Water-Energy-Food Foresight for Sustainable Economic Development and Eco-Resilience in ASEAN Countries

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Regional Consultation on Innovation Strategies for Sustainable Development through Water-Energy-Food Nexus
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Outline

- Real-Time Delphi
- ASEAN Water Energy Food Scenarios
- Areas for Consideration

REAL-TIME DELPHI

DELPHI survey with 4 questions

1. Which constraints do you think are most important for (likely highest impact on) the future of energy security in ASEAN countries, and what degree of uncertainty do you believe each carries?

2. Which specific capacities for effective action will be required by ASEAN – at what level (Local – Provincial - National – ASEAN regional –International) - and what degree of importance and uncertainty that best characterizes each capacity?

3. In terms of the roles that ASEAN play in 2020 and beyond, which measures do you believe would be most cost-effective for encourage inclusive innovation and BOP involvement with more secure, efficient, and environmentally benign energy, water and food systems?

4. In terms of the roles that ASEAN play in 2020 and beyond, which measures do you believe would be most cost-effective for encourage long term sustainability of the energy, water and food systems - and their nexus and why?

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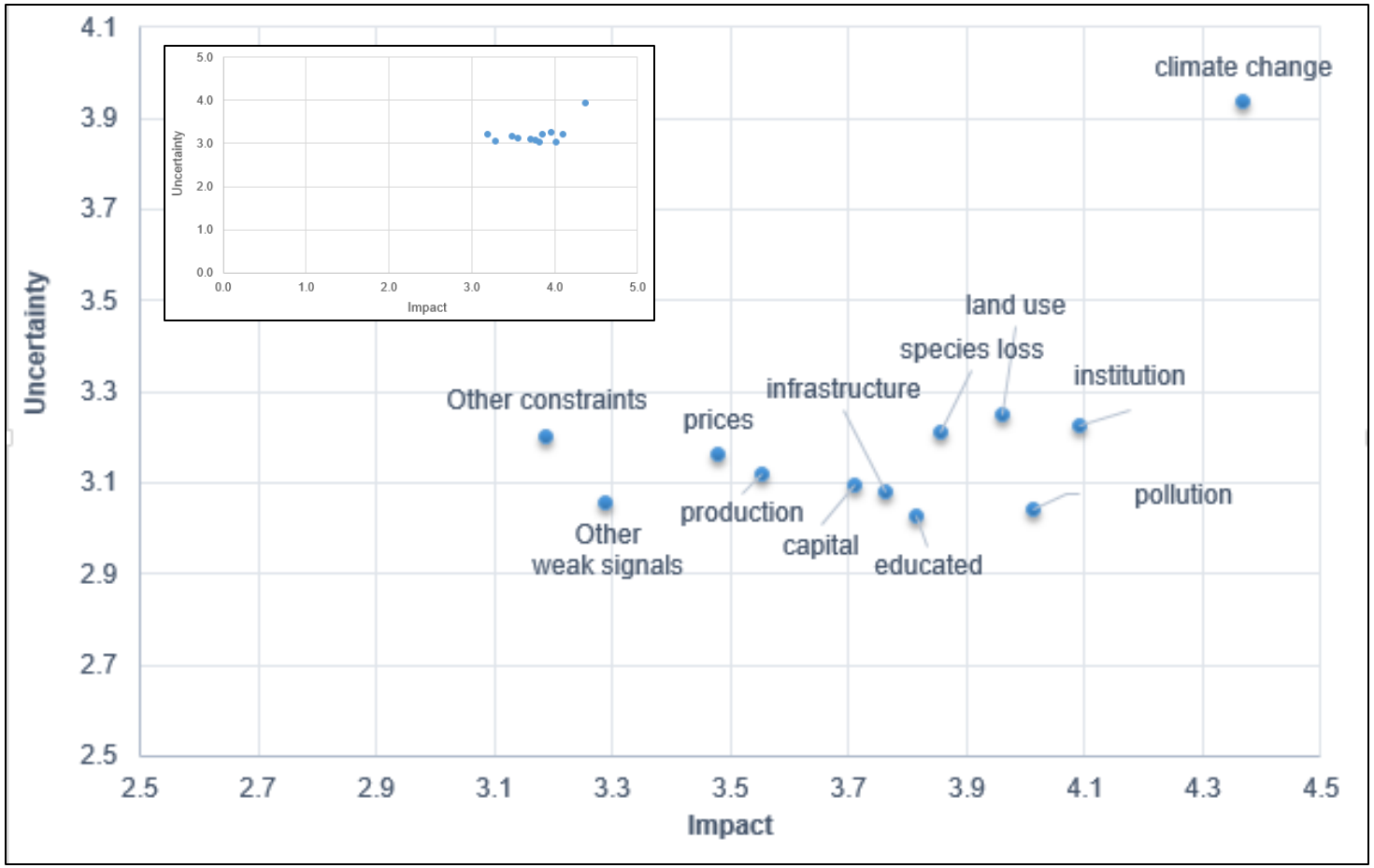

