India 2022: Non-Traditional Security Threats

Focus Area: Natural Resources (Energy sources, Minerals, Land, Water and Atmosphere)

Introduction

As part of a larger project on India's non-traditional security threats, the Observer Research Foundation is generating a series of scenarios on the basis of answers to this questionnaire. As an expert in the field, you are invited to provide judgments about questions given below that will help construct those scenarios:

- **Natural Resources:** What natural resources (such as energy, land, minerals, water and atmosphere in the context of emission of waste such as carbon di-oxide) would be of strategic significance to India **by 2022?**
- **Resource Availability:** How the relative abundance or scarcity of the above resources will impact India's geo-political strategies **by 2022?**
- **Competition/Cooperation:** Which of these resources will be the reason for co-operation or conflict **by 2022?** How and why would conflict or cooperation occur?

The questionnaire attempts to address the security (accessibility, affordability, sustainability) of primary resources (e.g. oil, gas, coal, water, land, nuclear fuel etc.) and secondary resources (e.g. food, fertilizer, power etc.).

Please answer only those questions about which you feel comfortable. Leaving a section blank is an acceptable answer. We are seeking your personal views and not those of the organization you are associated with. If you wish, your views will be kept confidential.

Please enter the following details:

Name:_____

Address: _____

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Organization:_____

Primary area of expertise: _____

Section A: External Threats

(Threats originating from outside India)

The text in Boxes 1-5 contains information relevant to the questions that follow the text. If you are familiar with the topic of the question, please skip the text and go straight to the questions.

The questions in this section broadly address the following scenario themes:

Box 1

1. **Business as usual:** This scenario assumes that the national and global dynamics of change continue without great surprises or much change in resource availability and consumption patterns, other than those that might be expected as a result of the change dynamics and trends already in place.
2. **Concerned Cooperation:** This scenario assumes that the international concern for unconstrained resource use becomes strong, forcing nations to adopt radical policies that change resource use patterns. Broader fears about life style and economic prospects forge new alliances that promote action in both developed and developing nations. This leads to the emergence of a critical mass of parallel responses to supply, demand, and climate stresses, and hence the relative promptness of some responses.
3. **Scramble for Resources:** This scenario assumes that national governments focus on increasing supply because curbing growth of demand for resources and hence economic growth is simply too unpopular politically and socially. The result is a range of uncoordinated national mandates for increasing resource availability. In the international context, bilateral deals between producers and consumers increase, with national governments competing with each other for favourable terms of supply or for access. A strong element of rivalry between consumer governments emerges.
4. **Forced Carbon Caps**: This scenario assumes that stringent limits are imposed on resource use and carbon emissions by multilateral bodies which India is unable to oppose unilaterally.

Question I: Resource Security

Please choose the appropriate option

SCENARIO QUESTIONS	Scenario1 **Business as usual**	Scenario 2 **Concerned cooperation**	Scenario 3 **Scramble for resources**	Scenario 4 **Forced carbon caps**
What is the **probability of this scenario** development by 2022	◯ Very likely ◯ Likely ◯ Unlikely	◯ Very likely ◯ Likely ◯ Unlikely	◯ Very likely ◯ Likely ◯ Unlikely	◯ Very likely ◯ Likely ◯ Unlikely
What is the impact of this scenario on **availability of imported resources** such as **coal, oil, gas, nuclear fuel, metals** and **minerals** by 2022? **(Volume Risk)**	◯ Positive ◯ Negative ◯ Neutral	◯ Positive ◯ Negative ◯ Neutral	◯ Positive ◯ Negative ◯ Neutral	◯ Positive ◯ Negative ◯ Neutral
What is the impact on the **price of globally traded resources** such as coal, oil, gas, nuclear fuel, metals and minerals in this scenario by 2022? **(Price risk)**	◯ Positive ◯ Negative ◯ Neutral	◯ Positive ◯ Negative ◯ Neutral	◯ Positive ◯ Negative ◯ Neutral	◯ Positive ◯ Negative ◯ Neutral

