Chapter 6
Scenarios and pathways to a sustainable future

Adrian Cashman, Andre Joseph-Witzig, Dianne Roberts, Desiree Daniel, Neema Ramlogan, Rishard Khan, Judlyn Telesford-Checkerly, Brian Neff, Thera Edwards, Ryan Mohammed, Edmond McSween, Karrym Forsyth

“scenarios are stories. They are works of art, rather than scientific analyses. The reliability of their content is less important than the types of conversations and decisions they spark.”

de Geus, A. (2002). *The Living Company*. Harvard Business Press

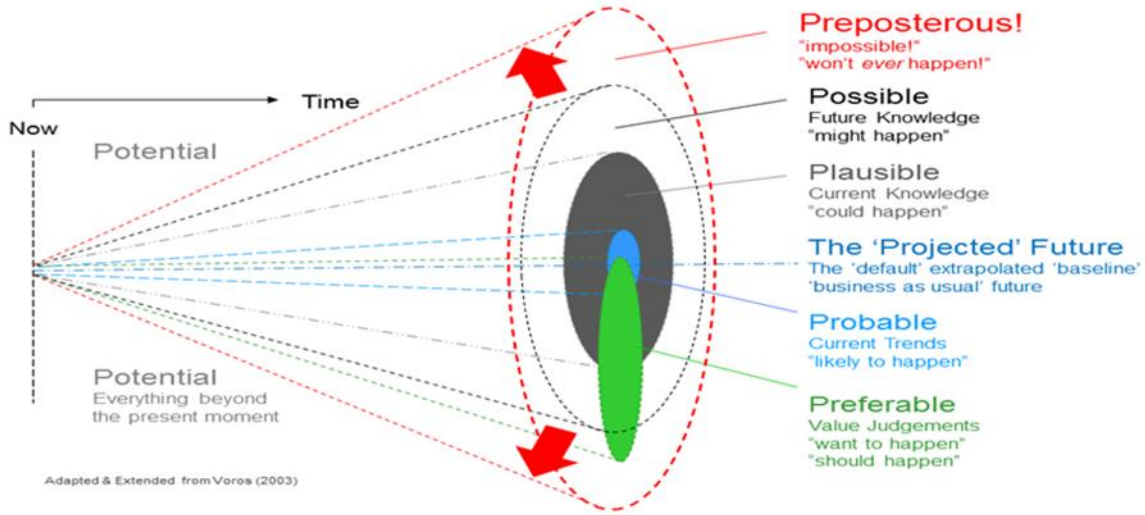
Head of Group Planning at Shell

Purpose of the Chapter

- To present a set of contrasting future scenarios of Grenada.
- To use the insights to assess the possible states of biodiversity and ecosystem services within each of the future scenarios.
- To use the contrasting scenarios to inform decision-making that would support biodiversity and ecosystems services.

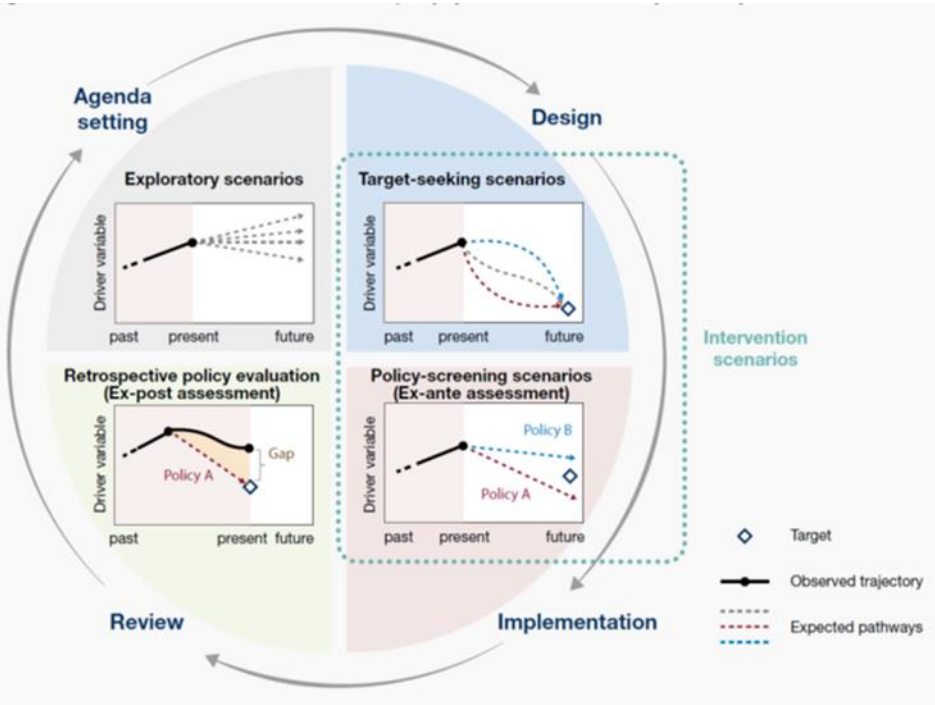
What are scenarios?

