

# BIOECONOMY TRANSFORMATION PROGRAMME

Enriching the Nation, Securing the Future



**Enriching the Nation,  
Securing the Future**



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## A NOTE FROM THE PRIME MINISTER OF MALAYSIA

“ *The second year of BTP has seen significant progress in our effort to transform Malaysia into a high income nation by the year 2020 while ensuring economic benefit to the rakyat at all levels of society.* ”

According to the Ease of Doing Business Report 2014 released by the World Bank, Malaysia's business environment is significantly conducive to starting and operating new ventures. Malaysia has surged from twelfth position to sixth among 189 economies evaluated: a testament to the success of government economic transformation programmes like the Bioeconomy Transformation Programme (BTP) as well as efforts made by both public and private sectors to make Malaysia a high income nation.

Launched in 2012, BTP is specifically designed to benefit Malaysian society by nurturing the commercialisation of businesses in the bio-based industry. Over the past year, I am pleased to share that several high impact projects utilising exciting new technologies have been captured, drawing significant investment while creating a host of new skilled, high-paying jobs for Malaysians.

Notable among these is a project co-owned by Verdezyne Inc. (a US-based industrial biotechnology company specialising in bio-based chemical production for the global market), and Malaysian palm oil producer, Sime Darby Berhad. I was delighted that alongside the President of the United States, Barack Obama, during his recent visit to Malaysia, I was able to witness the signing ceremony between the two partners to construct a RM1.5 billion commercial facility for palm oil-based chemicals.

Nearly 500 jobs will be created for local workers, providing exposure to innovative, cutting-edge technology. This simultaneously creates income opportunities while enhancing the value of our nation's human capital.

In line with the vision to increase income in a socially inclusive manner, 2014 has also seen the introduction of the Bioeconomy Community Development Programme (BCDP) to augment the BTP.

The BCDP was formulated as an effort to transform rural communities through adoption of bio-based technologies. This follows from the Budget Speech last year in which I proposed the application of bio-based technology as a game changer to increase the income of our local farmers. The initial planning phase of the BCDP is now nearing completion and several pilot projects will be launched by the end of the year, which will increase farmer income through a guaranteed buyback programme with identified anchor companies.

Going forward, it is crucial to develop a strategic roadmap focusing on key areas yielding the greatest benefit for the nation. We can leverage our natural strengths and resources to develop sectors like Bio-cosmeceuticals, Wellness and Pharma Nutrition, Cellular Medicine and Stem Cells, as well as Bio-based Chemicals. Through the BTP, Malaysian Biotechnology Corporation (BiotechCorp) will be the prime mover in formulating and implementing strategies to grow these specific areas.

However, the cross-cutting nature of Bioeconomy requires extensive coordination and cross-checking between public sector stakeholders like the Ministry of Health, Ministry of Agriculture and Agro-based Industries, their respective agencies, as well as the private sector.

Under the purview of the National Bioeconomy Council, we will strive to improve interagency communication and work hand-in-hand toward the shared goals of this programme to drive our nation toward high-income status by the year 2020.

*Finally, in light of the hard work that has been put in, I would like to thank all parties involved for their continuous support and commitment in making this objective a reality. With the cooperation of everyone involved, I fully expect the BTP to continue developing economic growth through Bioeconomy, and also to ensure that this growth is shared equitably across all levels of society: from the young, skilled knowledge workers in our labour force, to the hard-working bio-agropreneurs of our rural regions.*



A stylized signature in black ink, consisting of a few loops and a horizontal line at the end.

**Y.A.B. Dato' Sri Mohd Najib bin  
Tun Abdul Razak**

## A NOTE FROM THE MINISTER OF SCIENCE, TECHNOLOGY AND INNOVATION

“ *The Bioeconomy Transformation Programme (BTP) will be a strategic driver towards the commercialisation of bio-based projects in Malaysia.* ”

The Bioeconomy Transformation Programme (BTP) is a holistic framework for the nation to develop a high-income Bioeconomy through a sustainable ecosystem of R&D and commercialisation in the areas of agriculture, healthcare and industrial biotechnology by 2020.

As the BTP lead ministry, the Ministry of Science, Technology and Innovation (MOSTI) has played a key role in facilitating interdepartmental coordination between the relevant Bioeconomy ministries. This continues to be an important factor in fostering commercialisation of innovative research in Malaysia. For example, regulatory requirements need to be reviewed, aligned and tailored to suit the unique conditions of new discoveries that may transcend beyond boundaries of conventional industry activities.

With the launch of MOSTI Commercialisation Year 2014 (MCY2014), MOSTI aims to further boost the commercialisation rate of research products in Malaysia, targeting at least 60 R&D products to be commercialised this year, and increase Malaysia's current commercialisation rate from 8% to 10%. This is in line with the direction of Phase 2 of the National Biotechnology Policy (Science to Business).

Together with the Malaysian Biotechnology Corporation (BiotechCorp), we will work closely with private sectors, agencies and research institutions to move forward in achieving our ultimate goal for BTP and MCY2014.

The implementation of Bioeconomy Malaysia Accelerator Programmes (Bio-Accelerators) can further fast-track commercialisation and reduce the time it takes to nurture new research and technology to maturity.

MOSTI would like to take this opportunity to commend BiotechCorp on the implementation of the four flagship Bio-Accelerator programmes:

- **BIOECONOMY COMMUNITY DEVELOPMENT PROGRAMME**
- **TECHNOLOGY DEVELOPMENT AND INNOVATION**
- **BIO-ENTREPRENEURSHIP PROGRAMME**
- **BIONEXUS GO GLOBAL**

The Bio-Accelerators link stakeholders from the private companies, universities, research institutions, finance institutions and ministries to ensure the efforts undertaken are comprehensive, deliver a multiplier effect on the economy and have a positive impact on the income and welfare of the people.

*Last but not least, allow me to put on record my sincerest appreciation to stakeholders in both the private and public sectors for their efforts to catalyse development in this industry as well as the continuous support to bring Bioeconomy to the next phase.*



**Y.B. Datuk Dr. Ewon Ebin**

*Minister of Science,  
Technology and Innovation*



## A NOTE FROM THE CHAIRMAN OF MALAYSIAN BIOTECHNOLOGY CORPORATION

“ *International linkages play an important role to accelerate the growth of Bioeconomy.* ”

The development of Bioeconomy in Malaysia will not only need a strong network within Malaysia but it is also important to have global engagements and interactions. Strong linkages with overseas players open up a myriad of commercial opportunities, potential research collaborations, and information sharing on latest technological and policy developments.

This year we have witnessed significant progress from several BTP Trigger Project owners that have expanded their presence globally. Sengenics Sdn Bhd, for example, is a member of the International Standards for Cytogenomic Arrays (ISCA) Consortium and has sales offices and laboratories in four countries. Similarly, GES International Sdn Bhd has penetrated the Japanese market to meet the demand for high quality animal feed products and Fuciphagus Agritech Sdn Bhd has extended the sales of its premium Edible Bird's Nest products to China.

