

# A more sustainable path to development

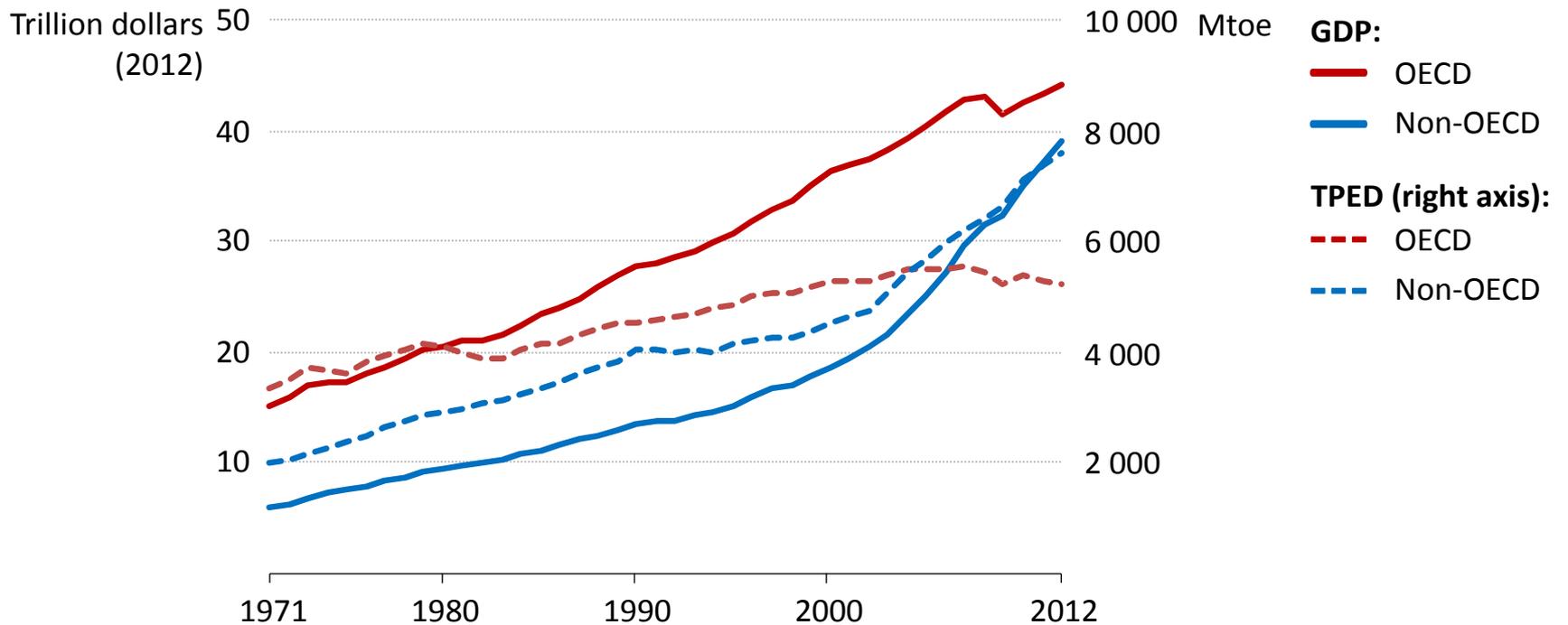
World Energy Trilemma

Joan MacNaughton

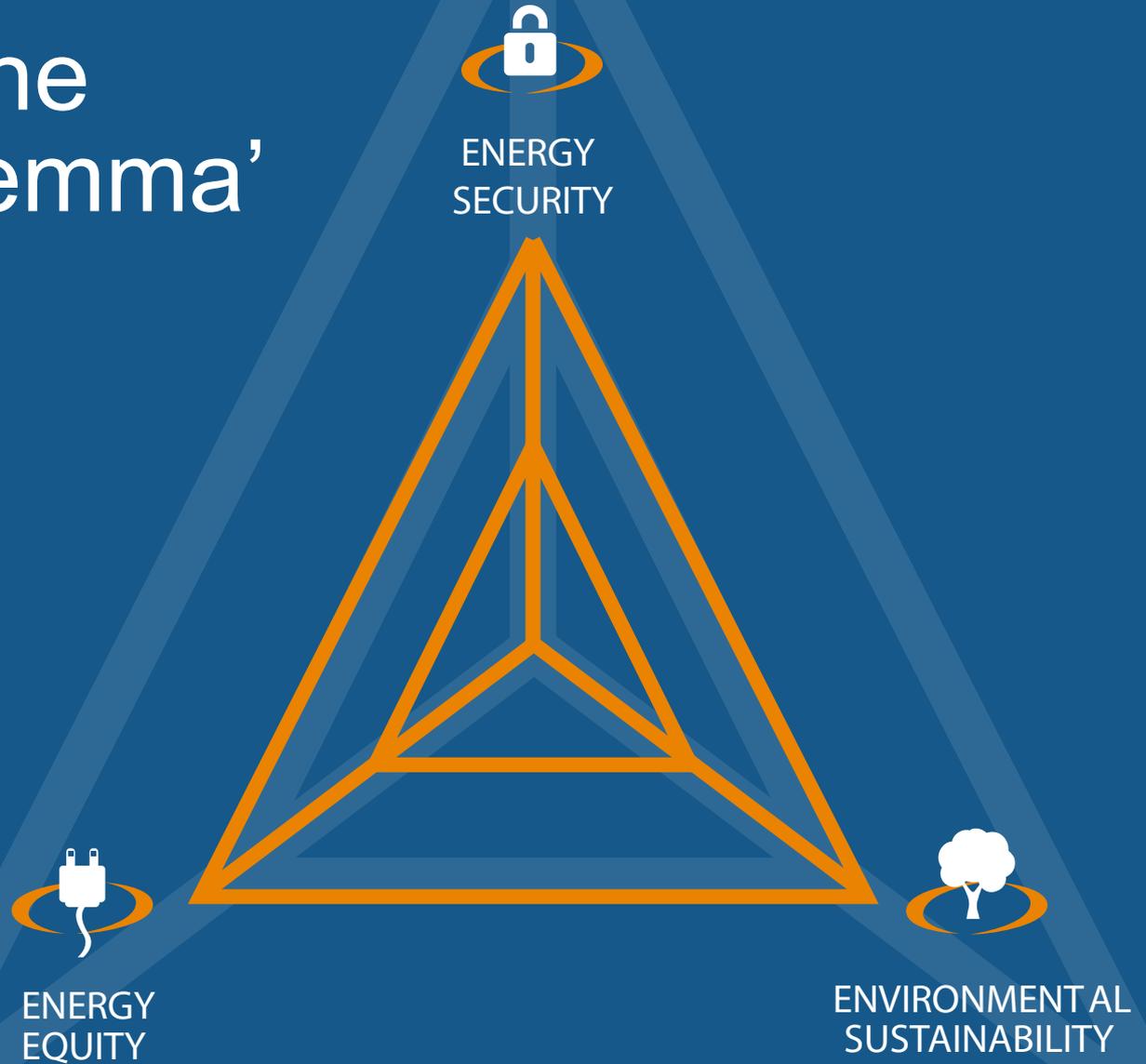
Colorado, March 2014



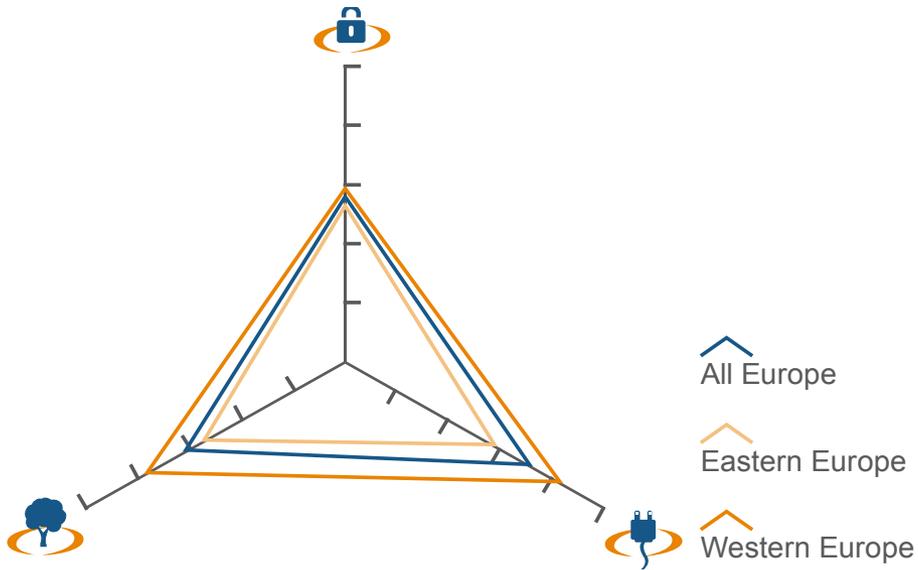
# Energy Demand and GDP



# Balancing the 'Energy Trilemma'

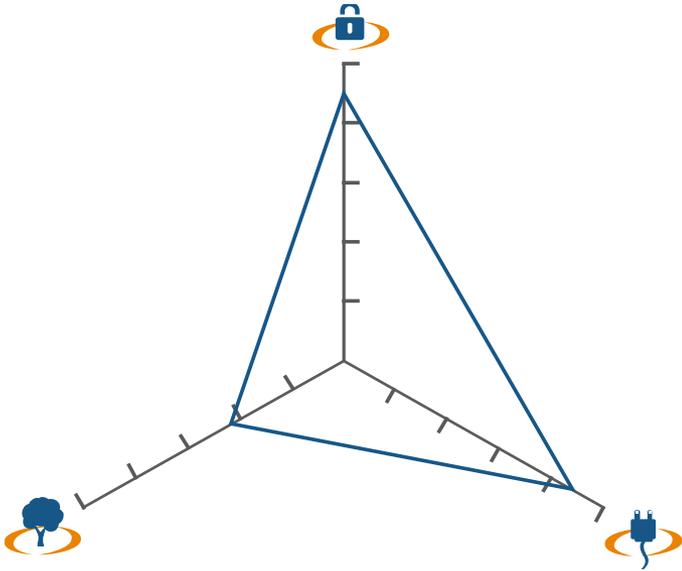


# Europe



Western Europe		Eastern Europe	
Austria	Luxembourg	Albania	Poland
Belgium	Malta	Bulgaria	Romania
Cyprus	Netherlands	Croatia	Russia
Denmark	Norway	Czech Rep.	Serbia
Finland	Portugal	Estonia	Slovakia
France	Spain	Hungary	Slovenia
Germany	Sweden	Latvia	Ukraine
Greece	Switzerland	Lithuania	
Iceland	Turkey	Macedonia	
Ireland	United Kingdom	Moldova	
Italy		Montenegro	