Which resource poses the **greatest price risk** under this scenario by 2022?	◯ Fossil fuels ◯ Nuclear fuel ◯ Metals /Minerals ◯ Atmosphere (For Carbon Price)	◯ Fossil fuels ◯ Nuclear fuel ◯ Metals /Minerals ◯ Atmosphere (For Carbon Price)	◯ Fossil fuels ◯ Nuclear fuel ◯ Metals /Minerals ◯ Atmosphere (For Carbon Price)	◯ Fossil fuels ◯ Nuclear fuel ◯ Metals /Minerals ◯ Atmosphere (For Carbon Price)
Which resource poses the **greatest volume risk** under this scenario by 2022?	◯ Fossil fuels ◯ Nuclear fuel ◯ Metals /Minerals ◯ Water (e.g., sharing of Himalayan river system) ◯ Land (for food production) ◯ Atmosphere (For CO_2 emissions)	◯ Fossil fuels ◯ Nuclear fuel ◯ Metals /Minerals ◯ Water (e.g., sharing of Himalayan river system) ◯ Land (for food production) ◯ Atmosphere (For CO_2 emissions)	◯ Fossil fuels ◯ Nuclear fuel ◯ Metals /Minerals ◯ Water (e.g., sharing of Himalayan river system) ◯ Land (for food production) ◯ Atmosphere (For CO_2 emissions)	◯ Fossil fuels ◯ Nuclear fuel ◯ Metals /Minerals ◯ Water (e.g., sharing of Himalayan river system) ◯ Land (for food production) ◯ Atmosphere (For CO_2 emissions)
Which of the resources and their associated **infrastructure** pose the greatest **terror threat** under this scenario by 2022?	◯ Oil/Gas pipelines ◯ LNG /Oil tankers ◯ Nuclear power installations ◯ Ports	◯ Oil/Gas pipelines ◯ LNG /Oil tankers ◯ Nuclear power installations ◯ Ports	◯ Oil/Gas pipelines ◯ LNG /Oil tankers ◯ Nuclear power installations ◯ Ports	◯ Oil/Gas pipelines ◯ LNG /Oil tankers ◯ Nuclear power installations ◯ Ports

Question II: Resource Conflict & Cooperation

1. Which of the following resources would be the reason for external cooperation/conflict in 2022 for India? (Please choose the appropriate options)

Tick the appropriate resource	**Nature of relationship with suppliers**	**Reason(s)**
☐ Coal	◯ Cooperation ◯ Conflict	☐ Scarcity ☐ Price volatility ☐ Domestic policy constraints Other…….
☐ Oil & Gas	◯ Cooperation ◯ Conflict	☐ Scarcity ☐ Price volatility ☐ Domestic policy constraints Other…….
☐ Uranium	◯ Cooperation ◯ Conflict	☐ Scarcity ☐ Price volatility ☐ Domestic policy constraints Other……
☐ Water (e.g., sharing of Himalyan river system)	◯ Cooperation ◯ Conflict	☐ Scarcity ☐ Price volatility ☐ Domestic policy constraints Other……
☐ Minerals	◯ Cooperation ◯ Conflict	☐ Scarcity ☐ Price volatility ☐ Domestic policy constraints Other……..
☐ Land	◯ Cooperation ◯ Conflict	☐ Scarcity ☐ Price volatility ☐ Domestic policy constraints Other…….

☐ Atmosphere (e.g., for carbon emission)	◯ Cooperation ◯ Conflict	☐ Scarcity ☐ Price volatility ☐ Domestic policy constraints Other…….

Any other resource you may like to add:

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Any comments you may like to add:

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Question III: Energy Resources

Please take a few minutes to go through the information in the table below before answering questions that follow:

Resource ***Regions/Countries***	**Coal**	**Crude Oil**	**Natural gas**
Major regions/countries with export potential to India	**1. Australia** **2. South Africa** **3. Indonesia** **4. Thailand** **5. Commonwealth of Independent States (CIS)**	**1. Middle East** **2. North-West Africa** **3. CIS** **4. S. & Central America** **5. Asia- Pacific**	**1. Middle East** **2. CIS** **3. North-West Africa** **4. South-East Asia** **5. Australia**

Question: In the context of India securing imports of energy resources in 2022, kindly choose the appropriate option against the respective countries?