We expect more market penetration globally from local bio-based companies triggered by one of our Bio-Accelerator programmes, BioNexus Go Global, which will go into full swing next year. This initiative will support local bio-based industries through facilitation and advice to increase product visibility via international branding.

Action plans have also been put in place to foster international collaborations between local universities/research institutes and foreign companies. For example, we have facilitated a Public-Private Partnership between Swiss-based healthcare giant Novartis and Ministry of Health Malaysia (MOH). This MOH-Novartis tie-up was developed as a symbiotic platform to build various healthcare capabilities in Malaysia.

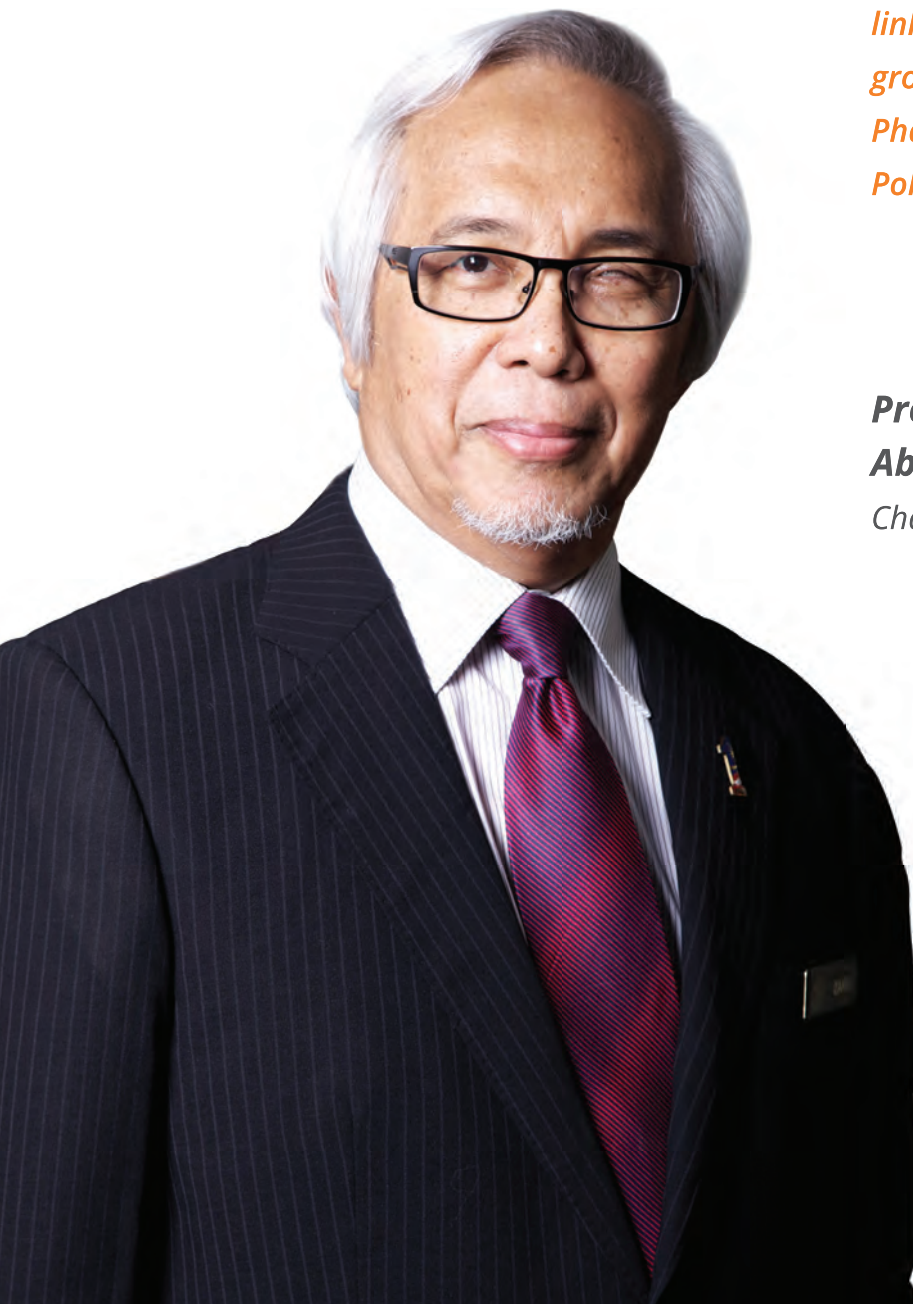
Besides that, BiotechCorp has expanded a collaboration with California Institute for Quantitative Biosciences (QB3) which allows Malaysian bio-entrepreneurs to collaborate and tap into the vast experience, knowledge and innovation of the San Francisco bio-innovation ecosystem. San Francisco is one of USA's major biotech hubs, housing about 240 bioscience-related companies, and BiotechCorp seeks to strengthen its presence further by opening a new BiotechCorp office there, to connect with the bio-based communities in the San Francisco Bay Area and the United States in general.

To further accelerate the commercialisation of Malaysia's bio-based industry, BiotechCorp has also signed a collaborative arrangement with Michigan State University which allows the sharing of existing know-how and innovation potential for the collaborative development of new bio-based products, processes and technologies between Malaysia and the US.

This year also marks significant progress on the European Union (EU) Bioeconomy Observatory which shall be a hub for information exchange between Bioeconomy countries. It will open doors to many opportunities for collaboration between Malaysia, the EU, and the world's Bioeconomies, while together identifying critical areas for future growth.

These international collaborations provide a global perspective and ensure that the evolution of Malaysia's Bioeconomy through National Science to Action Initiatives (S2A) continues to be aligned with global growth trends. This is further facilitated by the close guidance of experts on the Bioeconomy-International Advisory Panel (BIO-IAP).

*In summation, these international linkages will lay the foundation of our growth as we venture together into Phase 3 of the National Biotechnology Policy – Going Global.*



A handwritten signature in black ink, appearing to read 'Zakri'.