# North America



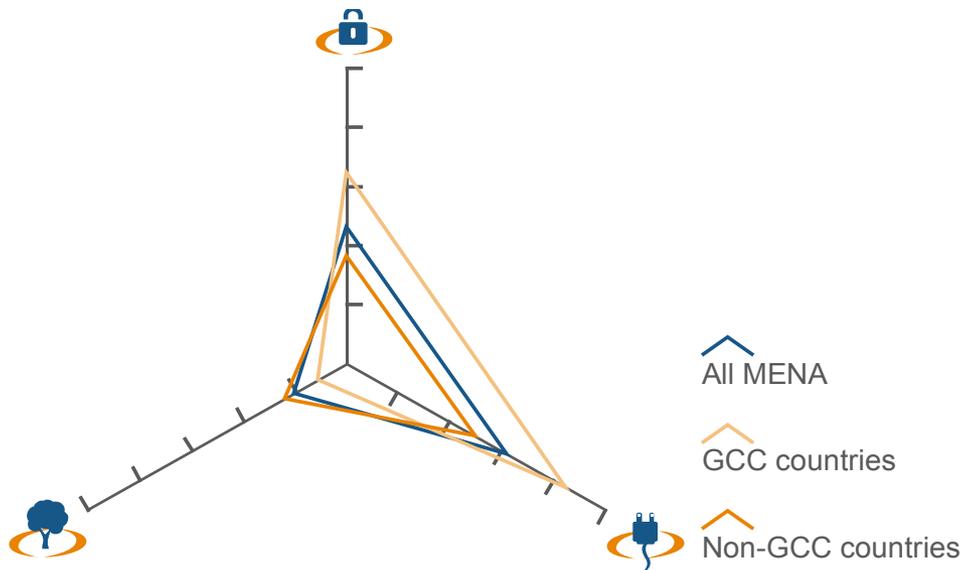
## North American countries

Canada

Mexico

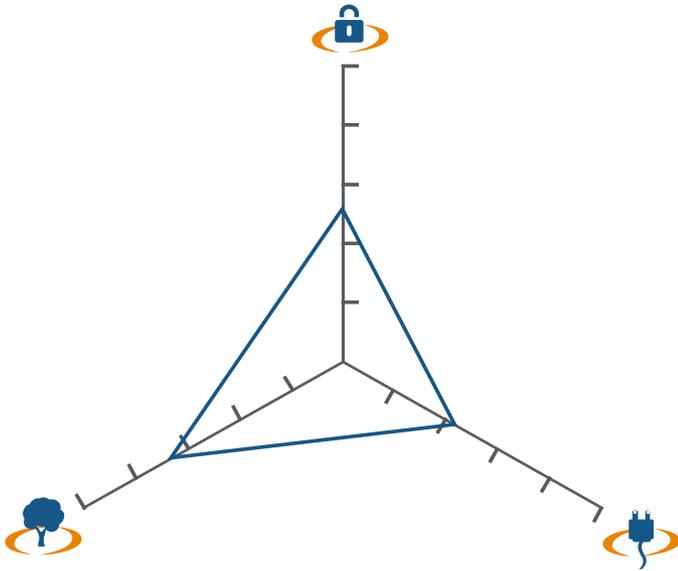
United States

# Middle East and North Africa



GCC countries	Non-GCC countries	
Bahrain	Algeria	Syria
Kuwait	Egypt	Tunisia
Oman	Iran	Yemen
Qatar	Israel	
Saudi Arabia	Jordan	
United Arab Emirates	Lebanon	
	Libya	
	Morocco	

