltaic programme, covering 100% of total electricity consumption (national balance) from renewable energy sources by 2030.

The Renewable Energy Expansion Act (EAG), which was passed by a two-thirds majority in parliament on 7 July 2021, is now a first, important step towards climate neutrality. Specifically, the annual electricity generation from renewable energies is to be increased by 27 TWh by 2030, taking strict ecological criteria into account, with 11 TWh for photovoltaics, 10 TWh for wind power, 5 TWh for hydropower and 1 TWh for biomass. In addition, investment security for existing and future plants for the production of renewable gas is to be guaranteed and the share of nationally produced renewable gas in Austrian gas sales is to be increased to 5 TWh by 2030.

A mandatory 'supplier quota' for green gas as well as a regulation to 'stop the expansion of the gas grid' will be laid down in a separate 'Renewable Gas Act', which is to be assessed in the summer of 2021.

The Renewable Energy Expansion Act provides for an 'Integrated Grid Infrastructure Plan' as a central measure. This is intended to create the energy infrastructure required for the energy transition (including sector- and technology-specific measures), to achieve better coordination between the generation, transport and consumption of electricity, gas and heat and to ensure security of supply.

The legal basis for the decarbonisation of the Austrian heating sector is to be created by a Renewable Energies Heat Act. In addition, the Federal Energy Efficiency Act and the Austrian Climate Change Act will be amended in 2021 or early 2022.

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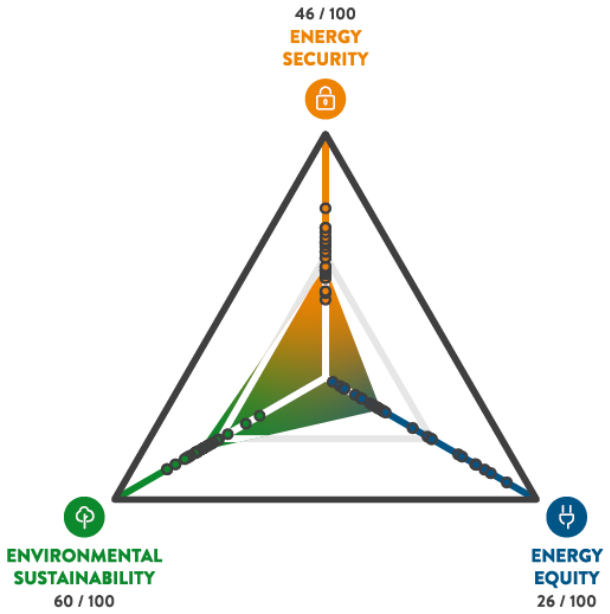
ANNEX II

Regional profiles

Africa



Source: World Energy Council

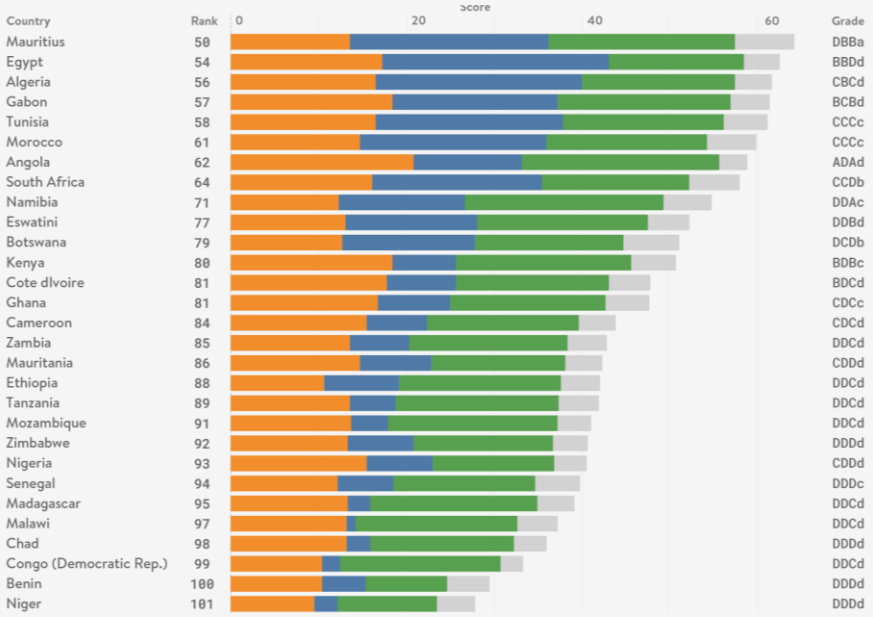
PROGRESS IN ENERGY EQUITY CONTINUES BUT ENERGY SECURITY REMAINS CHALLENGING

Despite wide geographical, demographic and economic disparities, significant progress in Energy Equity has been made across the continent. Although overall Energy Equity scores remain low, a steady year-on-year increase is apparent. But much still remains to be achieved, with access to clean, affordable and reliable energy urgently required to improve livelihoods and lifestyles. Further progress on Africa's Energy Equity challenge requires bold action to improve infrastructure, promote regional energy integration and improve public sector governance.