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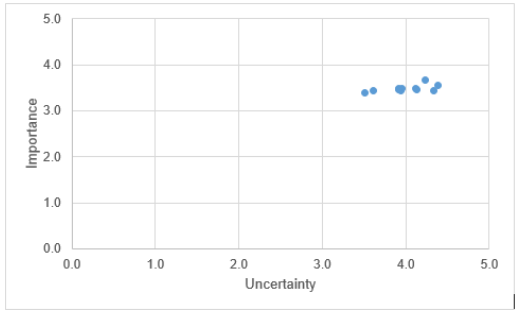

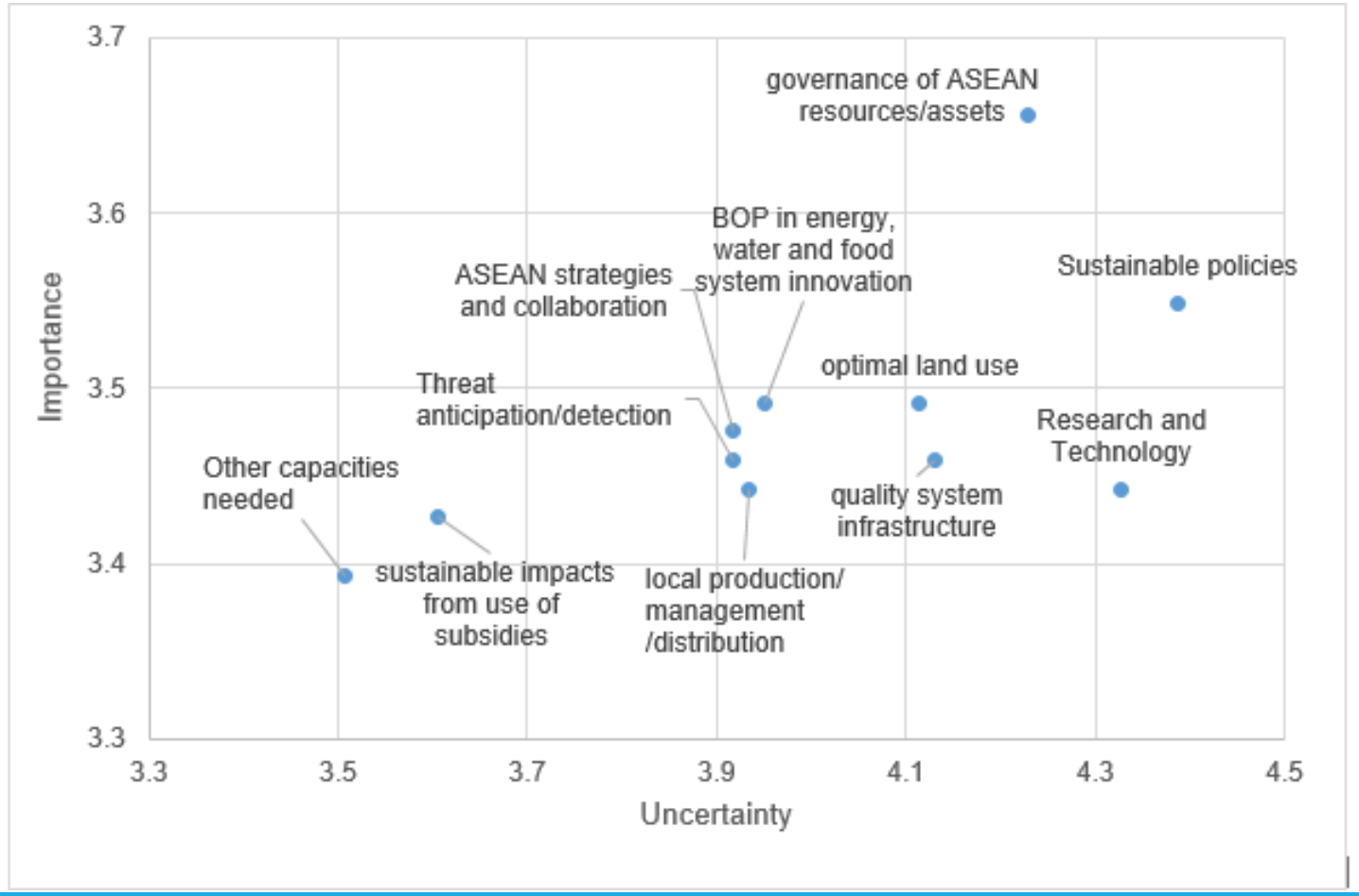