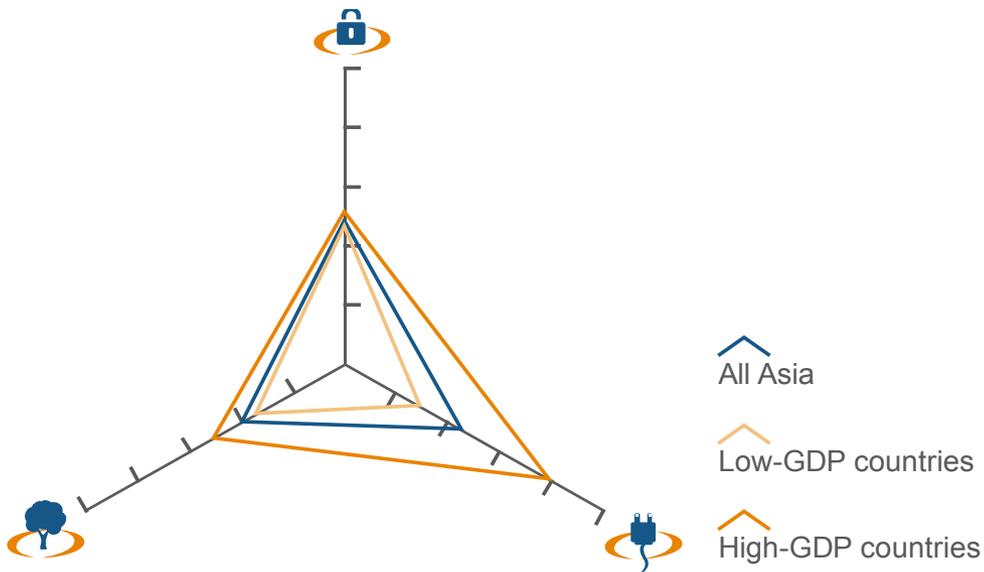
# Latin America and the Caribbean



## LAC countries

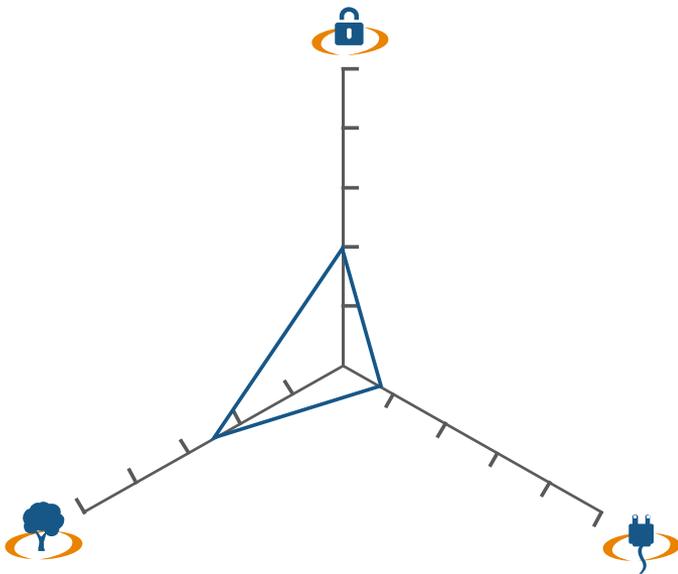
Argentina	Jamaica
Barbados	Nicaragua
Bolivia	Panama
Brazil	Paraguay
Chile	Peru
Colombia	Uruguay
Costa Rica	Venezuela
Dominican Republic	
Ecuador	
El Salvador	
Guatemala	
Honduras	

# Asia



Low-GDP countries	High-GDP countries
Armenia	Australia
Azerbaijan	Hong Kong, China
Bangladesh	Japan
Cambodia	Korea (Rep.)
China	Malaysia
Georgia	New Zealand
India	Singapore
Indonesia	Taiwan, China
Kazakhstan	
Mongolia	
Nepal	
Pakistan	
Philippines	
Sri Lanka	
Tajikistan	
Thailand	
Vietnam	