**Professor Tan Sri Zakri  
Abdul Hamid**  
Chairman

## CHIEF EXECUTIVE OFFICER'S REPORT



“

*It has just been two years but the BTP has already made significant impact as a cross-sectoral platform for the development of bio-based industry. The BTP continues to draw support from industry players and public stakeholders, including research institutes, government agencies, and private companies who are working together to channel and maximise the commercial opportunities of bio-based technology.*

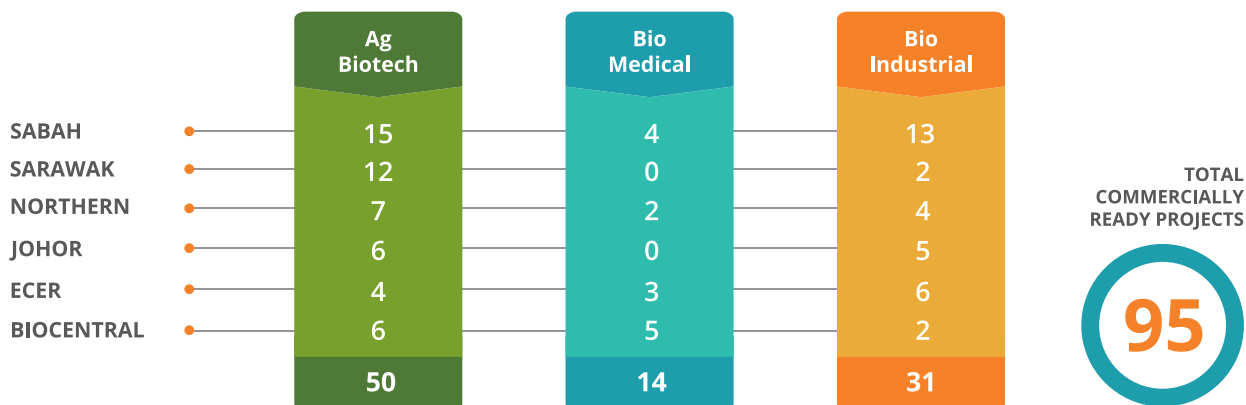
After a series of successful runs in Sabah, Sarawak and the Northern Region last year, we are proud to have mapped out the potential for Bioeconomy in the rest of Malaysia with the completion of BTP Workshops in Johor, East Coast Economic Region and BioCentral Region (Malacca, Negeri Sembilan, Selangor and Wilayah Persekutuan) this year.

The BTP Workshops provided us with a comprehensive insight of the industrial landscape in the regions visited, enabling us to develop a Bioeconomy roadmap to the year 2020 and beyond, based on focus areas identified.

In Sabah, for example, there is a strong need to provide continued support to existing industry clusters such as Lahad Datu's Palm Oil Industry Cluster (POIC) and Kota Kinabalu Industrial Park (KKIP). Concurrently, areas like Kundasang and Ranau could potentially be developed as new clusters based on the significant number of projects proposed in these locations during the workshop.

In total, 175 projects of varying stages were identified during the BTP Workshops. 95 of these projects were shortlisted as commercially ready and further assessed, the others being classified as early-stage projects requiring significant nurturing before commercialisation. As indicated in the table below, the majority of the commercially ready projects are focused on Agricultural Biotechnology (AgBiotech), signifying agriculture as the main economic driver for the Malaysian bio-based industry. The outcome of the BTP Workshops also revealed that BioMedical promises a positive future in Malaysia through a number of emerging projects in the BioCentral Region.


### Number of shortlisted projects from BTP Workshops by Focus Areas



Projects are identified as commercially ready based on the Technology Readiness Level (TRL) assessment system adapted from United States National Aeronautics and Space Administration (NASA) and Michigan State University Bioeconomy Institute. TRL1-6 (Stage 1) includes basic research and feasibility demonstration, TRL7-8 (Stage 2) refers to pilot scale demonstration, and TRL 9 (Stage 3) is defined as large-scale commercial operations.

PHASE	TRL	MATURITY LEVEL	
Basic Research	1	Promising research finding	Stage 1 : Discovery Stage
	2	Technology application formulated	
	3	Lab-scale experimental proof of concept	
Feasibility Demonstration	4	Lab-scale development and integration	Stage 2 : Determination Stage
Technology Department	5	Production enhancement techno-economic model	
Viability Demonstration	6	Scale up and pilot-scale technology validation	Stage 3 : Development Stage
Commercial Transition	7	Detailed engineering/ plant design	
	8	Semi-works-scale technology demonstration	
Commercial Deployment	9	Large-scale commercial operation	

The commercially ready projects are comprehensively evaluated for national impact and immediate readiness. As a result, five high impact projects are approved for inclusion into the BTP.




..... NEW .....

**BTP**

**TRIGGER**

**PROJECTS**


.....



**Fuciphagus Agritech Sdn Bhd [Malaysia]**

Production of premium edible bird's nest and downstream products for international markets.


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**Palsgaard [Denmark]**

Development of commercial emulsifiers and stabilisers from palm oil derivatives.


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**Verdezyne Inc. [United States] & Sime Darby Bhd [Malaysia]**

Bio-based Chemical Production using Renewable Palm oil derivatives.


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**CJ-CheilJedang [Korea] & Arkema [France]**

World's first renewable bio-methionine and Asia's largest thiochemicals platform.

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**Green & Smart Sdn Bhd [Malaysia]**

Biogas power generation based on the Feed-In-Tariff model.

As a result, as of September 2014, the BTP now boasts a total of 25 Trigger Projects that are expected to generate a total GNI of RM4.2 billion in 2020, provide 18,100 job opportunities, and secure cumulative investments of RM13.7 billion by 2020.

The overwhelming response of the BTP Workshops has demonstrated the latent potential of the Bioeconomy in Malaysia. As the projects continue to mature along the commercialisation timeline, we expect the industry's economic contribution to grow in tandem. We hope to capture this in the BTP as we approach the year 2020 with new long term targets of RM 48 billion of Gross National Income (GNI), creation of 170,000 new job opportunities and investment of at least RM 50 billion by the year 2020.

These ambitious targets are expected to be achieved as a result of the increasing rate of contribution by the Bioeconomy going forward; an improvement that is expected to be catalysed by the implementation of Bioeconomy Malaysia Accelerator Programmes (Bio-Accelerators).

The lead component for the Bio-Accelerators is the Bioeconomy Community Development Programme (BCDP), involving the enlistment of rural farmers and settlers to cultivate raw materials potentially as inputs for BioNexus companies and BTP project owners. The proposed contract-farming mechanism with guaranteed buyback will generate additional income for the programme participants and contribute to the national Gross Domestic Product, but more importantly, will provide a foundation for the upstream portion of the Bioeconomy industry supply chain. The creation of a secure, local, high-quality source of raw material enables capacity expansion for downstream ventures as well as improved market penetration.

Several pilot projects are in the pipeline for the implementation of BCDP which will achieve these objectives. For example, a pilot project in Kota Tinggi, Johor will kick off this year led by selected anchor companies conducting a range of high-value, bio-based technology enhanced agricultural activities.