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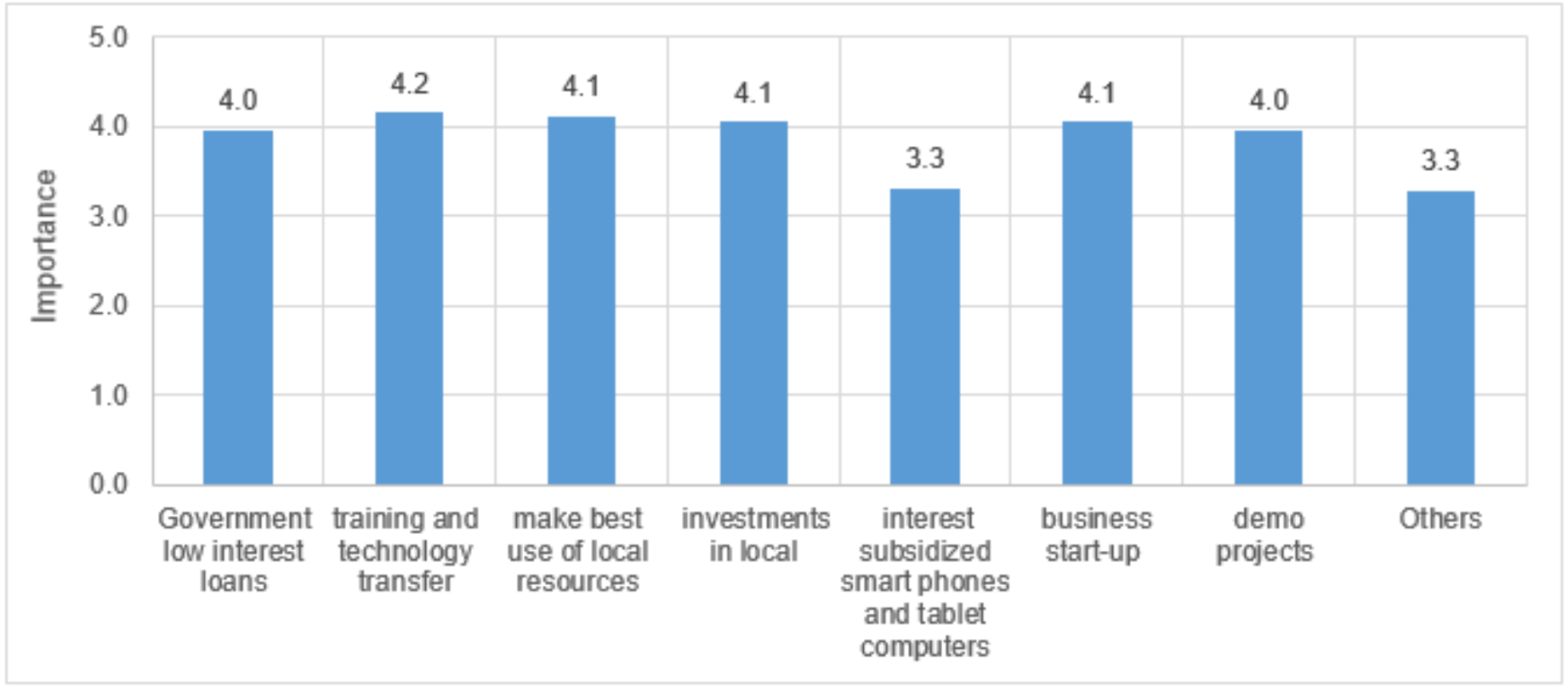