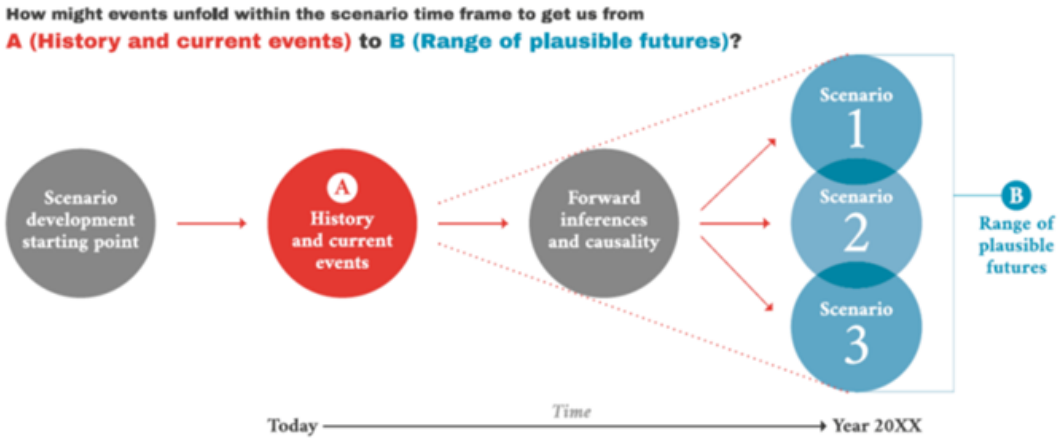
- Scenarios are a systematic approach to inform present day decisions that affect future outcomes.
- They generate ideas about the future to anticipate and better prepare for change.
- Scenarios are an exploration of different **plausible** futures, and the opportunities and challenges they could present.



Generating Grenada Sce

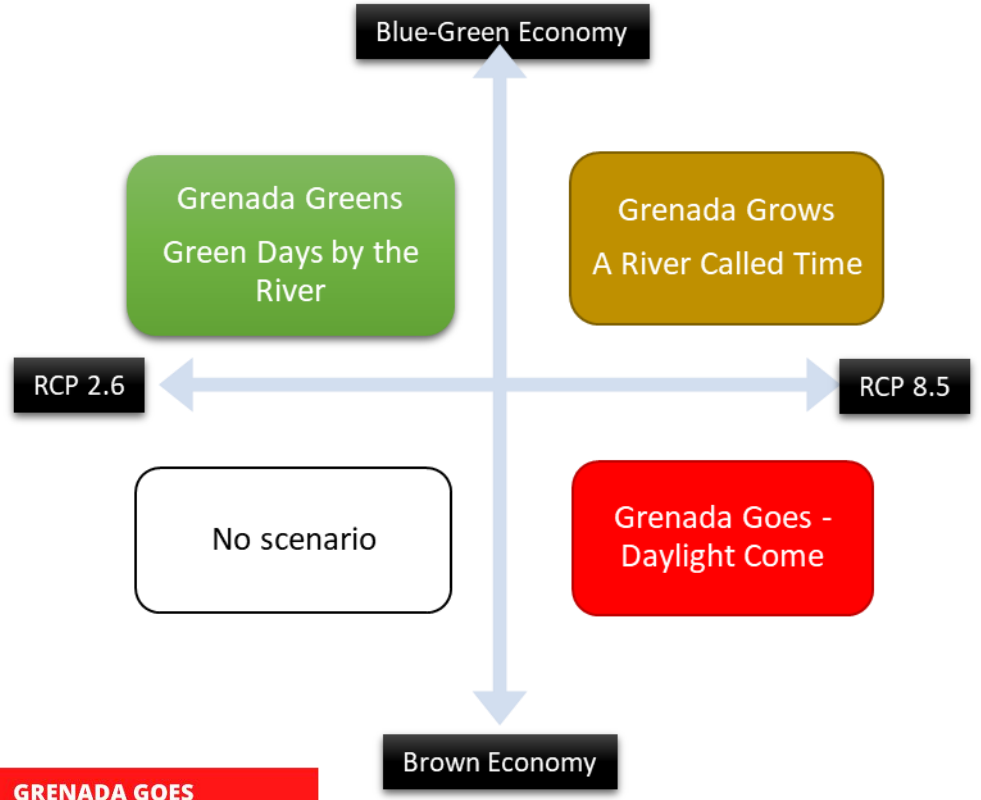
- Adopted an Exploratory approach
- Stakeholder Workshop to identify Critical Uncertainties affecting BESS
- Time horizon - 2050