**New BTP target is envisioned to contribute RM 48 billion of Gross National Income (GNI) in 2020, create 170,000 job opportunities and attract RM 50 billion in investment by 2020.**



**GNI in  
2020**

**RM 48  
Billion**



**Job Opportunities  
by 2020**

**170,000**



**Investments  
by 2020**

**RM 50  
Billion**

These include Flora Bee Hive Enterprise Sdn Bhd, BioAlpha (Johor Herbal) Sdn Bhd, Pure Circle Sdn Bhd and Holstein Milk Co. Sdn Bhd. An additional collaboration between BiotechCorp and Flora Bee Hive Enterprise Sdn Bhd has also been executed upon this year to develop honeybee contract farming in Kuala Linggi, Malacca and several other locations to be identified. In Pasir Raja, Terengganu, contract farming will complement the value chain of commercial herbs extraction for nutraceutical and pharma nutrition through a joint collaboration between BiotechCorp, East Coast Economic Region Development Council (ECERDC), BioAlpha International Sdn Bhd and Generasi Muda Berjaya Malaysia.

Finally, a BioNexus company, SeaHarvest Aquamarine Sdn Bhd has been selected as the anchor company to develop bio-enhanced oyster aquaculture involving 10 acres of land in Balik Pulau, Penang identified by Lembaga Kemajuan Wilayah Pulau Pinang (PERDA).

*We are nearing the year 2020 and I am optimistic that with the holistic approach through extensive collaborations between government agencies, research institutes, state authorities and private stakeholders, Malaysia will be able to transform into a sustainable, high income nation with Bioeconomy as an engine of growth. Allow us to share the latest on Malaysia's Bioeconomy in this Annual Report and based on these findings, I am pleased to share our motivations for the years ahead.*

**Dato' Dr. Mohd Nazlee Kamal**  
Chief Executive Officer

## THE SENIOR MANAGEMENT TEAM

**Dr. Harcharan  
Singh**

Senior Vice  
President,  
Technology  
Management  
Office

**Dr. Kodi  
Isparan  
Kandasamy**

Senior Vice  
President,  
Business  
Development  
& Investment -  
AgBiotech

**En. Adnan  
Baharum**

Senior Vice  
President,  
CEO's Office

**Mr. Jay  
Christopher  
George  
Padasian**

Senior Vice  
President,  
Business  
Development  
& Investment -  
BioMedical

**Cik Sharifah  
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Syed Abdul  
Aziz**

Senior Vice  
President,  
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**En. Zainal  
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Hasnan  
Tarmizi**

Chief  
Operating  
Officer

**YBhg. Dato'  
Dr Mohd  
Nazlee  
Kamal**

Chief  
Executive  
Officer

**Tuan Syed  
Agil Syed  
Hashim**

Chief Financial  
Officer

**Puan Zurina  
Che Dir**

Senior Vice  
President,  
Bioeconomy  
Development





# BIOECONOMY IN MALAYSIA

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## INTRODUCTION

**As the first country in Southeast Asia to launch a Bioeconomy initiative, Malaysia is providing an effective and conducive platform for bio-based industry to positively contribute to Malaysia's sustainable development agenda, improve industry competitiveness, encourage public - private partnerships and bring socio - economic benefits to the nation.**

“ The BTP initiative will make it easier for local bio-based companies to grow even faster to compete in international market. I believe the BTP will help Agrovery Sdn Bhd and Rompin Integrated Pineapple Industries Sdn Bhd to leap forward in the bio-based industry.

*Mr. Patrick Teoh Gim Hooi  
Rompin Integrated Pineapple  
Industries Sdn Bhd.*

## BENCHMARKING THE MALAYSIAN BIOECONOMY

As of 2010, Bioeconomy as a whole contributed up to 13.4 per cent of the total Malaysian GDP, a contribution equivalent to RM106.7 billion. This value encompasses economic impact from all sectors of economy that could possibly benefit from application of bio-based technology, like agriculture, chemical production, and oil & fat processing.

The contribution of Bioeconomy is envisaged to grow higher in the coming years. At a steady 15% yearly growth, the size of the Bioeconomy can grow to RM181.2 billion in 2030. Of this amount, RM84.8 million is expected to be contributed by activities enhanced by the application of advanced bio-based technologies. However, strategic direction, effective sectoral investment in technology and facilitation can maximise this value further by displacing activities reliant on conventional processes and technologies.

## CAPTURING THE POTENTIAL

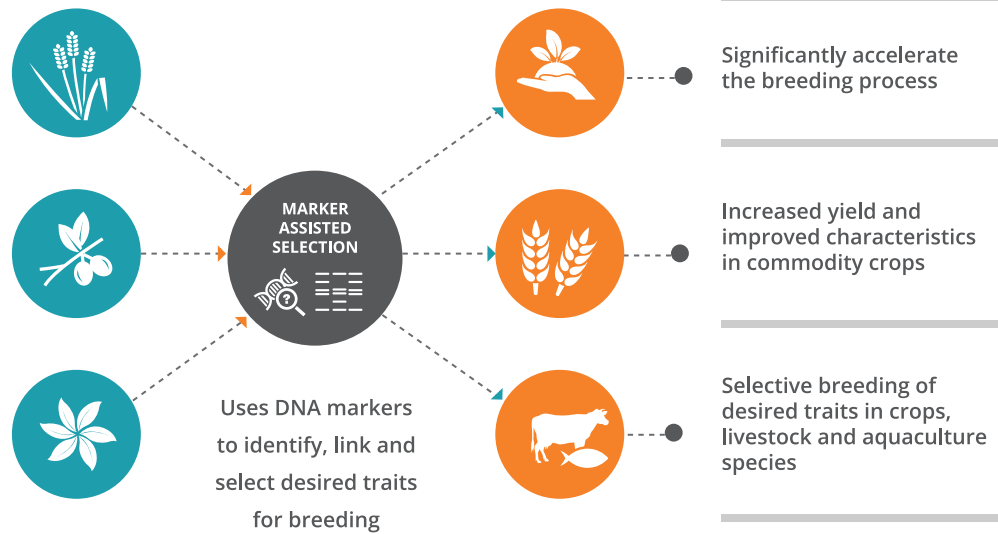
In order to capture this significant potential, we must leverage on our existing strengths comprising of the high-impact activities within the palm oil industry and primary agricultural production sectors. These activities will generate the greatest marginal impact in the coming years due to the firm industrial framework, ecosystem and markets that are already in place.

Bio-based technology can amplify the economic contributions of these sectors beyond current capacities by enhancing productivity, yield and quality of outputs. Development of these upstream sectors creates a ripple effect throughout the entire industry supply chain. Raw materials can be channelled for processing or extraction, enabling downstream companies to expand capacity and penetrate new markets at the local and global scale.

The creation of a secure, local supply of high quality inputs, like indigenous herbs, energy crops and other products turns the upstream sector into a key driver for the industry. This is the basis for the implementation of the Bioeconomy Community Development Programme, which simultaneously attracts investment, promotes growth, and increases economic contribution to the nation, while creating an immediate impact of increasing income of rural farmers.