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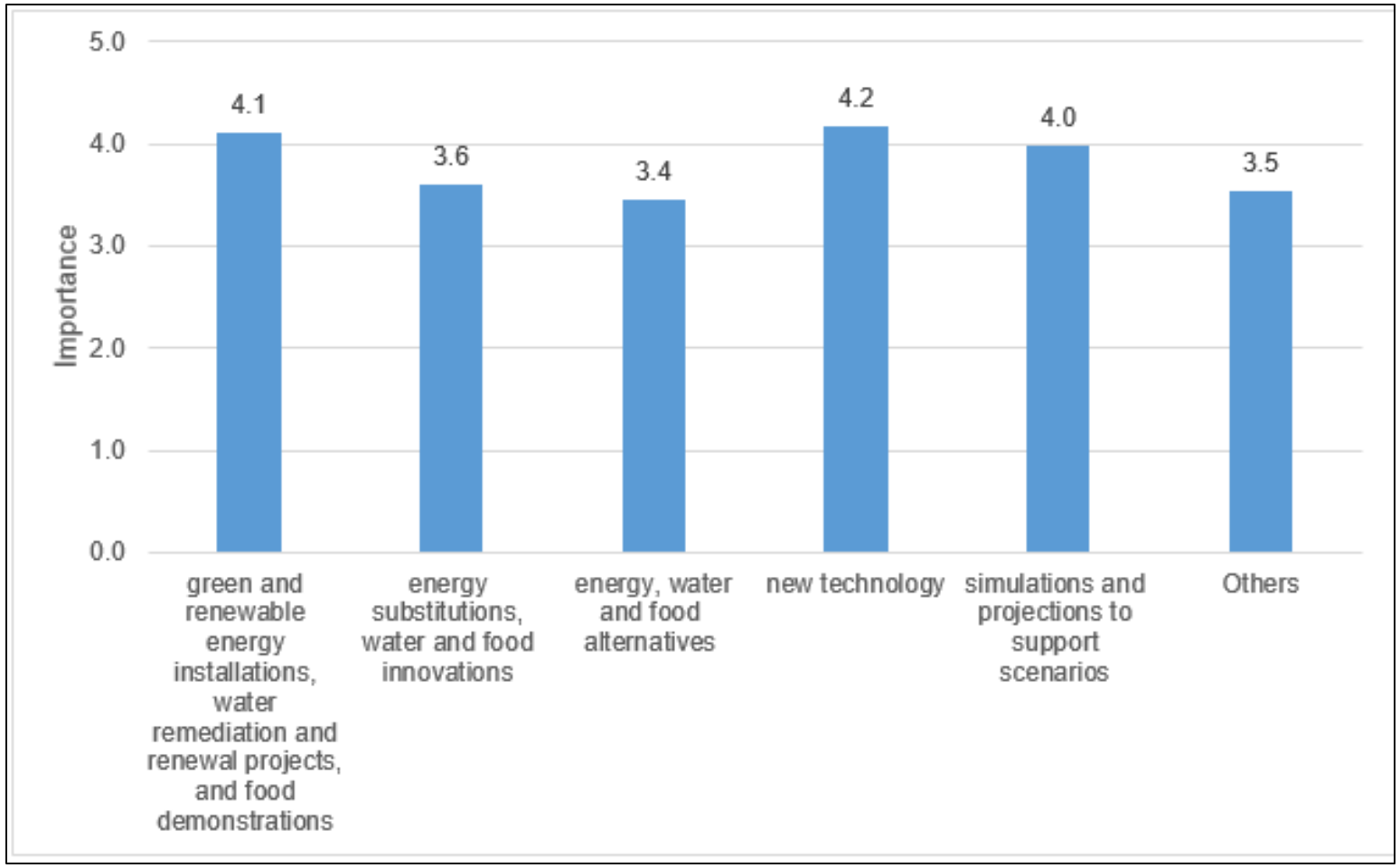