Region/Country	**Ranking**	**Reason(s)**
Middle East (Crude Oil, Natural Gas)	◯ Dependable ◯ Undependable ◯ Neutral	☐ Political stability/ ☐ instability ☐ Increase / ☐ decrease in domestic demand ☐ Inadequate/ ☐ adequate investment in developing resources ☐ Logistics & Infrastructure availability/ ☐ unavailability ☐ Preference for other regions
Australia (Coal, Natural Gas)	◯ Dependable ◯ Undependable ◯ Neutral	☐ Political stability/ ☐ instability ☐ Increase / ☐ decrease in domestic demand ☐ Inadequate/ ☐ adequate investment in developing resources ☐ Logistics & Infrastructure availability/ ☐ unavailability ☐ Preference for other regions
CIS (Natural Gas, Crude Oil, Coal)	◯ Dependable ◯ Undependable ◯ Neutral	☐ Political stability/ ☐ instability ☐ Increase / ☐ decrease in domestic demand ☐ Inadequate/ ☐ adequate investment in developing resources ☐ Logistics & Infrastructure availability/ ☐ unavailability ☐ Preference for other regions

North- West Africa (Crude Oil, Natural Gas)	◯ Dependable ◯ Undependable ◯ Neutral	☐ Political stability/ ☐ instability ☐ Increase / ☐ decrease in domestic demand ☐ Inadequate/ ☐ adequate investment in developing resources ☐ Logistics & Infrastructure availability/ ☐ unavailability ☐ Preference for other regions
Indonesia (Coal)	◯ Dependable ◯ Undependable ◯ Neutral	☐ Political stability/ ☐ instability ☐ Increase / ☐ decrease in domestic demand ☐ Inadequate/ ☐ adequate investment in developing resources ☐ Logistics & Infrastructure availability/ ☐ unavailability ☐ Preference for other regions

Question IV: Hydrocarbons: Concentration / Nationalism

Box 2

(i) In 2008, 78 percent of oil reserves were held by National Oil Companies (such as Aramco) with limited or no equity access and 10 percent was held by National Oil Companies (such as Statoil) with equity access and 6 percent was held by new Russian Companies.

(ii) International Oil Companies have full access to only 6 percent of global reserves. Roughly 78 percent of total world oil was produced by 50 companies and of that production about 70 percent was produced by National Oil Companies (NOCs).

(iii) World gas production is dominated by a relatively small number of very large fields, a concentration much greater than that of oil production. Iran and Russia together are said to control over 50 percent of the reserves of 'conventional' natural gas.

(iv) Out of the world's ten biggest conventional natural gas fields by initial reserves (accounting for about 83 Trillion Cubic Meters [TCM] gas), 9 fields

accounting for over 80 percent of the reserves are in the Middle East (Iran, Qatar and Saudi Arabia) and Russia.

(v) Over 60 percent of world coal reserves are in just three countries: USA, Russia and China.

Questions: Please choose the appropriate option:

1. The projected increased concentration of oil & gas production in a few resource-rich countries dominated by national oil and gas companies will lead to coordinated action to control regional markets.

Strongly agree | Agree | Neutral | Disagree | Strongly disagree

2. The increasing concentration of the world's remaining conventional oil and gas reserves in a small group of countries would increase their market power and ability to influence prices

Strongly agree | Agree | Neutral | Disagree | Strongly disagree

3. Supply will not respond to demand as National Oil & Gas companies are likely to be driven by political rather than commercial concerns

Strongly agree | Agree | Neutral | Disagree | Strongly disagree

4. Stagnant demand in OECD countries and fear over emission constraints on fossil fuels will enable more rational decisions from resource rich countries

Strongly agree | Agree | Neutral | Disagree | Strongly disagree

5. Resource rich countries will form partnerships with high growth developing countries to ensure security of demand

Strongly agree | Agree | Neutral | Disagree | Strongly disagree

6. ‘Resource nationalism’ and ‘resource concentration’ are western constructions and therefore cannot be seen as security threats for India.

◯ Strongly agree ◯ Agree ◯ Neutral ◯ Disagree ◯ Strongly disagree

Question V: Fossil Fuels: Peak Supply or Peak Demand?