## AN EXAMPLE OF TRANSFORMING AGRICULTURAL PRACTICES THROUGH TECHNOLOGY:

### MARKER ASSISTED SELECTION



At the same time, special emphasis must also be accorded to sectors that will create value in the long run. Activities like production of bio-based chemicals and biofuels are niche sectors of our Bioeconomy for now, but the upside potential is significant.

Based on the information gathered on proposed projects throughout Malaysia, key activities were identified as natural strengths for our economy. Coupled with major emerging trends and opportunities arising around the globe, high potential opportunities can be developed. For example, Bio-cosmeceuticals, Wellness and Pharma Nutrition, Cellular Medicine and Stem Cells, as well as Bio-based Chemicals are all compelling markets that should be explored.

As technologies mature and markets gravitate toward these high-value, high-margin products, the return on investment will grow exponentially. This manifests itself, not just in economic terms, but in other important areas like improved quality of life, sustainability, food security and climate equilibrium.

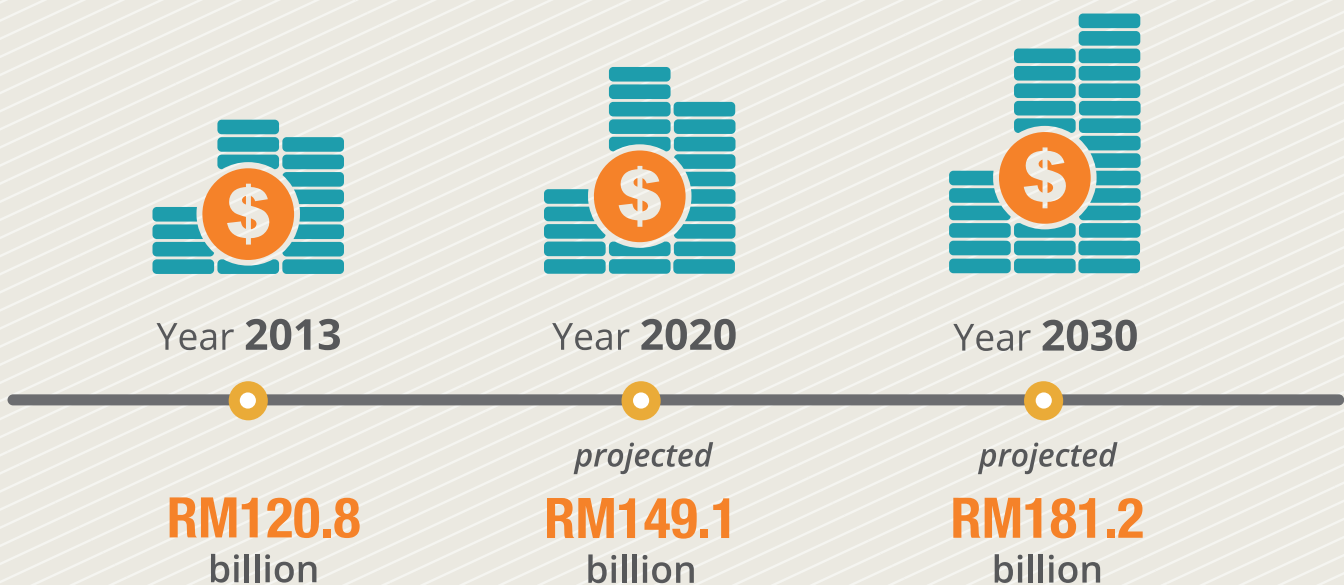
In light of this, BiotechCorp recognises the importance of anticipating these future focus areas. Due to the developing nature of these sectors, a nurturing platform for growth must be made available as they mature in the coming years. It is crucial that the existing policy framework accommodates for the potential impacts of these nascent sectors by providing strategic thrust, guidance, and importantly, support for a robust research and development ecosystem in Malaysia.

The Bioeconomy Transformation Programme (BTP) has been thrust into this role as a platform to develop the growth of the bio-based industry. The BTP will achieve this as part of an overall Strategic Industry Innovation Masterplan: under the purview of the National Bioeconomy Council, the BTP will work hand-in-hand with ministries, agencies, and industry stakeholders to maximise our nation's bio-resources through cohesive strategy and programme implementation.

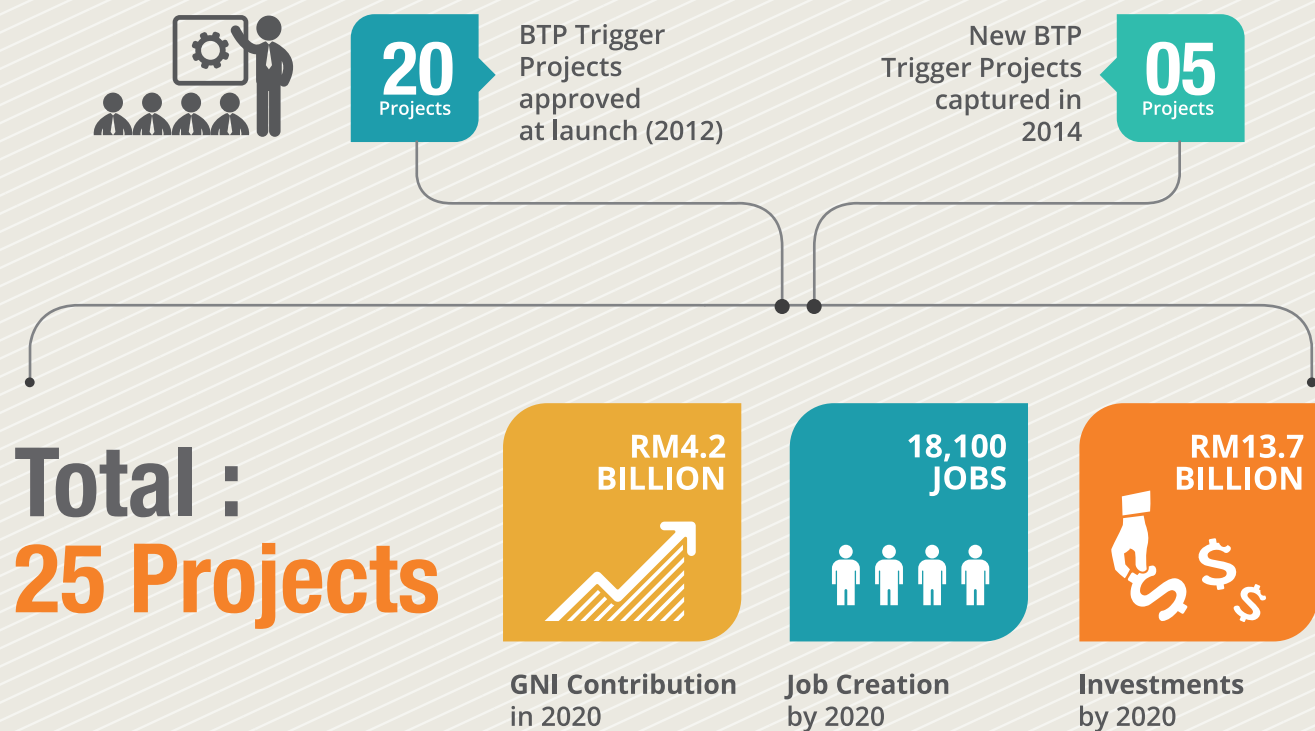
Together, we can fully realise the potential of our Bioeconomy with bio-based technologies as the catalyst for our transformation.