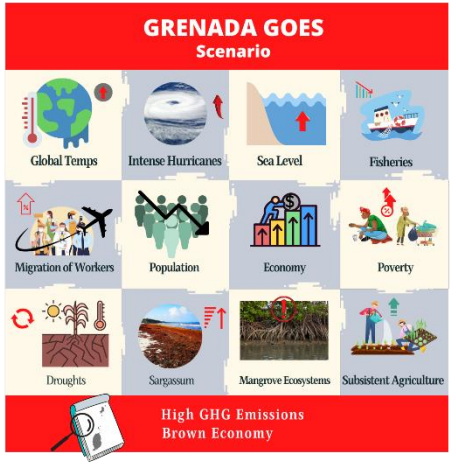




The Grenada Scenarios

- Critical Uncertainties
  - State of Grenada's economy
  - State of Climate Change
- Three possible scenarios identified
  - Grenada Greens
  - Grenada Grows
  - Grenada Goes





Scenario narratives

Developed from:

- Literature review and case studies
- Archetypes
- Scenario studies e.g.:
  - United States National Intelligence Council, the IPCC's Shared Socioeconomic Pathways, the Millennium Ecosystem Assessment, the Inter-American Development Bank's Latin America and the Caribbean 2030: Future Scenarios, Arup's 2050 Scenarios and GloLoCarSce Regional Scenarios
- IPBES Regional Assessments
- UNEP's Foresight Briefs
- Horizon scanning

Scenario narratives

- For each scenario a detailed descriptive narrative was developed
- Each narrative reviewed
- Summary narrative of 1½ pages developed for the Chapter
- Key features of each scenario are shown in the next slide

	Grenada Greens	Grenada Grows	Grenada Goes
Global conditions	At a global level the World moves towards sustainability and inclusive development with human well-being garnering greater focus and investment. There is low material growth and reduced energy intensity and resource use. Regional focus of trade and development within an expanded and integrated Caribbean economic area. Increased access to financing structures such as Loss & Damage through the Bridgetown Initiative and agreement on Reparations. CARICOM reinvigorated.	Initially characterised by a bipolar world of competing hegemonic economic blocks. Continued exploitation of fossil fuel led to a climate crisis which resulted in international cooperation to adapt to a warmer world. Increased funding flows to Caribbean channelled through the private sector. Increased importance of role of the OECS.	Global population has increased to 10 billion people, with increased inequalities and poverty levels. Geopolitical challenges include migration, war, and conflicts over water resources continue to threaten attainment of key development targets. The goal of limiting temperatures to less than 2°C has not been achieved. Weakened and ineffective CARICOM, dominance by and increased dependence on the USA by the Region. Fragmented international collaboration and limited access to international funding.
Demographics	Population 128,000. Small family sizes. Important middle class. Dependency ratio 60%	Population 136,000. Ageing population, slowing growth. Dependency ratio 55%.	Population 122,000. High level of outward migration and high rates of unemployment. Dependency ratio 70%
Education	Sustained investment in quality education	Private sector led educational improvements	Little improvement in quality of education
Energy	Uptake and use of renewable energy.		
Technology	Widespread adoption of new technologies and application across sectors. Application to environmental management.	Adoption of technology mostly in the business sectors	Little uptake and use of new technology – some niche areas
Economy	Diversified economy including food production systems, tourism, education, research & development, health and wellness, business services. Food exports. Growth of integrated economic production zone Grenville. GDP/capita US$17,200.	Diversified economy. Growth in manufacturing and light engineering as well as IT services and services provision. Tourism education, construction, and services continue to be important. Food production, terrestrial and marine have been growth areas. GDP/capita US$16,900	Low skilled, emphasis on tourism remains. Other important sectors include education, construction and services with agriculture and fisheries a long way behind. High youth unemployment. GDP/capita US$11,900
Urbanisation	70% of population is urban. Planned urban environments. Emergence of Grenville and a major urban centre	50% of population is urban	50% of population is urban, growth of urban sprawl
Land use	Establishment of Nature Protection areas. Limited expansion into previously cultivated areas.	Establishment of Nature Protection areas. Some expansion into previously cultivated areas.	Expansion into previously cultivated areas.
Community	Stable, prosperous society	Relatively prosperous society. Emergence of extra-national influences & private sector	Increasing crime rates. Growth of elites
Food production	Growth in commercial diversified food production sector. Use of technology	Growing commercial food production	Subsistence agriculture prevalent
Marine economy	Growth of offshore seaweed & fish farming	Near shore coastal marine farming and aquaponics	Collapse of traditional fisheries
Government	Strong fiscal position growth of collaborative governance arrangements. Sub-regional integration. Strong focus on sustainability.	Focus on economic growth. Partnerships with the OECS, small civil service. Fiscal space to provide services.	Weak fiscal position undermines governance
Environmental Policies & Regulation	Strong regulation and ability to implement policies.	Good level of regulation, focus on adaptation rather than mitigation.	Weak environmental management

