Bio-Circular-Green (BCG) Economic Model and Regional Opportunities

Office of National Higher Education, Science, Research and Innovation Policy Council

22 Feb 2022

12th High Level Seminar on Sustainable Cities
Bio-Circular-Green Economy

Bioeconomy
Value Creation in bio-based manufacturing and service sectors

Circular Economy
Loop of sustainable resource use

Green Economy
Environment-friendly production
The principle of BCG Model

- **BCG Quadruple Helix + Global Partnership**
  - **SEP** Sufficiency Economy Philosophy
  - **STI** Science, Tech, Innovation
  - **SDGs** Sustainable Development Goals

1. Prioritize R&D
2. Strategic investment
3. Quadruple Helix + Global Partnership
Driving Strategies and Plan

1. Building the sustainability of natural resource and biodiversity
   - Conserve, restore, manage, utilize and increase biodiversity and culture diversity
   - Resource management
   - Development Resource management system

2. Strengthen local economy
   - Increases Food, health and energy security
   - Area-Based Development
   - Increase accessibility and knowledge transfer to the community
   - Enhance sustainable competitive for BCG industrial level
   - Develop target sectors
   - Talent & Entrepreneur Development

3. Create ability to respond for changing
   - Frontier Research and Knowledge Development
   - Enhance capacity Building
   - Enhance global network

4. Build and develop markets
   - Develop law and regulation
   - Facility and Infrastructure

Source: NSTDA, 2021
How of BCG in action

1. นางยุคล สิมมาฉายา
   Agricultural Sector

2. นายธีรพงศ์ จันศิริ
   Food Industry

3. ศ. ดร. เกียรติคุณ
   Medicine & Vaccine

4. ศ. ดร. ไพฑูรย์
   Medical Device

5. นายเทวินทร์ วงศ์วานิช
   Bio Energy

6. นายกลินท์ สารสิน
   Material & Chemical

7. ดร. วิจารย์ สิมาภยา
   Circular Economy

8. ศ. ดร.สนิท อักษรแก้ว
   Biodiversity

9. นายอิสระ ว่องกุศลกิจ
   HVA bioproducts

10. นายปรภณ บุญประชาพันธ์
    Law & Regulation

11. ศ. ดร.สมัค สิริไชยภูริ
    Human Resource Development

Source: NSTDA, 2021
Government investment in BCG

Northern Economic Corridor (NEC)
- food safety and agricultural health standards
- agro-industry and food processing
- the integration of “Lanna Culture” into the products and services

Central Economic Corridor
- waste management
- innovation for ageing-society

Eastern Economic Corridor (EEC)
- fruit production
- the development of future industries.

North-Eastern Economic Corridor (NEEC)
- resolving major health issues inherent to this region such as liver fluke
- promoting insect farming for an alternative protein source
- developing cultural tourism along the Mekong riverbank

Southern Economic Corridor
- precision aquaculture
- innovative halal food products
- development of new tourist destinations
Government investment in BCG

- BIOPOLIS GMP Pilot Plant
- Functional Ingredient
- Active Compound
- Nano-encapsulation

- ARIPOLIS Pilot Plant
- Sensing Innovation
- Computing Innovation
- Manufacturing & Service Innovation
- Cyber-Physical System Integration

- BIOPOLIS Non-GMP Pilot Plant
- Chemical & Bioprocess Tech.
- Biorefinery

- NQI Pilot Plant
- Electromagnetic Compatibility (EMC) Testing Facility
- Toxicology Center

- BIOPOLIS Green House & Plant Factory
- Innovative Agriculture
- Phenotype Facility
- High-value crops

- EECi Headquarters

- Leasehold Land
- Auditorium, Meeting Rooms, Canteen
- Exhibition Hall & Co-working Space
- Wet & Dry Laboratory

Source: NSTDA, 2021
### Opportunity from BCG: Functional Food

<table>
<thead>
<tr>
<th>Nat feedstock</th>
<th>Based ingredients</th>
<th>F&amp;F Blends</th>
<th>End user</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmer &amp; Aggregator</td>
<td>Extractors</td>
<td>Ingredient producers</td>
<td>F&amp;B, FMCG, Nutraceutical</td>
</tr>
</tbody>
</table>

#### Plant extracts
- Oleoresins (spice)
- Essential oils
- Natural color
- Herbal extracts

#### Other extracts
- Microbial food cultures & Probiotics
- Functional food ingredient
- Xanthone
- Protein powder & biopeptides

### Flavors
- 14,600 M$ (6%)

### Nutraceutical ingredients
- 162,000 M$ (7%)

### Strategic Target
- Competitive HVA functional ingredients industry set up and supply chain connection
- SME capability building to enter the value chain

### Impact

#### Economic
- Global Market 200,000 M$ growth 6%

#### Social
- BoP supply chain
- Health function

#### Environment
- Reduce agro waste

### Plants
- Plants
- Herbs
- Microbes
- Biomass
Investment from private sector

Nakhon Sawan Biocomplex

- Phase I Bioethanol plant
- GGC Bio and KTIS Bioethanol
- Phase II Biochemicals & Bioplastic
- GC and Nature Work

Source: Ministry of Industry, 2021
Mosaic & Wall Surface from rice husk

Source: SINGH INTRACHOTO, “CIRCULAR ECONOMY IN ARCHITECTURE”, Circular Economy Leadership & Partnership (CELP) Summit 2021

https://sonitesurfaces.com/products/husk/surface-covering
Enable community to access to renewable energy without subsidies by developing appropriate technology and innovative microfinance.

Solar water pump

Biogas from manure

Solar dome for producing dried fruit

Source: Ministry of Energy, 2021
Driving BCG to regional and int’l platform

BANGKOK GOALS ON BCG, 2022

- **Zero emission** / carbon neutrality/climate change adaptation, mitigation and resilience
  - Action area - Energy transition, sust. transport & agri

- **Zero waste** / SCP
  - Action area - Circular Economy

- **Preservation and conservation** of environment and biodiversity / Sustainable management of resources
  - Action area - Bio-economy

- **Increase us of STI and digitalization**
  - Action area - Smart city, Sustainable finance

- **Social inclusion**/ human resource development
  - Action area - ESG, Empowering, Reskill-upskill for transition

- **Facilitating trade and investment**
  - In a conducive ecosystem utilizing appropriate economic tools

- **Rebooting Regional Connectivity**
  - Particularly in the travel and tourism industry

- **Advancing sustainable and inclusive growth**
  - Focusing on alleviating inequalities and protecting the environment
Opportunity for collaboration

Global Partnership
Support collaborative research between Thai and foreign researchers

Thai company
Thai research institute
Foreign research institute
Foreign company

Specification
• Research projects between Thai research institute and foreign research institute that result in innovation in BCG sector
• Should have letter of intention from both private partners to contribute at least 10% in-cash or in-kind
• Researchers should hold technology above TRL 4
• The funding cover research expense and other activities need to facilitate the collaboration such as networking forum and workshop
THANK YOU

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