Environmental Sustainability has been the focus for the top five performers in the region, all of which have developed and implemented national climate action plans. However, sustainability is still a challenge for most of the region.

Energy security remains poor in many countries due to lack of investment, unreliable power generation, resource shortage, etc. but slight improvements have been seen in some areas. Top performers are focusing on energy diversification, energy efficiency and infrastructure investments to improve this dimension.

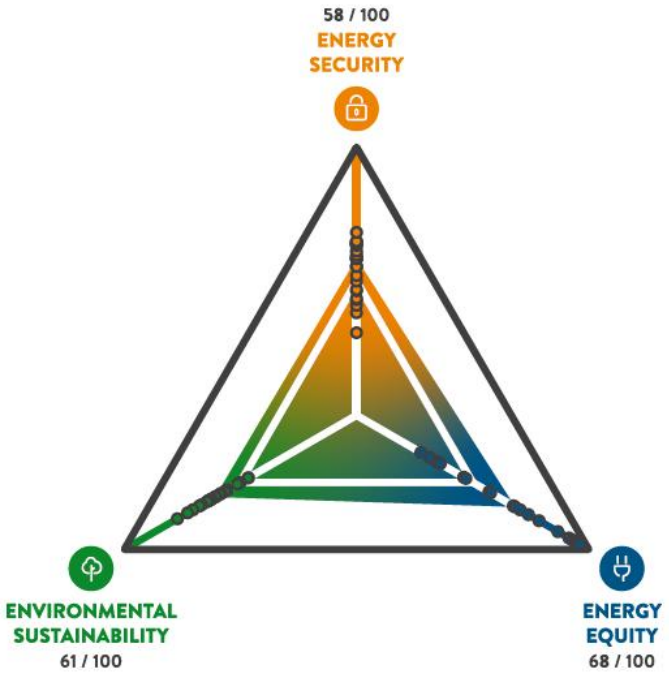
Regional profile
COUNTRY PERFORMANCE



Country	Rank	Grade
Mauritius	50	DBBa
Egypt	54	BBDd
Algeria	56	CBCd
Gabon	57	BCBd
Tunisia	58	CCCc
Morocco	61	CCCc
Angola	62	ADAd
South Africa	64	CCDb
Namibia	71	DDAc
Eswatini	77	DDBd
Botswana	79	DCDb
Kenya	80	BDBc
Cote dIvoire	81	BDCd
Ghana	81	CDCc
Cameroon	84	CDCd
Zambia	85	DDCd
Mauritania	86	CDDd
Ethiopia	88	DDCd
Tanzania	89	DDCd
Mozambique	91	DDCd
Zimbabwe	92	DDDd
Nigeria	93	CDDd
Senegal	94	DDDc
Madagascar	95	DDCd
Malawi	97	DDCd
Chad	98	DDDd
Congo (Democratic Rep.)	99	DDCd
Benin	100	DDDd
Niger	101	DDDd

Source: World Energy Council

Asia



Source: World Energy Council

INNOVATION THE KEY TO EQUITY IMPROVEMENTS

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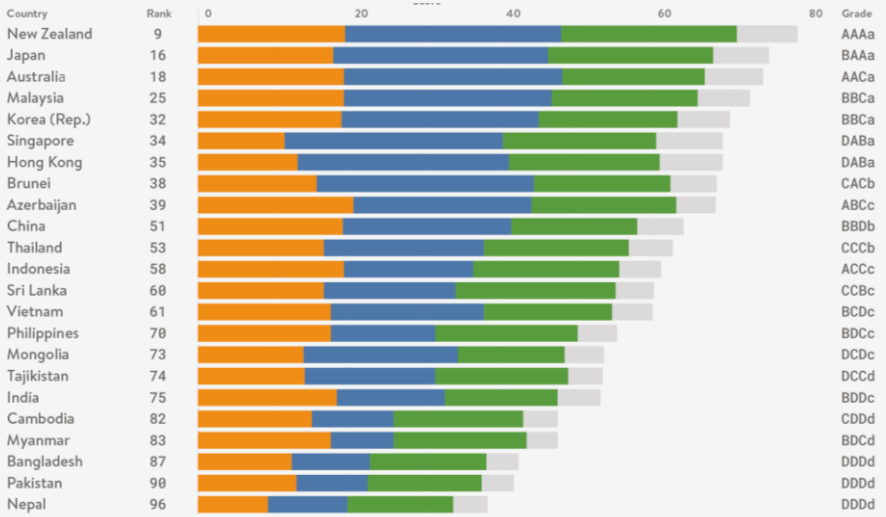
Covering a large and diverse region, Asia spans the 2021 Trilemma ranking with countries at the top and bottom of the index. While strides continue to be made in terms of Energy Equity, primarily through technology advances in 5G, Internet of Things and AI, as well as the development of energy storage systems, the region as a whole still struggles with Energy Security and Sustainability.