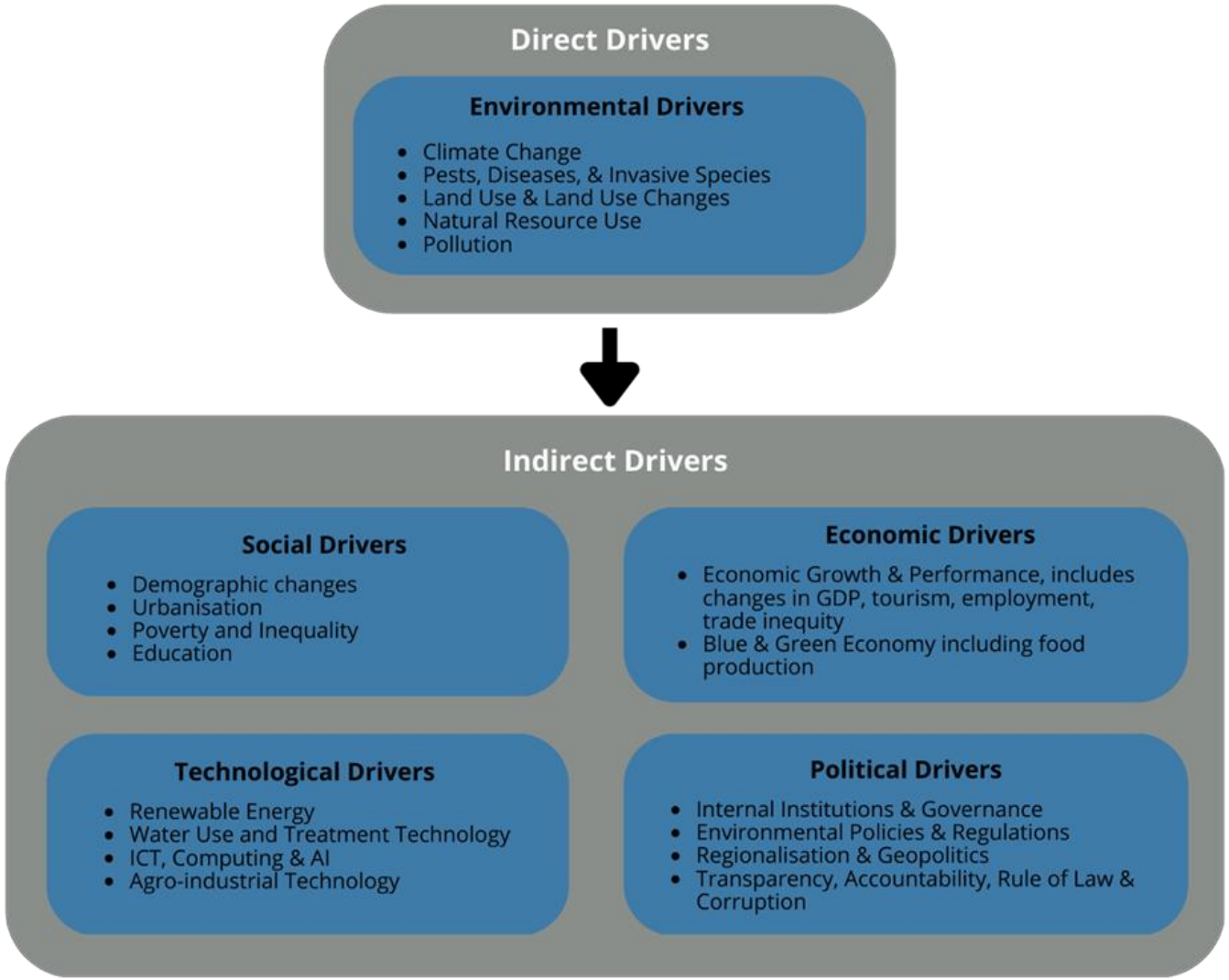
Impact on Biodiversity and Ecosystems

Changes in BESS under each of the scenarios were inferred:

- Drivers of Change of Biodiversity and Ecosystem Services across the Three Scenario
- Changes in Biodiversity and Ecosystem Services under each Scenario
- Changes in Ecosystem Goods and Services under the Three Scenarios

Summarised in tables with accompanying explanatory text.

Drivers of Change of Biodiversity and Ecosystem Services



Drivers of Change in BES	Grenada Greens	Grenada Goes	Grenada Grows
Social Drivers			
Population and demographic change	Population increases very slightly to 128,000 brought about by declines in fertility and a focus on economic well-being. Dependency ratio increases to 60%. Lower population numbers have a positive impact on BES. ↘	Population decreases to 122,000 driven by outward migration in search of employment opportunities leading to a loss of working age persons. Dependency ratio increases to 70%. Increases pressures on BES. ↘	Population increases to 136,000. More people are in the workforce with dependency ratio at 55%. Increases in population exert pressures on BES but in this scenario they are neutral in driving change. ↗
Urbanisation	Increased rate of urbanisation, 70% of the population urbanised, concentrated in Greater St Georges, Grenville and Gouyave. Quality of the urban environment is high with emphasis on sustainability. Positive impact on the environment and especially urban ecosystems. →	Slow growth of urban areas, increasing to 50% of the population. Urban sprawl is an issue with poor access to services. Increase in tourism developments. Overall although some increase in negative impacts on the environment, it is offset by decrease in population. Although negatively impacting the environment this is mitigated