Box 3

(i)	A wide range of forecasts for global conventional oil supply peaks have been made in the last decade: **2007-08** (Simmons), **after 2007** (Skrebowski), **before 2009** (Deffeyes), **before 2010** (Goodstein), **around 2010** (Campbell), **after 2010** (WEC), **2010-2020** (Laharre), **2016** (EIA), **after 2020** (CERA), **2025 or later** (Shell), **no visible peak** (Lynch).
(ii)	More recently peak oil theories have retreated while peak coal theories have surfaced as a result of applying the UN framework classification which requires ‘reserves’ to be economically mineable, technically feasible and geologically proven. USA, once known as the Saudi Arabia of coal is said to have only half as much recoverable reserves as originally thought which would work out to about 120 years’ worth. India’s own coal reserves estimated earlier to last for over 200 years has now been scaled down to last for less than 50-60 years.
(iii)	On the other hand, there is fear among resource producing countries about demand peaking before supply peaks. The IEA has already announced that oil demand had peaked in OECD countries. The head of the Saudi delegation to UN talks on climate has said that the possibility that oil demand might peak this decade was a "serious problem" for Saudi Arabia and that the kingdom had looked at the assumptions behind studies that pointed to demand peaking in 2016 and saw "some truth in it".

Questions: Please choose the appropriate option:

1. For oil, peak demand is more likely than peak supply by 2022

◯ Strongly agree ◯ Agree ◯ Neutral ◯ Disagree ◯ Strongly disagree

2. Peak supply is a serious supply threat as far as conventional oil is concerned

◯ Strongly agree ◯ Agree ◯ Neutral ◯ Disagree ◯ Strongly disagree

3. Peak oil is less of a security issue than climate change.

Strongly agree | Agree | Neutral | Disagree | Strongly disagree

4. 'Peak oil' or 'peak coal' are unlikely to have a major impact on security of supply by 2022.

Strongly agree | Agree | Neutral | Disagree | Strongly disagree

5. Peaks for oil or coal will not seriously affect energy security as gas will smoothly bridge the transition to a non-fossil fuel based economy.

Strongly agree | Agree | Neutral | Disagree | Strongly disagree

Question VI: Food Security: Land & Water

Box 4

(i)	Net sown area has been stagnant in India. From 1980-81 to 2004-05 it has remained at about 150 million hectares.
(ii)	The total food grain requirement for the country has been estimated as 449 million tonnes (high demand scenario) and 382 million tonnes by (low demand scenario) by 2025. Food grain production must double from the present level of about 210 million tonnes to meet the projected requirement for 2025.
(iii)	As per the 11^{th} plan, to achieve 4 percent agriculture growth target, food-grain yields have to increase by 2-3 percent per year to ensure food security and compensate for possible shift to high value production.
(iv)	Yield of wheat and rice for India in 2006-07 was 2.1 tonnes per hactrare (t/ha) and 2.7 t/ha respectively. Corresponding yields for developed countries in 2005 were close to 4.5 t/ha.
(v)	Access to water and irrigation is a major determinant of land productivity and the stability of yields. Irrigated land productivity is more than double that of rain-fed land. Over 80 percent of current and projected demand for water by 2020 is from agriculture even though only 60 percent of the cultivable land in India is un-irrigated.
(vi)	Water demand is expected to increase by 34 percent to 1093 Billion Cubic Meters (BCM) by 2025 from 813 BCM today.

(vii) As per the assessment in 1993 by the Central Water Commission, out of the total precipitation, including snowfall the availability from surface water and replenishable ground water is about at 1869 BCM. 60 percent of this (690 BCM from surface water and 432 BCM from ground water) can be put to beneficial use.

(viii) Though average figures do not predict a shortfall in water availability by 2025, in reality water availability is highly uneven in time and space.

(ix) Countries in Asia as well as private agriculture companies based in these countries are acquiring or leasing land in some of the world's poorest countries to satisfy demand for food and fuel. For example in Africa, nearly 2.5 million hectares of land have been acquired or leased for cultivation in the last five years. Indian private agricultural companies are also said to be indulging in the lease of agricultural land in Africa.

Questions: Please choose the appropriate option:

1. Grain yield will remain unchanged in the next decade because India is unlikely to implement policies to increase yield.