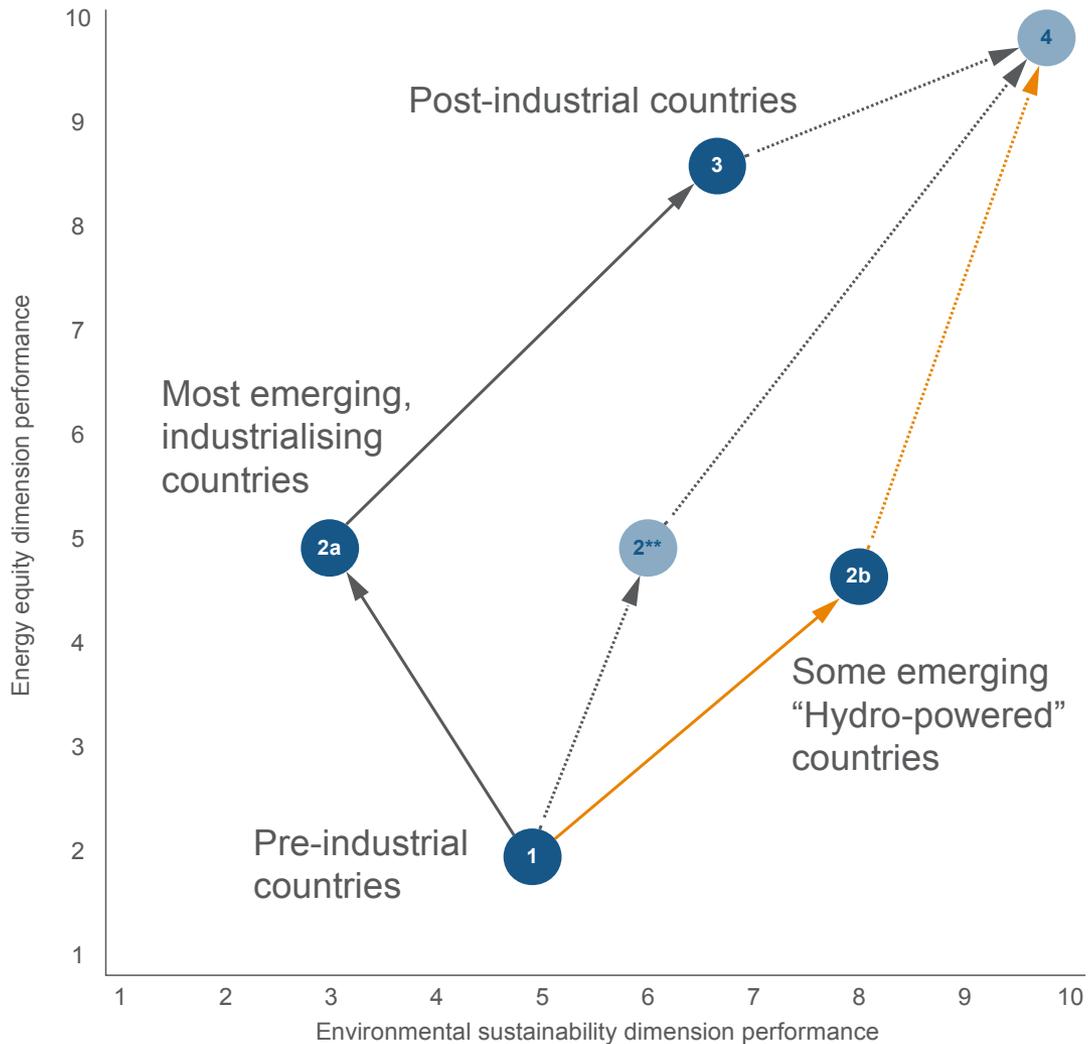
# Sub-Saharan Africa



## Sub-Saharan African countries

Angola	Ghana	Nigeria
Benin	Kenya	Senegal
Botswana	Madagascar	South Africa
Cameroon	Malawi	Swaziland
Chad	Mauritania	Tanzania
Congo (Dem. Rep.)	Mauritius	Zimbabwe
Côte d'Ivoire	Mozambique	Zambia
Ethiopia	Namibia	
Gabon	Niger	