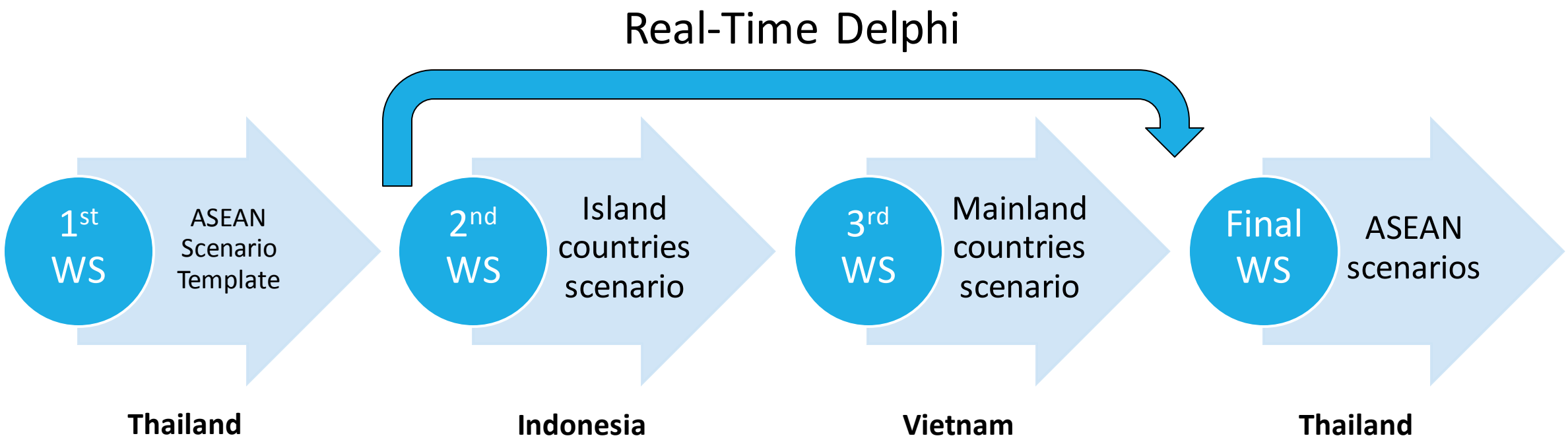
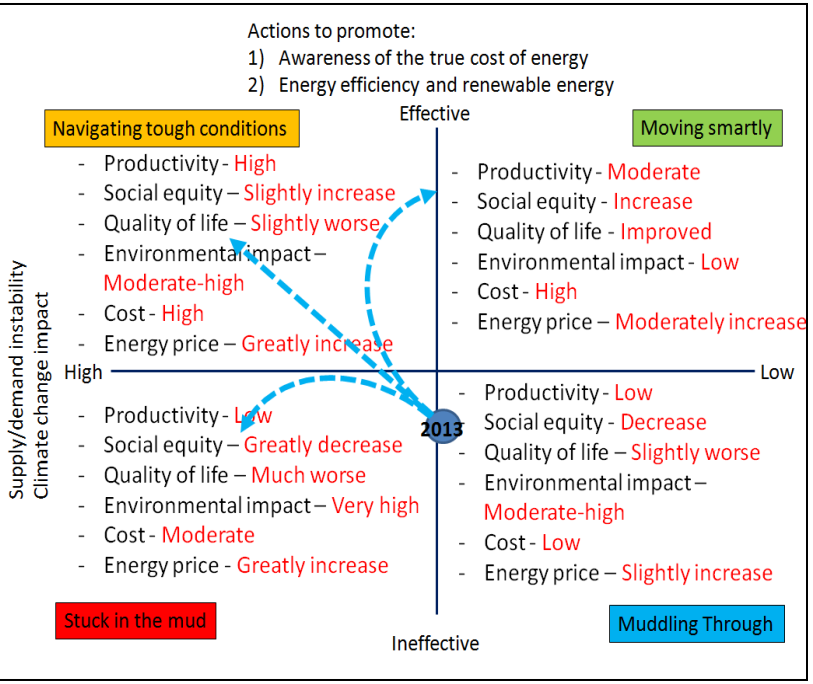