by the lower population. →	Slow growth of urban areas, increasing to 50% of the population. Improvements in access to services, urban development is better planned but increases in population mean an expansion of urban areas, affecting the environment. Absolute increase in urbanisation has a negative impact on the environment overall. ↗
Poverty	Reduction in poverty levels and overall the population is economically better off and there are more in the middle class. Reduced poverty and greater affluence positively reduces pressures on the environment. Social inequalities are less and there is a greater degree of equity. ↘	Decrease in extreme poverty but continued pockets of poverty. However, 50% of the population is classed as lower income. Increases pressures on the environment. Social inequalities sharpen with implications for crime. ↗	Decrease in extreme poverty with 40% of the population in the lower income group. Impact on the environment is neutral as there are fewer in extreme poverty having transitioned into the low income groups and a small increase in higher income groups. Social inequalities have lessened to a certain extent and there are some gains in equity across society. ↘
Education	High investment in education and an expansion of the tertiary education sector has led to a skilled and educated workforce. High numbers going on to tertiary education. Positive impact on the state of the environment.	Fall in school aged population. Little improvement in learning outcomes and low numbers advancing to tertiary education resulting in a predominantly low-skilled workforce. Impact on the	Increased expenditure driven through public -private partnerships with a focus on technical and vocational training to support the needs of the private sector. Positive impact on the state of the environment