Energy Security is an issue for many countries with overall scores generally below the global average. Many rely heavily on energy imports to meet exponential growth in energy demand. Low levels of interconnectivity pose an additional challenge, which is difficult to overcome due to low levels of inter-governmental trust.

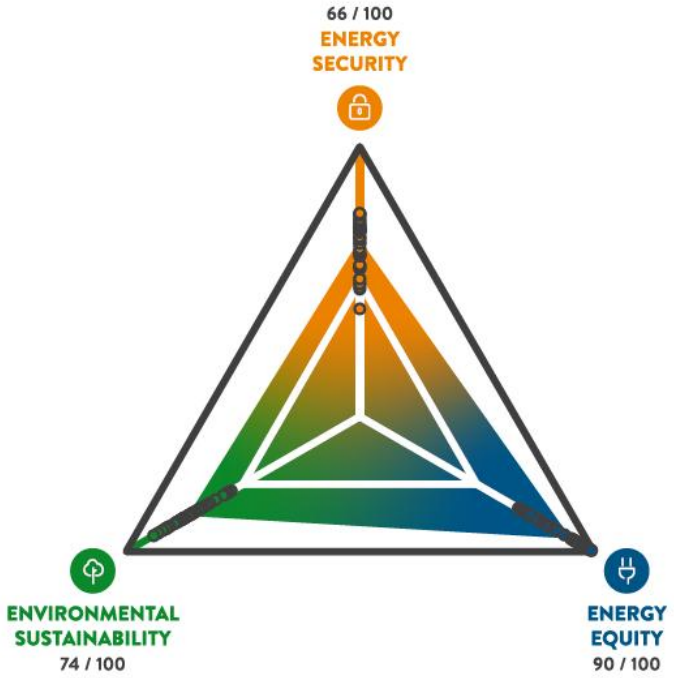
Environmental Sustainability remains flat, but an increasing number of governments have announced net-zero targets by 2050 and China has committed to net-zero by 2060. With these ambitious goals, and coordinated specific action plans, significant improvements are anticipated for future years.

Regional profile
COUNTRY PERFORMANCE



Source: World Energy Council

Europe



Source: World Energy Council

SUSTAINABILITY AT THE HEART OF THE ENERGY AGENDA

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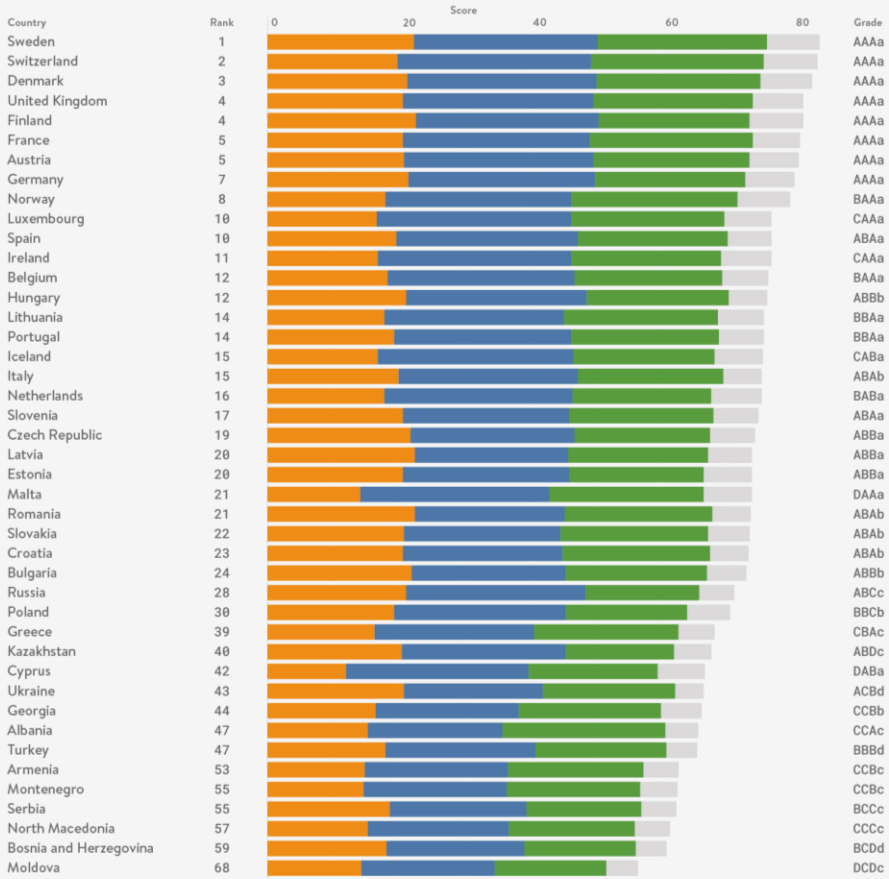
Europe continues to show leadership in balancing the Trilemma, occupying eight of the top 10 places in this year's Index. Whilst the effects of the pandemic continue to be felt, the region's overall energy agenda is firmly geared towards sustainability. Fossil fuels continue to play a declining role, with low carbon energy generation driven by renewables rising to 38% of EU electricity in 2020, overtaking coal and gas as the main electricity source for the first time.