## BIOECONOMY BY THE NUMBERS

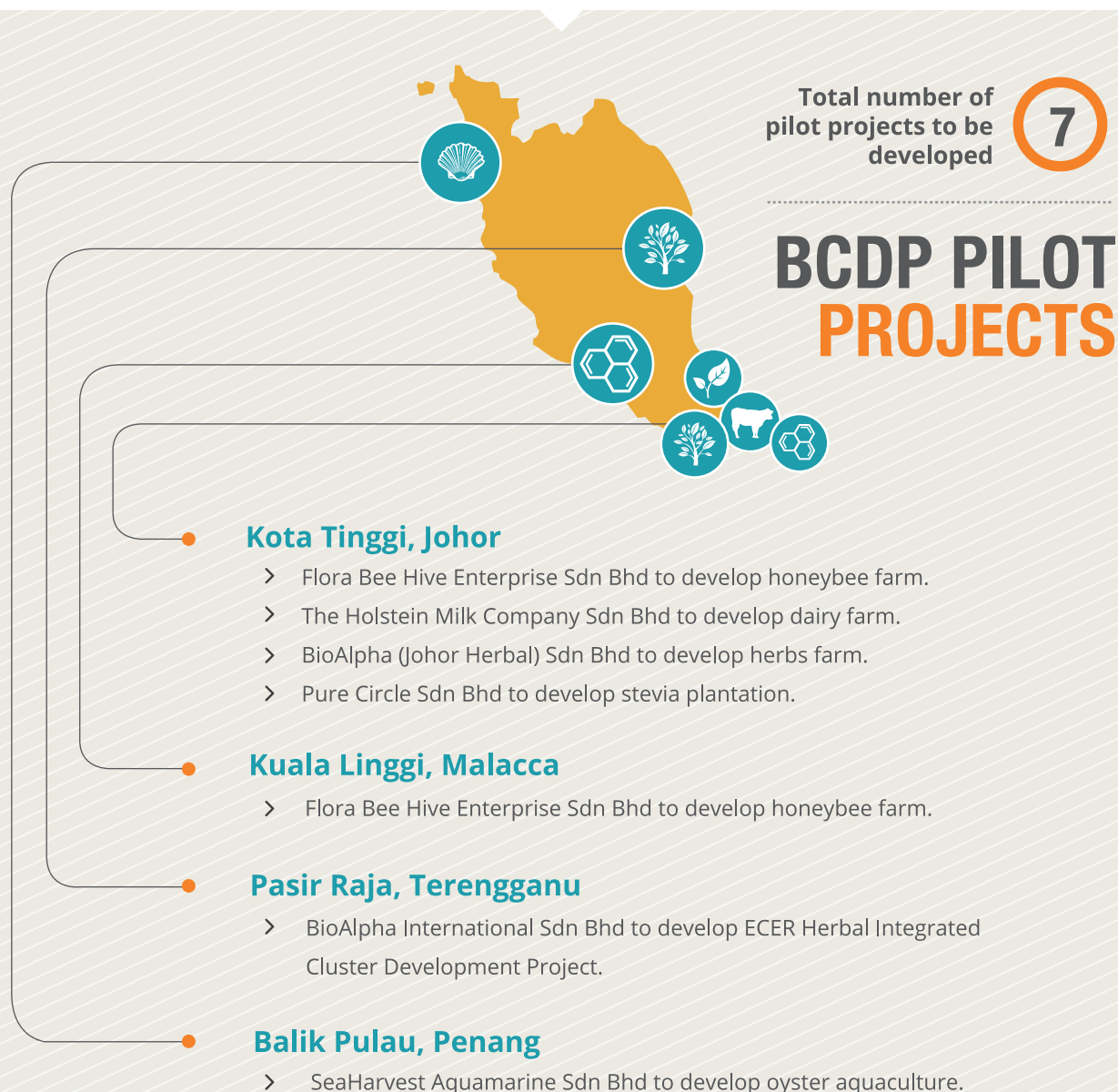
### Gross Domestic Product (GDP) Contribution of Bioeconomy



### Number of Approved BTP Projects



## Bioeconomy Community Development Programme (BCDP)



BTP gives the opportunity for bio-based entrepreneurs to commercialise their research. Because of Bioeconomy, it is now easier to get funded, to collaborate, to produce and to commercialise our technology. It has also given opportunity for investors to invest in new bio-based projects, hence BTP has created many new opportunities for both local and international.

Mr. William Hon Tian Kok | BioAlpha International Sdn Bhd

## CHALLENGES AND OPPORTUNITIES

The potential economic and environmental benefits of bio-based technologies have created a growing strategic interest in Bioeconomy across the globe. However, in order for Bioeconomy to succeed, considerable challenges will need to be addressed.

One of the main challenges for Bioeconomy projects is funding. In light of this, BiotechCorp (with the assistance of Malaysian Debt Ventures Bhd) is implementing the the Bioeconomy Transformation Programme (BTP) Fund in the form of soft loans to eligible BTP approved companies.

BTP Fund is envisioned as a 'tipping point' or 'bridging' mechanism to mitigate and de-risk a project from the point of view of conventional financing institutions.

Another key challenge faced by the bio-based project owners is inter-ministerial jurisdiction. Bio-based projects are unique as they involve cross-cutting disciplines such as healthcare, agriculture, industrial and green technology.

Clear ownership and specific responsibility should be addressed clearly for each ministry to effectively contribute to the development of a specific project.

With a distinct and cohesive strategic direction the risk of miscommunication within the ministries involved can be mitigated effectively. This will ensure a clear understanding between ministries on their roles in a particular project.

**As a programme under the purview of the National Bioeconomy Council (NBC), the BTP serves as an important bridge between Bioeconomy ministries like the Ministry of Science, Technology and Innovation (MOSTI), Ministry of Health (MOH), Ministry of Agriculture (MOA), and many others.**

With the committee members including Ministers from ministries involved in Bioeconomy, the NBC strives to coordinate efforts and ensure co-ownership among the ministries in implementing the BTP. It also ensures integrated strategic planning for the development of the industry.