Changes in Biodiversity and Ecosystem Services

Ecosystem	Scenario					
	Grenada Greens		Grenada Goes		Grenada Grows	
	Biodiversity	Ecosystem Services	Biodiversity	Ecosystem Services	Biodiversity	Ecosystem Services
Forests and Woodlands	↗	↗	↘	↘	↕	↗
Wetlands, Lakes and Rivers	↗	↗	↘	↘	↘	→
Intensive Land Use – Agri-systems	→	→	↘	↘	↕	↕
Coastal and Marine Ecosystems	→	→	↘	↘	↘	→
Urban and Artificial Areas	↗	↗	↘	↘	↕	↕

Increase	Decrease	Stable	Variable	Uncertain
↗	↘	→	↕	

Changes in Ecosystem Goods and Services

Services	Component			
ing	Freshwater flows	→	↘	⇵
	Food & Fibre – terrestrial	↗	↘	→
	Food & Fibre - marine	↗	↘	⇵
	Genetic resources-terrestrial	→	↘	→
	Genetic resources-marine	⇵	↘	⇵
	Natural resources-terrestrial	↗	↘	→
	Natural resources-marine	↘	↘	↘
	Energy (wind, solar, geothermal, natural gas & oil)	↗	↗	↗

Services	Component	Grenada Greens	Grenada Goes	Grenada Grows
	Air quality	↗	→	→
	Climate regulation	→	↘	↘
	Erosion control & soil sediment retention	→	↘	→
	Water flows, quality & purification	→	↘	→
	Natural hazard controls	→	↘	↘
ng	Pollination & seed dispersal	→	↘	↘
	Bio control: pest, disease & alien invasive species regulation	↗	↘	↘
	Carbon sequestration	↗	↘	→
	Soil formation & fertility	→	↘	↘
	Nutrient cycling	↗	↘	→
	Coastal protection	↗	↘	→

g		Grenada Greens	Grenada Goes	Grenada Grows
	Terrestrial habitat	↗	⇵	→
	Coastal & marine habitat	→	↘	→
	Material cycling	↗	↘	→
	Soil formation & retention	↗	↘	→
	Biomass production – terrestrial	↗	⇵	→
	Biomass production - marine	→	↘	→
	Water cycling	↗	⇵	→
	Genetic diversity	→	⇵	→
	Biodiversity – terrestrial	→	⇵	→
	Biodiversity - marine	→	↘	→
	Photosynthesis	↗	↘	→
	Oxygen production - terrestrial	↗	⇵	→
	Oxygen production - marine	→	↘	↘

ervices		Grenada Greens	Grenada Goes	Grenada Grows
	Recreation - terrestrial	↗	↘	→
	Recreation - marine	↗	↘	→
	Aesthetic	↗	↘	→
	Education/ILK	↗	↗	↗
	Heritage	↗	↘	↗
	Spiritual	↗	→	→
	Intrinsic & existence	↗	↘	→
	Cultural diversity	↗	→	↗
	Social relations	↗	↘	↗

Policy Implications

Indirect Supportive Policies	Direct Supportive Policies
• Renewable Energy Generation Policies • TVET and Tertiary Education Promotion Policies • Economic Diversification and Support Policies • Enterprise Development Areas Policy • National Sustainable Building Standards and Regulations • Blue-Green Preferential Incentives Policies • National Environmental Accounting Standards • Updating National Climate Change Adaptation Policy • Eastern Caribbean Sustainable Development Plan – National Counterpart Plan • Sustainable Transport, Shipping and Freight Policies • National Solid Waste Strategy • Sustainable Resource Recovery Company • Democratisation of Government Policy and Strategy	• Physical Development and Land Management Policies including Protected Areas • Land Banking and Co-management Policies • Sustainability Assessment Policy • Gene Bank Promotion • Grenada Agribusiness Development Facility • Caribbean Agricultural University • Food Production and Sovereignty Policies • Freedom and Access to Information Policies • Transfer of Conventions on Hazardous Substances and Plastic Pollution into National Legislation • Blue-Green Innovations Institute • Extended Producer Responsibility Obligations • Packaging and Waste Protocols • Biodiversity Strategy

Questions to consider

- Are there any Drivers of Change, Ecosystems or Ecosystem Services that you think should be included, and why?
- What is your opinion on the inclusion or exclusion of the exploitation of offshore hydrocarbons?
- How likely do you think it is that Geothermal Energy will be developed?
- Are there other emerging technologies you envision for the future? Why?
- Should we include Wild Cards (low probability-high impact events)?
- How should we present the policy implications?
- What key points should be emphasised in the Chapter?

Your comments and observations are welcomed