For the countries of the EU, the Green Deal provides a robust framework for achieving ambitious climate-neutrality goals. And outside the EU27, decarbonisation is also firmly on the policy agenda. Progress in Energy Security is being achieved through diversification and interconnection, but further pressure to phase-out coal is required.

The region scores highly in Energy Equity, improving scores this year, but the pandemic has exposed some societal vulnerability and heightened concerns over energy affordability and accessibility.

Regional profile
COUNTRY PERFORMANCE

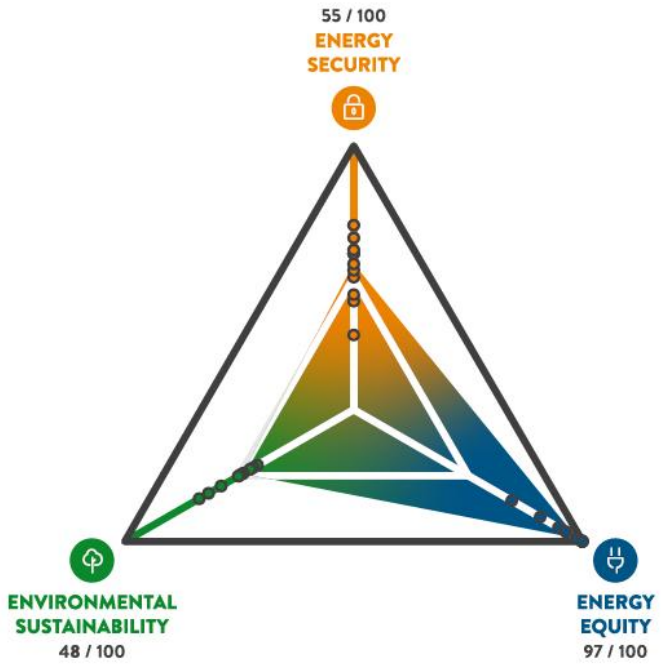


Country	Rank	Grade
Sweden	1	AAAa
Switzerland	2	AAAa
Denmark	3	AAAa
United Kingdom	4	AAAa
Finland	4	AAAa
France	5	AAAa
Austria	5	AAAa
Germany	7	AAAa
Norway	8	BAAa
Luxembourg	10	CAAa
Spain	10	ABAa
Ireland	11	CAAa
Belgium	12	BAAa
Hungary	12	ABBb
Lithuania	14	BBAa
Portugal	14	BBAa
Iceland	15	CABa
Italy	15	ABAb
Netherlands	16	BABa
Slovenia	17	ABAa
Czech Republic	19	ABBa
Latvia	20	ABBa
Estonia	20	ABBa
Malta	21	DAAa
Romania	21	ABAb
Slovakia	22	ABAb
Croatia	23	ABAb
Bulgaria	24	ABBb
Russia	28	ABCc
Poland	30	BBCb
Greece	39	CBAc
Kazakhstan	40	ABDc
Cyprus	42	DABa
Ukraine	43	ACBd
Georgia	44	CCBb
Albania	47	CCAc
Turkey	47	BBBd
Armenia	53	CCBc
Montenegro	55	CCBc
Serbia	55	BCCc
North Macedonia	57	CCCc
Bosnia and Herzegovina	59	BCDd
Moldova	68	DCDc

Source: World Energy Council

Middle East

ENERGY DIVERSIFICATION AND INTERCONNECTIVITY BECOMING APPARENT



Source: World Energy Council

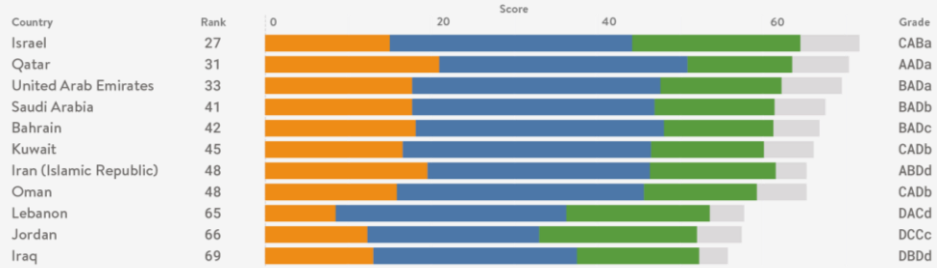
Energy Equity remains a strength across the region, with near-universal, affordable energy available in most countries.