ASEAN Water Energy Food Scenarios

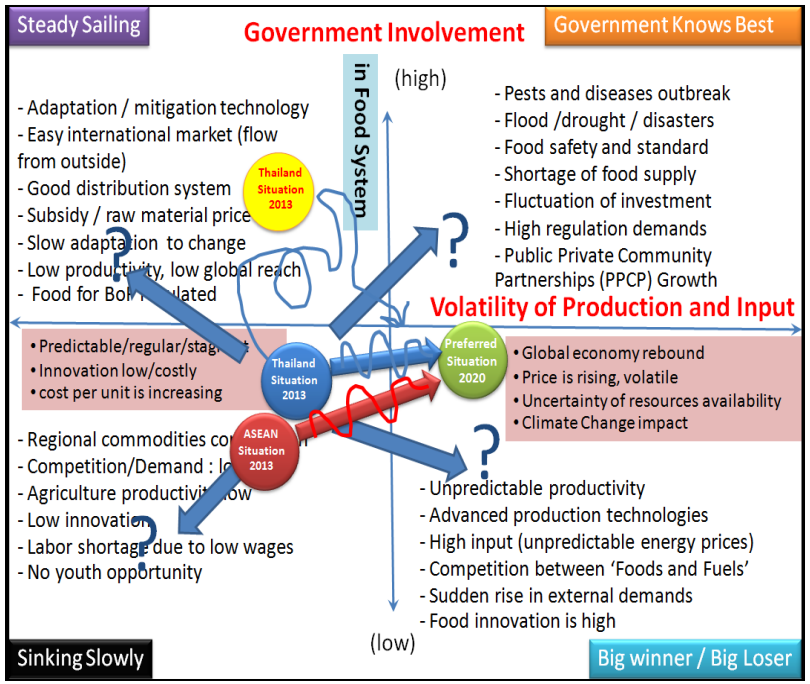
Process to formulate the ASEAN Scenarios