Strongly agree ◯ Agree ◯ Neutral ◯ Disagree ◯ Strongly disagree

2. India is likely to become a food grain importer as grain production and grain yield is unlikely to keep up with demand

Strongly agree ◯ Agree ◯ Neutral ◯ Disagree ◯ Strongly disagree

3. Another green revolution is unlikely as fertilizer and technology use as well as water use and investment are likely to be inadequate

Strongly agree ◯ Agree ◯ Neutral ◯ Disagree ◯ Strongly disagree

4. Food insecurity is likely to increase in the future as a result of increased dependence on global grain markets

Strongly agree ◯ Agree ◯ Neutral ◯ Disagree ◯ Strongly disagree

5. Fears over food security are unjustified. Supply has always responded to demand with technology and the resource allocation mechanisms playing facilitating roles.

Strongly agree Agree Neutral Disagree Strongly disagree

6. India is likely to lease land for agriculture overseas to meet domestic demand because of its inability to implement appropriate reforms to increase productivity and yield by 2022.

Strongly agree Agree Neutral Disagree Strongly disagree

7. India is likely to be 'water stressed' by 2022 because of poor water distribution and management and not because of water availability.

Strongly agree Agree Neutral Disagree Strongly disagree

8. Indian agriculture is likely to move overseas because of water stress.

Strongly agree Agree Neutral Disagree Strongly disagree

Question VII: Conflict Mediation

Questions: Please choose the appropriate option:

1. Conflict between countries over resources in the next decade will necessarily involve *military* intervention

Strongly agree Agree Neutral Disagree Strongly disagree

2. Conflict over resources will lead to *'regimes & empires'* formed by supplying and consuming countries which will in turn lead to geo-political divisions in the world

Strongly agree Agree Neutral Disagree Strongly disagree

3. There will be no conflict over resources as *bilateral and multilateral agreements* between suppliers and consumers will allocate scarce resources efficiently

Strongly agree | Agree | Neutral | Disagree | Strongly disagree

4. There will be no conflict over resources as *markets and institutions* (e.g., regulatory bodies) will allocate scarce resources efficiently

Strongly agree | Agree | Neutral | Disagree | Strongly disagree

5. Conflict over sharing the atmosphere (e.g., for emission of CO_2) will grow more intense in the next decade

Strongly agree | Agree | Neutral | Disagree | Strongly disagree

6. Conflict over sharing the atmosphere will be resolved equitably and efficiently by 2022 through a mix of appropriate policies.

Strongly agree | Agree | Neutral | Disagree | Strongly disagree

7. Conflict over sharing the atmosphere will divide the world sharply and lead to trade and non-trade barriers.

Strongly agree | Agree | Neutral | Disagree | Strongly disagree

8. The membership in the 'high emitters club' thrust upon India by rich nations in Copenhagen will chain India towards disproportionate burden sharing in forth coming climate change negotiations and threaten India's economic growth?

Strongly agree | Agree | Neutral | Disagree | Strongly disagree

Section B: Internal Threats

(Threats arising from within India)

The questions in this section refer to four scenario themes in the internal context:

Box 5

1. **Business as usual:** This scenario assumes that the domestic supply and demand trends as well as policy dynamics will continue without great surprises or much change, other than those that might be expected as a result of the change dynamics and trends already in place.
2. **Adequate availability:** This scenario assumes that the Government implements the right policy and pricing regimes resulting in adequate supply of all primary and secondary resources.
3. **Scarcity prevails:** This scenario assumes that the Governments, both at the State and Central level, implement inappropriate policy and pricing regimes resulting in inadequate investment and scarcity in resource supply.
4. **Externally constrained:** This scenario assumes that the Government is helpless due to resource constraints arising from the external environment such as changes in the climate (dramatic changes in the monsoon patterns, severe droughts, changes in Himalayan river flows), as well as stringent carbon emissions caps imposed by multilateral bodies which India is unable to challenge.