However, resource distribution is uneven and although moves to improve the interconnectivity of gas and electricity grids are becoming apparent, Energy Security performance is lower that would be expected for such a resource-rich region.

Energy Sustainability still lags, but several Middle Eastern countries have set ambitious targets for renewables for 2030 and 2050 as part of energy diversification strategies. Concepts around creating a circular carbon economy are gaining traction, though the cost is inhibiting large-scale carbon capture and storage initiatives.

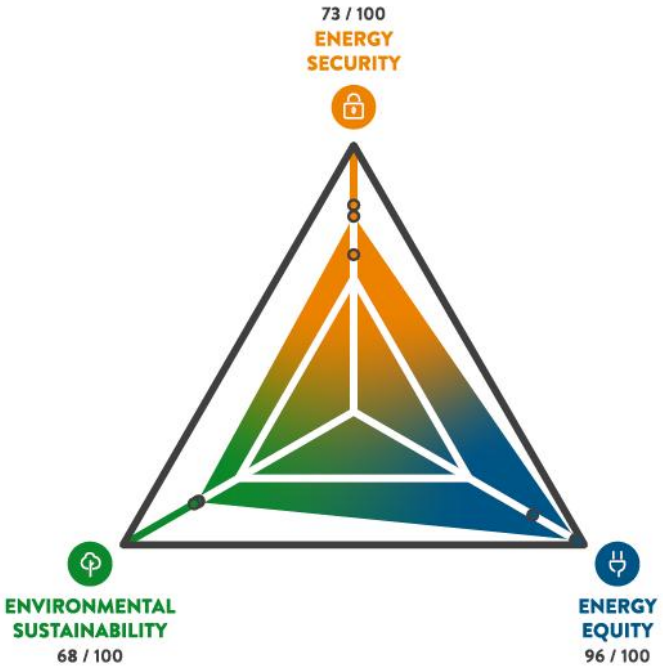
Hydrogen production is considered an opportunity for the region, with Saudi Arabia and the UAE both investing in hydrogen projects.

Regional profile
COUNTRY PERFORMANCE



Source: World Energy Council

North America



Source: World Energy Council

CHALLENGES AND OPPORTUNITIES FOR ENERGY TRANSITION

As significant energy producers and consumers, energy is a critical component of North American economies, with energy transition therefore posing big challenges alongside major opportunities.

Federal and national policy disparities in the US and Canada can hinder energy transition, impacting particularly on Energy Sustainability, which shows the greatest variation across the continent. 2021 marked the return of the US to the Paris Agreement, and the earmarking of substantial funds to support environmental and energy infrastructure investment. Canada enacted its Net Zero Accountability Act, setting legal requirements to achieve net-zero emissions by 2050, whilst Mexico has prioritised energy self-sufficiency above sustainability.

Energy Security is considered a strength, with continued resource diversification a characteristic of all three nations.

Energy Equity is considered a low-profile policy issue with widespread access to energy and energy services across the continent, but quality access and cost concerns are emerging.

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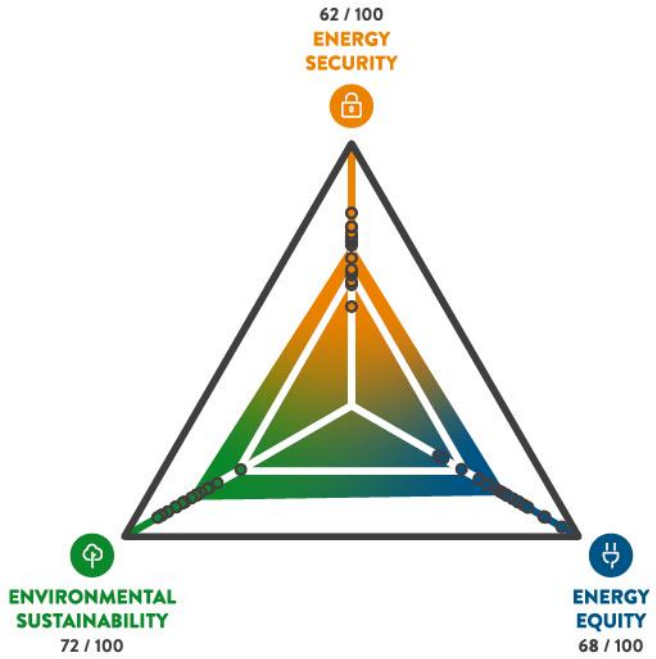
Regional profile
COUNTRY PERFORMANCE

Source: World Energy Council

Latin America

RENEWABLES SET TO SHAPE THE FUTURE



Source: World Energy Council

The deployment of renewables continues to keep pace with rising energy demand as oil and gas demand declines, with renewables firmly set to shape the future of energy across the region as countries seek to diversify.