The National Bioeconomy Council strives to enhance effective implementation of the BTP through:



Coordinating efforts among the ministries in addressing BTP implementation;

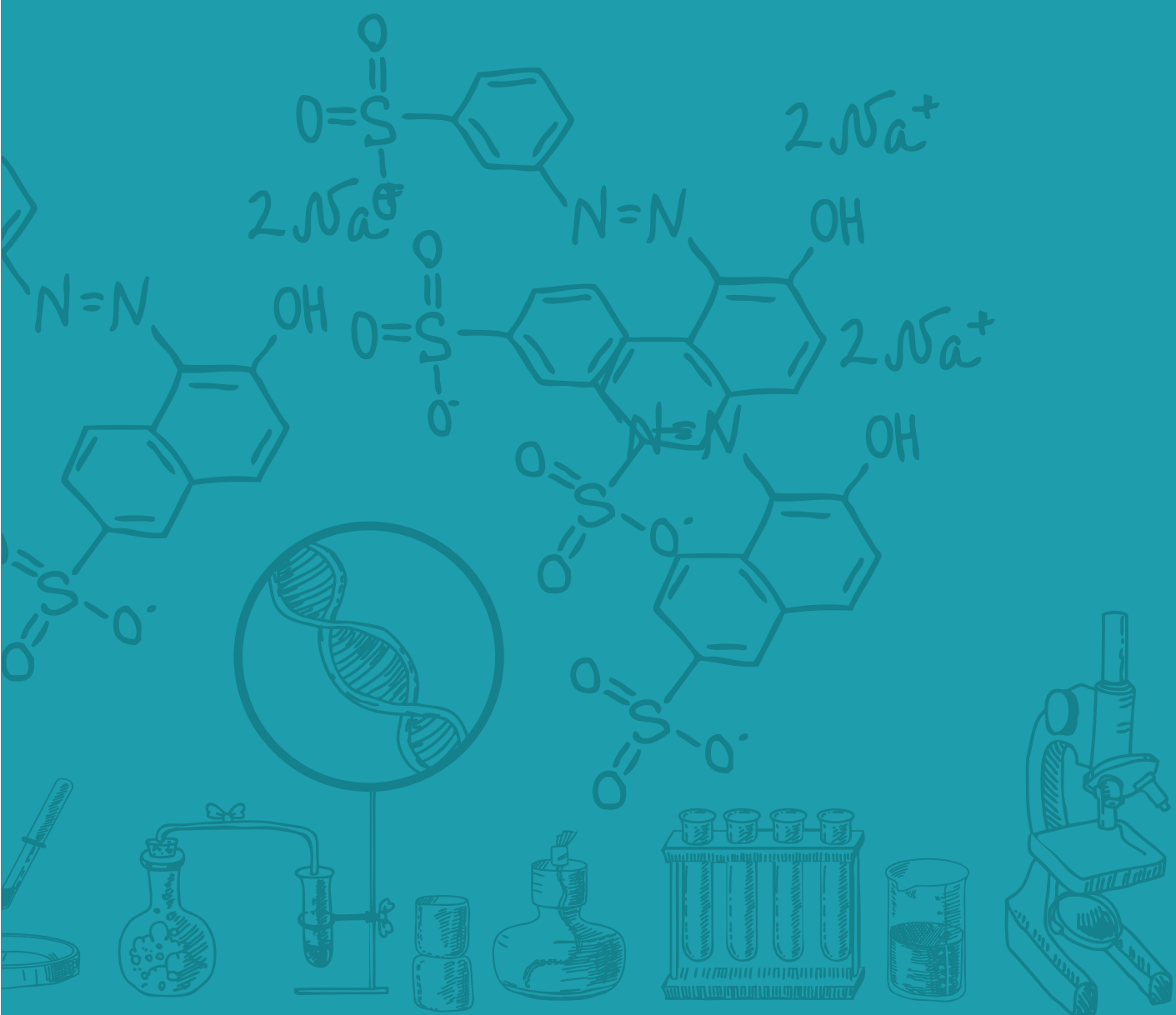


Encouraging co-ownerships between ministries on BTP projects; and



Serving as a platform for integrated strategic planning between relevant ministries that can enhance Bioeconomy contributions.

# PROGRESS OF BTP TRIGGER PROJECTS



## Agricultural Biotech (AgBiotech)



### Trigger Project

### Progress

#### EPP A1 : Secure local biobased farm input

Production of biofertilisers through integrated waste treatment plants

The project owner is expanding its business in Indonesia while sustaining its operation in Sabah.



Scale up production and commercialisation of bio-feed for livestock industry

The project is meeting with commercial success and is in the process of expanding its capacity.



#### EPP A2 : Identify, produce and commercialise high value local bio-ingredients

Develop sustainable collection, extraction and commercialisation of mangosteen

Project owner is exploring options for the implementation of the upstream portion of the project in order to support its on-going downstream processes.



Scale up plantation, extraction and commercialisation of Stevia as an alternative sweetener

The project owner continues working on specific implementation details to successfully execute the project.



Research, development and manufacture of emulsifiers and stabilisers

Project construction has been completed with successful operation, and is embarking on the research and development aspect.



#### EPP A3 : Develop and commercialise high value food varieties

Premium edible bird's nest and downstream products

Project is progressing smoothly. It is in the process of setting up a pilot plant to produce high quality downstream products using in-house technology



To develop, produce and commercialise indigenous hybrid seed

Project in process of reviewing implementation mechanisms from the commercial, technical and funding aspects.



Scale up production of high value mushroom varieties

The project is in progress of expanding the proposed downstream activities; upstream operations are on-going.



Legend :



Good Progress



Moderate Progress



Slow Progress

## Industrial Biotech (BioIndustrial)



### Trigger Project

### Progress

#### EPP I1 : Industrial bioeconomy upstream inputs

Production and utilisation of compressed biomethane gas (CBG) for transportation and industrial sectors

Project is currently under review to explore feasible implementation mechanisms.



Setting-up of a biogas power generation plant at Felda Kahang based on the Feed-In-Tariff model

The project owner has received commercial approval from relevant authorities and is preparing to begin construction.



Establishment of an energy crop plantation as input for the industrial bioeconomy

Proposal remains on track for implementation.



Production of syngas for steam generation from solid biomass

Proposal remains on track for implementation.



#### EPP I2 : Biochemicals from renewable resources

Bio-based chemical production using renewable palm oil derivatives

The project has partnered with a reputable conglomerate player and continues on its path toward implementation.



Renewable production of L-Methionine and Thiochemicals

The project is progressing along its implementation timeline, and is approaching completion of construction.



Production of cellulosic sugars from woody biomass produced by energy crop plantations

The owner is reviewing the operationalisation plan for project execution.



Production of isobutanol from cellulosic feedstocks

The project owner continues finalising its technical details to optimise the processing platform.



Legend :



Good Progress



Moderate Progress



Slow Progress

### EPP I3 : Biomaterials from renewable resources

Agro-based bioresin production for bioplastics use	Project owner is identifying suitable investors to set up the new production facility.	
Production of biopolyols for biopolyurethanes from palm oil derived oleic acid	The owner is exploring new avenues of implementation for the project.	
Establishment of commercial production of polyhydroxybutyrate hexanoate (PHBH) from palm oil	The project owner is finalising the plant location for the new facility.	