Question I: General

SCENARIO QUESTIONS	Scenario1 **Business as Usual**	Scenario 2 **Adequate availability**	Scenario 3 **Scarcity prevails**	Scenario 4 **Externally constrained**
What is the **probability** of this scenario development by 2022?	◯ Very likely ◯ Likely ◯ Unlikely	◯ Very likely ◯ Likely ◯ Unlikely	◯ Very likely ◯ Likely ◯ Unlikely	◯ Very likely ◯ Likely ◯ Unlikely
What is the impact of this scenario on domestic **availability** of **Electricity**, **Fertilisers** and **Food grains** and **Water** by 2022?	◯ Positive ◯ Negative ◯ Neutral	◯ Positive ◯ Negative ◯ Neutral	◯ Positive ◯ Negative ◯ Neutral	◯ Positive ◯ Negative ◯ Neutral

What is the impact of this scenario on domestic **affordability** of **Electricity**, **Fertilsers** and **Food grains** and **Water** by 2022?	◯ Positive ◯ Negative ◯ Neutral	◯ Positive ◯ Negative ◯ Neutral	◯ Positive ◯ Negative ◯ Neutral	◯ Positive ◯ Negative ◯ Neutral
Under this scenario which acceleration of **trend** is most likely by 2022	☐ Energy Stress ☐ Food stress ☐ Water stress	☐ Energy Stress ☐ Food stress ☐ Water stress	☐ Energy Stress ☐ Food stress ☐ Water stress	☐ Energy Stress ☐ Food stress ☐ Water stress
Under this scenario acceleration of which **trend** is most likely by 2022	☐ Urbanization ☐ Distributional inequity ☐ Resource poverty	☐ Urbanization ☐ Distributional inequity ☐ Resource poverty	☐ Urbanization ☐ Distributional inequity ☐ Resource poverty	☐ Urbanization ☐ Distributional inequity ☐ Resource poverty

Question II: Resources (Primary/Secondary)

The current average resource consumption in India and a corresponding value in a developed country are provided in the table below. Please enter your estimates for respective resource consumption levels in 2022 for India in column 4. If you wish, please add comments about your estimate in last page with appropriate serial number. For example what may increase or decrease your estimate. Even if you did not provide an estimate you are still most welcome to add comments about the status of resource consumption in 2022.

Sr. No.	Resource	Current consumption in India	Current consumption in Developed country	Consumption in India in 2022
1	Coal *tonnes of oil equivalent (toe) per 1000 persons per annum*	200	1900 (USA)	Give a figure _____ Or choose the appropriate option ◯ Increase dramatically ◯ Increase gradually ◯ Stagnant
2	Electricity (per capita) *units per annum*	544	13616 (USA)	Give a figure _____ Or choose the appropriate option ◯ Increase dramatically ◯ Increase gradually ◯ Stagnant
3	Oil (p*er capita) barrels per annum*	1	24 (USA)	Give a figure _____ Or choose the appropriate option ◯ Increase dramatically ◯ Increase gradually ◯ Stagnant

4	Primary energy demand in *million toe* in 2007	595	2793 (USA)	Give a figure _____ Or choose the appropriate option ◯ Increase dramatically ◯ Increase gradually ◯ Stagnant
5	Water (per capita) *cubic meter per annum*	600	1600 (US)	Give a figure _____ Or choose the appropriate option ◯ Increase dramatically ◯ Increase gradually ◯ Stagnant
6	Agricultural yield *tonnes per hectare* (Wheat)	2.1	4.5 (OECD average)	Give a figure _____ Or choose the appropriate option ◯ Increase dramatically ◯ Increase gradually ◯ Stagnant
7	CO_2 emission (per capita) *tonnes per annum*	1.18	19.1 (USA) 10.9 (OECD average)	Give a figure _____ Or choose the appropriate option

				◯ Increase dramatically ◯ Increase gradually ◯ Stagnant
8	CO_2 emission per unit GDP (PPP) *Kg/2000 USD*	0.33	0.5 (USA) 0.4 (OECD average)	Give a figure _____ Or choose the appropriate option ◯ Increase dramatically ◯ Increase gradually ◯ Stagnant

Sources for information/data provided in this questionnaire: BP Statistical Review, International Energy Agency, Central Intelligence Agency, The World Bank, Ministry of Water Resources, Planning Commission, GoI.

Any other resource you may like to add:

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Comments, you may like to add, for **Question II: Resources (Primary/Secondary)**
for **Serial No**._____

for **Serial No**._____

for **Serial No**._____

for **Serial No**._____

for **Serial No**._____

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