The region scores well on the Sustainability dimension due to its significant hydro resource and the opportunities presented for hydrogen production using low-cost renewable energy for export. But, for some countries, the reliance on oil exports continues to be a major issue.

Energy equity scores have improved across the region, primarily through subsidies, but the lack of comprehensive regulatory frameworks, economic uncertainty and political stability continues to hamper balanced energy transition.

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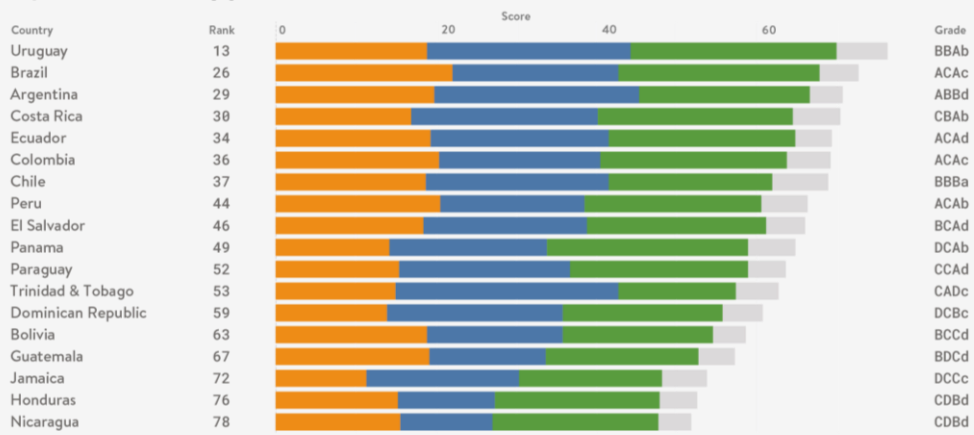
Regional profile
COUNTRY PERFORMANCE



Source: World Energy Council

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ANNEX III

Dimension Insights

SUMMARY

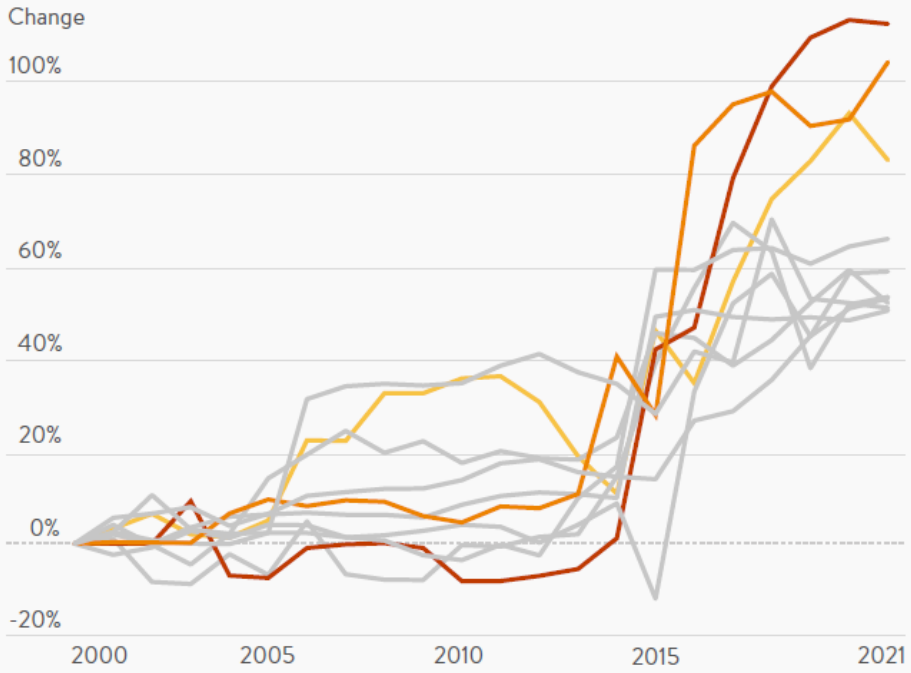
ENERGY SECURITY

WORLD ENERGY COUNCIL

TOP 10 RANK ENERGY SECURITY

Rank	Country	Energy Security Score
1	Canada	77.5
2	Finland	75.3
3	Romania	75.1
4	Latvia	74.9
5	Sweden	74.5
6	Brazil	73.5
7	United States	73.3
8	Bulgaria	73.2
9	Czech Republic	72.8
10	Germany	71.9