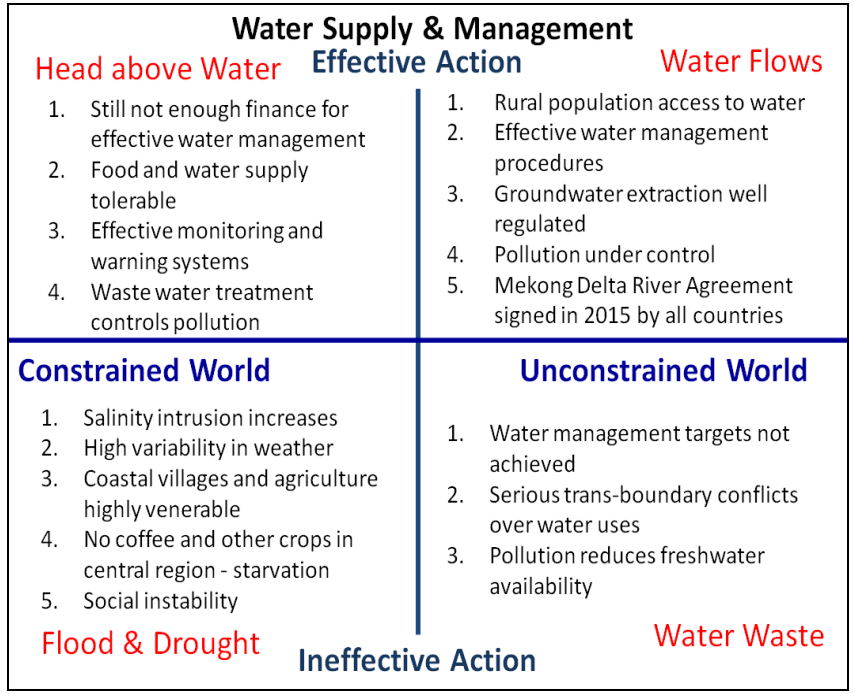
Energy Scenarios



Food Scenarios



Water Scenarios



1st Workshop (Nakorn Pathom, Thailand)

2nd Workshop (Jakarta, Indonesia)

3rd Workshop (Hanoi, Vietnam)

The Challenges of Water, Energy, Food Security are Interrelated

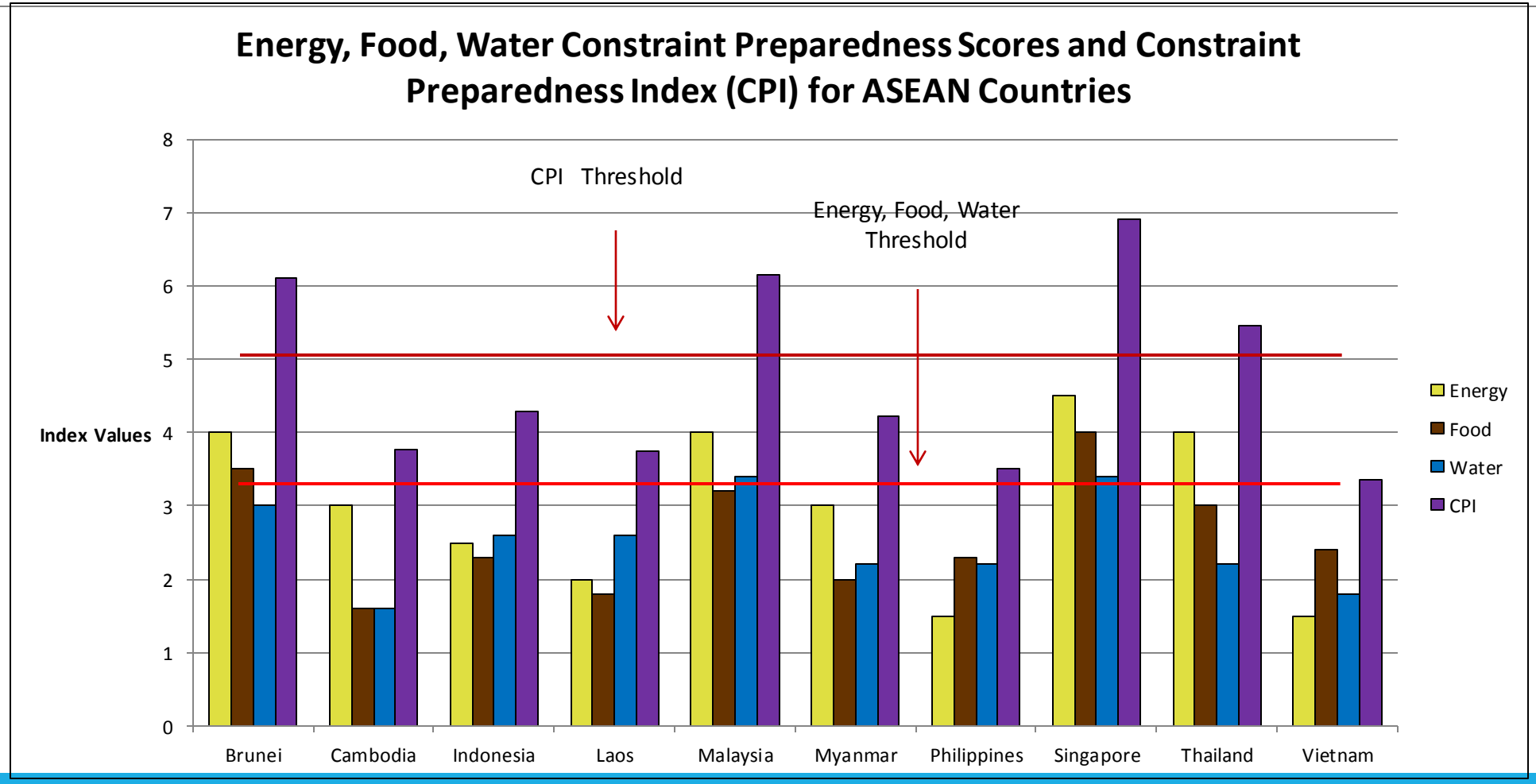
- Energy and water needs for agriculture
- Energy use for water purification, distribution, recycle
- Conflicts between use of water for hydroelectricity and by people
- Energy and water requirements for food processing and distribution
- Water needs for energy production