# An opportunity for developing countries



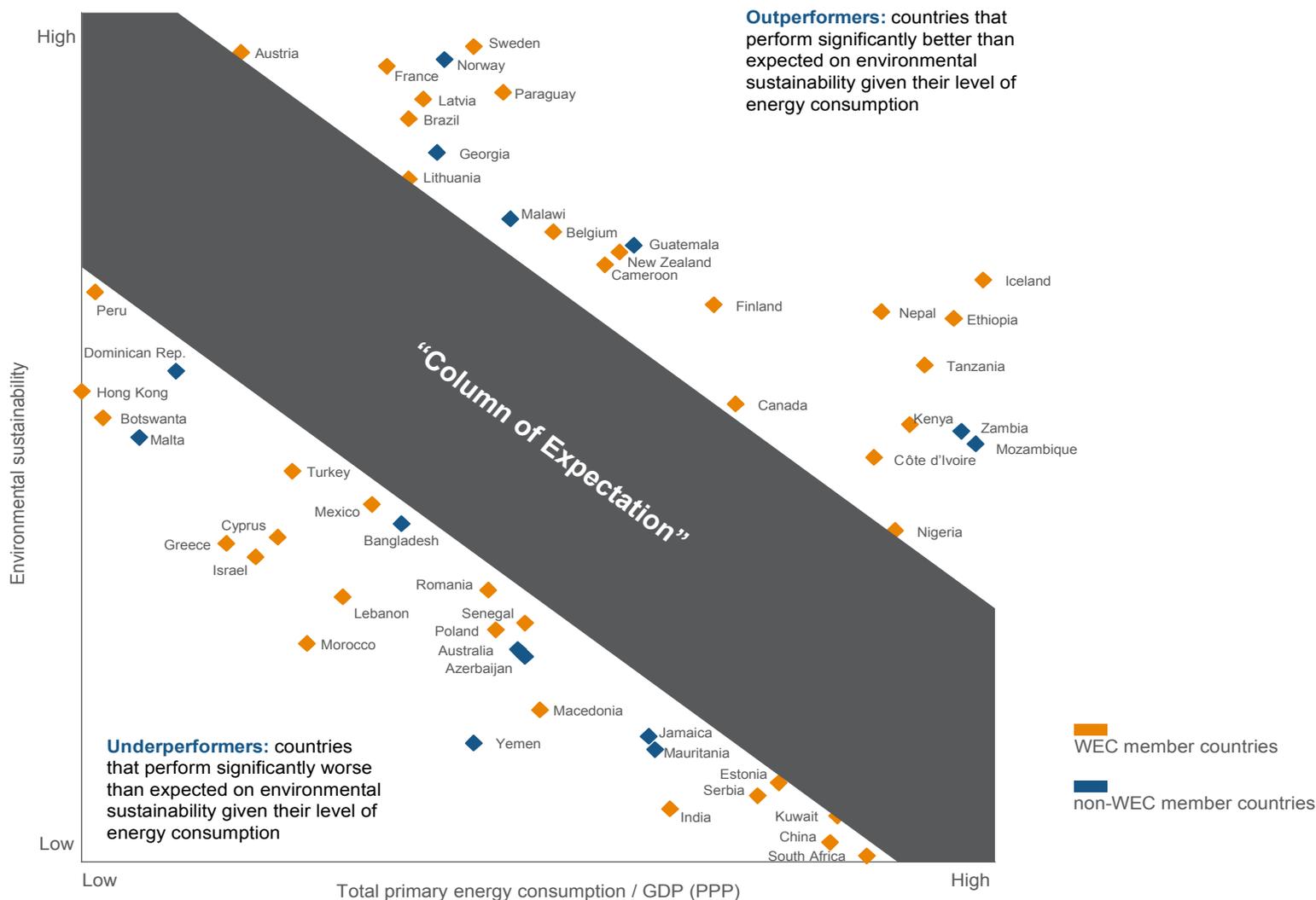
# *Thank you*

Any questions?

[www.worldenergy.org](http://www.worldenergy.org)  
[@WECouncil](https://twitter.com/WECouncil)



# Outperformers and underperformers



# Energy Sustainability Index structure

Total score	Indicator type	Dimension	Indicators
Country performance <b>100%</b>	<b>1. Energy performance</b> <b>75%</b>	<b>1.1 Energy Security</b> <b>25%</b>	<ul style="list-style-type: none"> <li>1.1.1 Ratio of total energy production to consumption <span style="float: right;">1/6 Each</span></li> <li>1.1.2 Diversity of electricity generation</li> <li>1.1.3 Distribution losses as a percentage of generation</li> <li>1.1.4 Five year CAGR of the ratio of TPEC to GDP</li> <li>1.1.5 Days of oil and oil product stocks</li> <li>1.1.6a For importers – Net fuel imports as a percentage of GDP</li> <li>1.1.6b For exporters – Fuel exports as a percentage of GDP</li> </ul>
		<b>1.2 Energy equity</b> <b>25%</b>	<ul style="list-style-type: none"> <li>1.2.1 Affordability of retail gasoline <span style="float: right;">1/2 Each</span></li> <li>1.2.2 Affordability and quality of electricity relative to access</li> </ul>
		<b>1.3 Environmental sustainability</b> <b>25%</b>	<ul style="list-style-type: none"> <li>1.3.1 Total primary energy intensity <span style="float: right;">1/2 Each</span></li> <li>1.3.2 CO<sub>2</sub> intensity</li> <li>1.3.3 Effect of air and water pollution</li> <li>1.3.4 CO<sub>2</sub> grams/kWh from electricity generation</li> </ul>