Top improvers in 2021 against their 2000 score



Rank	Country	% Score Improvement
1	Malta	+113%
2	Cambodia	+104%
3	Jordan	+83%
4	Cyprus	+66%
5	Kenya	+59%
6	Jamaica	+54%
7	Tajikistan	+53%
8	Dominican Rep.	+52%
9	Tanzania	+51%
10	Singapore	+51%

Source: World Energy Council

SUMMARY

ENERGY SECURITY

WORLD ENERGY COUNCIL

- Canada, Finland and Romania once again top the list of best performers in the energy security dimension, which is dominated by OECD countries.
- Significant natural resource endowment, coupled with diversification and close energy integration with neighbouring countries underpins a strong performance in this dimension. But attention should be paid to decarbonisation as well as diversification to ensure a balanced overall Trilemma score.
- Brazil is the only non-OECD country in the top 10 ranking. Its diverse energy system and decarbonised power generation underlie its strong performance, but water stresses need to be managed to create resilience.
- European Union membership and the accession process, particularly for smaller countries, has proved to be a significant catalyst for improvements in energy security.
- Increasing digitalisation of energy systems means critical attention should be paid to cybersecurity to ensure system resilience.
- Diversifying a country's energy mix improves energy security scores.

SUMMARY

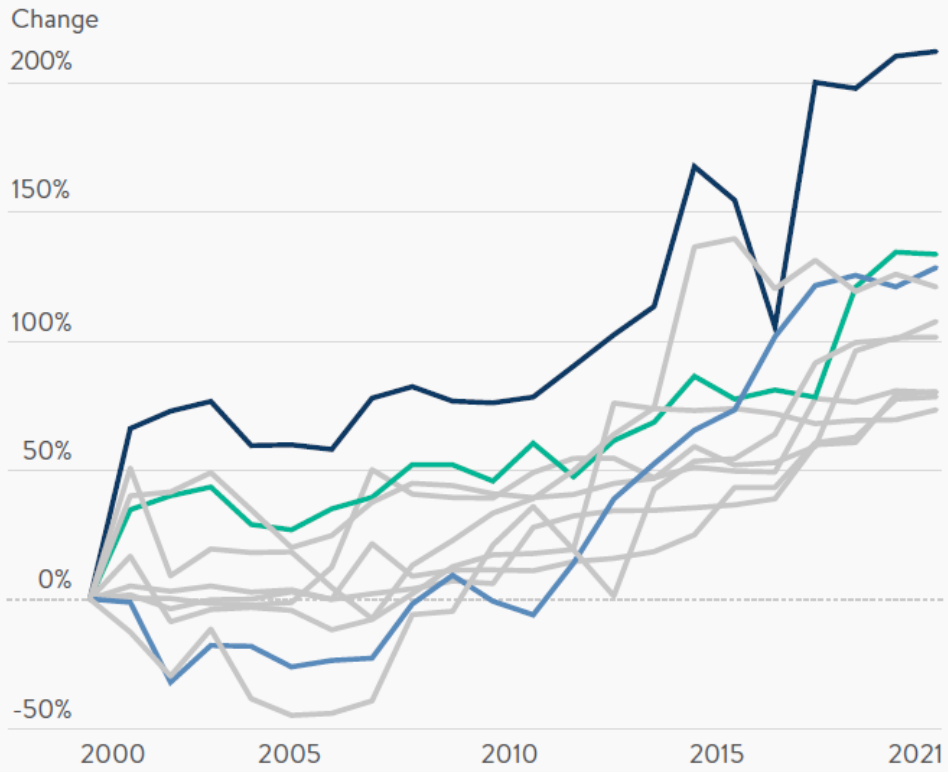
ENERGY EQUITY

WORLD ENERGY COUNCIL

TOP 10 RANK ENERGY EQUITY

Rank	Country	Energy Equity Score
1	Qatar	99.9
1	Kuwait	99.8
1	UAE	99.8
2	Oman	99.6
2	Bahrain	99.6
3	Iceland	99.2
4	Luxembourg	99.0
5	Ireland	98.4
6	Switzerland	98.0
7	Saudi Arabia	97.4
7	Israel	97.4
8	United States	97.1
9	United Kingdom	96.8
10	Denmark	96.4
10	Austria	96.4

Top improvers in 2021 against their 2000 score



Rank	Country	% Score Improvement
1	Nepal	+212%
2	Cambodia	+134%
3	Kenya	+129%
4	Benin	+121%
5	Ethiopia	+108%
6	Bangladesh	+102%
7	Sri Lanka	+80%
8	Iraq	+80%
9	Mongolia	+78%
10	Nigeria	+73%