ASEAN Countries Have a Broad Range of Scores

	Energy	Food	Water	Sum of Squares	CPI
Brunei	4.0	3.5	3.0	37.3	6.1
Cambodia	3.0	1.6	1.6	14.1	3.8
Indonesia	2.5	2.3	2.6	18.3	4.3
Laos	2.0	1.8	2.6	14.0	3.7
Malaysia	4.0	3.2	3.4	37.8	6.1
Myanmar	3.0	2.0	2.2	17.8	4.2
Philippines	1.5	2.3	2.2	12.4	3.5
Singapore	4.5	4.0	3.4	47.8	6.9
Thailand	4.0	3.0	2.2	29.8	5.5
Vietnam	1.5	2.4	1.8	11.3	3.4

Constraint Preparedness Index (CPI) $= \sqrt{(E^2 + F^2 + W^2)}$

Five ASEAN Countries Have Low Energy, Food, or Water Scores, or CPI



Areas for Consideration

ISSUE	PROBLEM	RECOMMENDED ACTIONS
Energy, Water for Agriculture	Too much waste and inefficiency	Log energy, water use Evaluate technology, processes Possible use of precision agriculture (Satellite data) Demos of efficient technology Embed cost of energy and water
Energy, Water for food processing and distribution	Water undervalued, energy tradeoffs with other uses	Track and monitor efficiency Include opportunity cost, e.g., cost of providing water for sanitation, drinking, bathing, etc

Areas for Consideration

ISSUE	PROBLEM	RECOMMENDED ACTIONS
Energy for water supply, distribution and waste processing	Very energy intensive with true cost of energy not taken into account	Calculate true cost of energy, including use and mitigation of impacts (remove subsidies?)
Water for electricity generation	Competes with other requirements for water	Calculate water use and compare with other possible uses and costs incurred
Land use	Conflicting requirements for agriculture, energy, commerce, habitation	Require analysis to balance and optimize potential uses for energy, food, water, e.g., agriculture, industry, residential and commercial use, electricity generation

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Backup

ASEAN Countries Can Be Given a Food Security Index Score (1-5)

Brunei	*3.5*
Cambodia	1.6
Indonesia	2.3
Laos	*1.8*
Malaysia	3.2
Myanmar	2.0
Philippines	2.3
Singapore	4.0
Thailand	3.0
Vietnam	2.4

Source: *Global Food Security Index 2013*, The Economist Intelligence Unit Limited, 2013

ASEAN Countries Can Be Given a Water Security Index Score (1-5)

Brunei	3.0
Cambodia	1.6
Indonesia	2.6
Laos	2.6
Malaysia	3.4
Myanmar	2.2
Philippines	2.2
Singapore	3.4
Thailand	2.2
Vietnam	1.8

Source: *Asian Water Development 2013: Measuring Water Security in Asia and the Pacific*, Asian Development Bank and Asia-Pacific Water Forum, 2013

These Scores Can Be Combined Into a Constraint Preparedness Index (CPI)

$$CPI = \sqrt{(E^2 + F^2 + W^2)}$$

E = Energy Constraint Preparedness Score (1-5)

F = Food Security Index Score (1-5)

W = Water Security Index Score (1-5)

CPI will take on values from 1.7 to 8.7