	<b>2. Contextual performance</b> <b>25%</b>	<b>2.1 Political strength</b> <b>8.3%</b>	<ul style="list-style-type: none"> <li>2.1.1 Political stability <span style="float: right;">1/4 Each</span></li> <li>2.1.2 Regulatory quality</li> <li>2.1.3 Effectiveness of government</li> </ul>
		<b>2.2 Societal strength</b> <b>8.3%</b>	<ul style="list-style-type: none"> <li>2.2.1 Control of corruption <span style="float: right;">1/3 Each</span></li> <li>2.2.2 Rule of law</li> <li>2.2.3 Quality of education</li> <li>2.3.4 Quality of health</li> </ul>
		<b>2.3 Economic strength</b> <b>8.3%</b>	<ul style="list-style-type: none"> <li>2.3.1 Cost of living expenditure <span style="float: right;">1/3 Each</span></li> <li>2.3.2 Macroeconomic stability</li> <li>2.3.3 Availability of credit to the private sector</li> </ul>

# Five profiles of the energy trilemma highlight common challenges

	Illustrative members	Key strengths	Core Challenges
Pack Leaders	Switzerland, Denmark	Overall performance and balance	Ensuring achievement of 2020 climate targets
Fossil-fuelled	United Arab Emirates, Malaysia, Saudi Arabia	Affordability and security of energy	Energy and emission intensity challenges
Highly-industrialised	India, Mexico	Energy security and strong GDP growth	Rapid industrial growth and impacts
Hydro-powered	Brazil, Colombia	Use of renewables leads to low emissions and higher electrification rates	Improve energy access and affordability
Back of the Pack	Zimbabwe, Nicaragua	Not yet locked in to fossil fuel heavy development path	Investment challenges