Source: World Energy Council

SUMMARY

ENERGY EQUITY

WORLD ENERGY COUNCIL

- Gulf countries continue to dominate the top 10 Energy Equity performers for 2021, with Qatar, Kuwait and the UAE sharing top billing. Small, wealthy nations with high GDP, strong interconnections, low energy prices through subsidy and/or significant easily extractable energy resources characterise the countries at the head of the list.
- Progress is being made on reducing subsidies, with the aim of stimulating energy supply diversification.
- New entrants to the top 10 include several Northern European countries that have been successfully exploited their own ‘natural energy resources’ and interconnectedness to a pan-European energy system.
- Kenya, Ethiopia, Bangladesh and Nepal have made continued and consistent improvements in their energy equity scores since 2000. A focus on large urban and rural electrification schemes, in combination with rising GDP per capita and decreasing energy prices have been key to energy equity success.
- India, Morocco and El Salvador join the list of top improving countries for energy equity, but have taken different pathways on their journey.
- But more than 700 million people still do not have access to basic energy, or clean fuels and technology, particularly in Sub-Saharan Africa – continued progress on SDG7 is an imperative.

SUMMARY

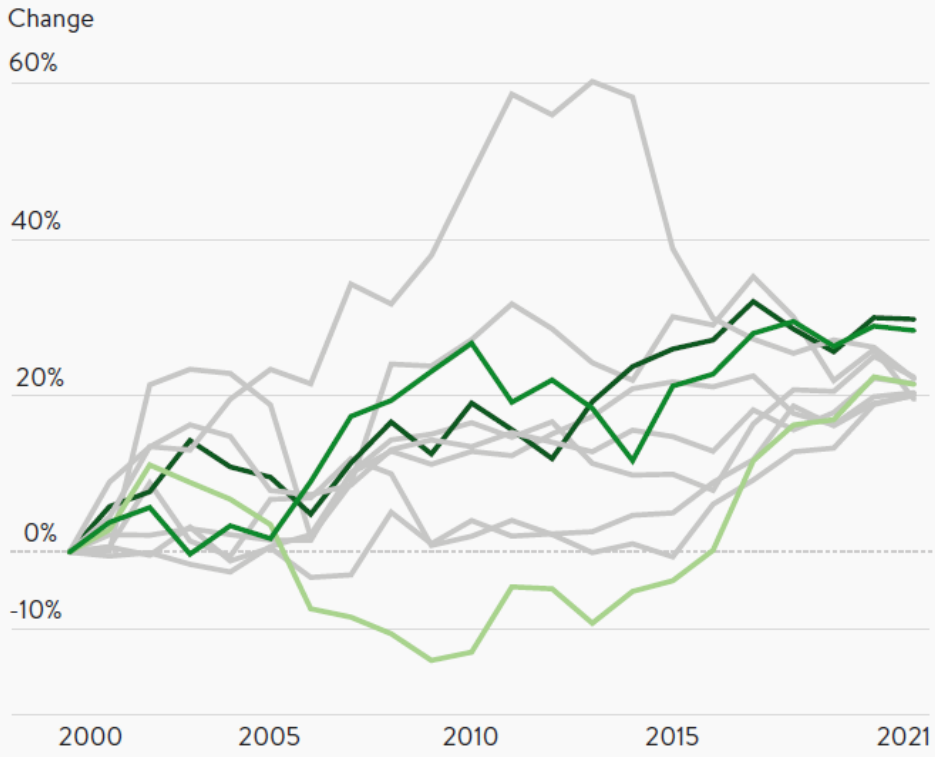
ENVIRONMENTAL SUSTAINABILITY

WORLD ENERGY COUNCIL

TOP 10 RANK SUSTAINABILITY

Rank	Country	Sustainability Score
1	Switzerland	88.2
2	Sweden	86.3
3	Uruguay	85.4
4	Norway	84.4
5	Panama	83.7
6	Brazil	83.4
7	Denmark	83.0
8	France	82.7
9	Albania	82.5
10	United Kingdom	81.3

Top improvers in 2021 against their 2000 score



Rank	Country	Score Improvement
1	Denmark	+30%
2	Azerbaijan	+28%
3	Ukraine	+22%
4	Myanmar	+22%
5	Thailand	+22%
6	China	+21%
7	Ireland	+20%
8	Panama	+20%
9	Malta	+20%
10	Serbia	+19%

Source: World Energy Council

SUMMARY

ENVIRONMENTAL SUSTAINABILITY

WORLD ENERGY COUNCIL

- Switzerland, Sweden and Uruguay head the top ten in the Environmental Sustainability dimension.
- Uruguay's significant progress is the result of energy diversification into wind and solar to complement its existing hydropower resource.
- Denmark, Azerbaijan and the Ukraine once again lead the top improvers in a list that sees few changes from 2020.
- A rapid shift away from coal must be made if Paris Agreement goals are to remain within reach.

WORLD ENERGY COUNCIL

THANK YOU!