Legend :



Good Progress



Moderate Progress



Slow Progress

“ BTP has provided us with a tangible platform to maximise our commercialisation opportunities. BTP being one of the implementation strategies under the Economic Transformation Programme (ETP) has immensely helped Malaysia's bio-based industries to grow exponentially. The best part is, we are just getting started.

*Mr. Saravanan Rasaratnam | Green & Smart Sdn Bhd*

## Medical Biotech (BioMedical)



### Trigger Project

### Progress

#### EPP M1 : Develop and commercialise biosimilars/biologics

Develop and commercialise biosimilars/ biologic drugs

The project owner is currently exploring strategies to engage potential stakeholders and expand manufacturing capacity.



#### EPP M2 : Develop drug discovery and pre-clinical services ecosystem

Develop drug discovery and pre-clinical services ecosystem

Project owner is identifying suitable funding sources to implement the proposal.



#### EPP M3 : Scale up innovative molecular screening and diagnostics

Scale up innovative molecular screening and diagnostics (MSD) products and services

Most of the component project owners demonstrated good progress through on-going operations and newly announced commercial collaborations.



#### EPP M4 : Scale up stem cells and regenerative medicine

Scale up stem cell and regenerative medicine

Owner is engaging with selected public stakeholders to facilitate project implementation.



Legend :



Good Progress

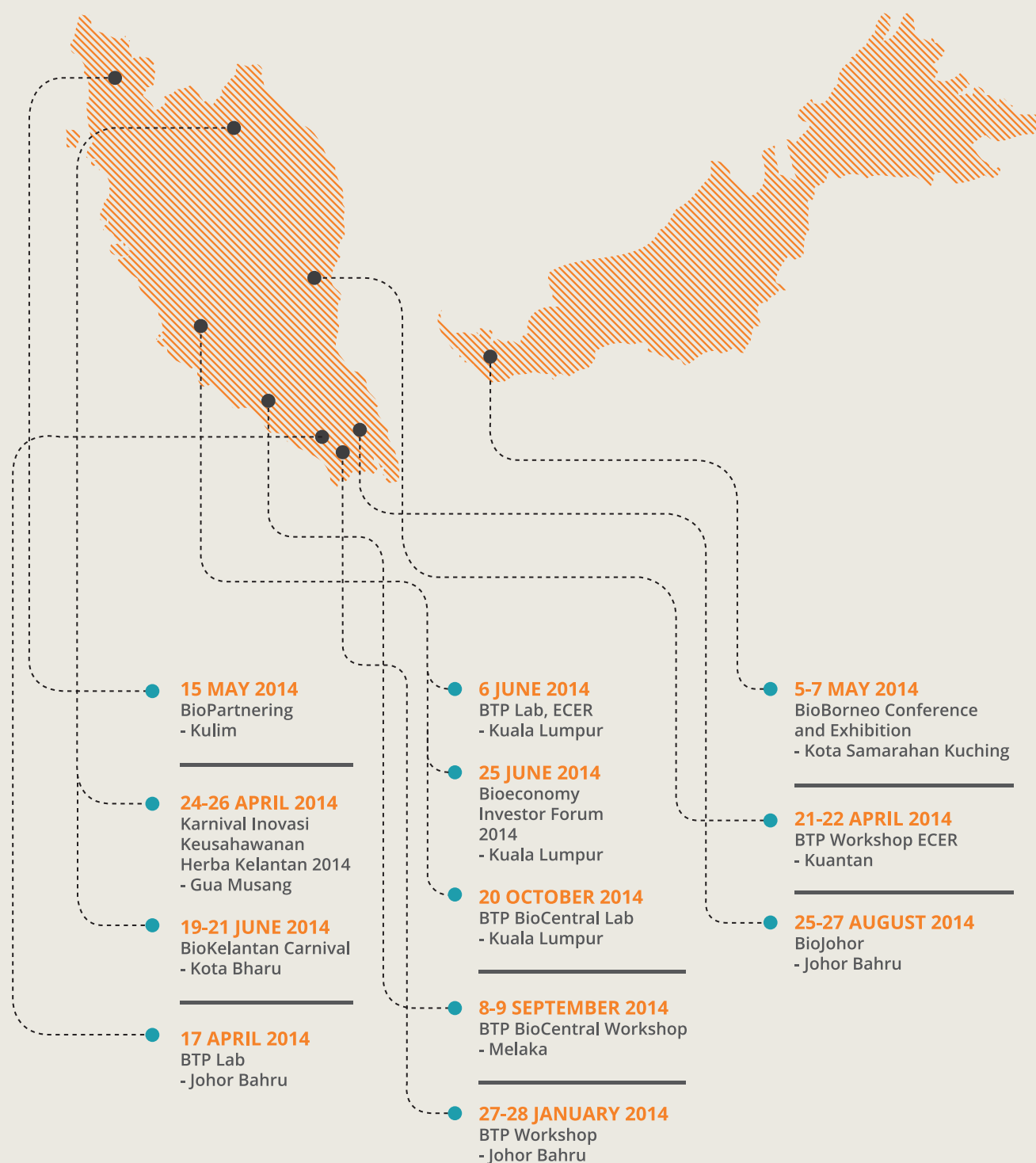


Moderate Progress



Slow Progress

## KEY EVENTS (i) LOCAL



## KEY EVENTS (ii) INTERNATIONAL

**20 - 22 MAY 2014**

EU Bioeconomy Observatory and Malaysia-EU Partnership  
and Collaboration  
- **Brussels, Belgium**

**23 - 26 JUNE 2014**

BIO San Diego 2014  
- **San Diego, United States**

**24 SEPTEMBER 2014**

Bioeconomy International Advisory Panel Meeting  
- **New York, United States**

**8 - 9 OCTOBER 2014**

3rd Bioeconomy Stakeholders' Conference (TOBE 2014)  
- **Turin, Italy**

2nd Bioeconomy Observatory Stakeholder Roundtable  
- **Turin, Italy**

**28 - 30 OCTOBER 2014**

10th World Islamic Economic Forum (WIEF)  
- **Dubai, UAE**



## MOVING FORWARD

As we edge closer to the year 2020 and our national goal of becoming a high income nation, it becomes increasingly important to maximise the economic potential of our resources.

The application of bio-based technologies is the game changer which can transform conventional processes and industries in the Bioeconomy into major contributors to the national economy.

Thanks to our biodiversity and the natural resources available, we have all the necessary building blocks to establish ourselves as a leader in the global Bioeconomy. However, this requires commitment and a cohesive strategic direction at the policy level, driven by the concerted efforts of all the stakeholders involved.

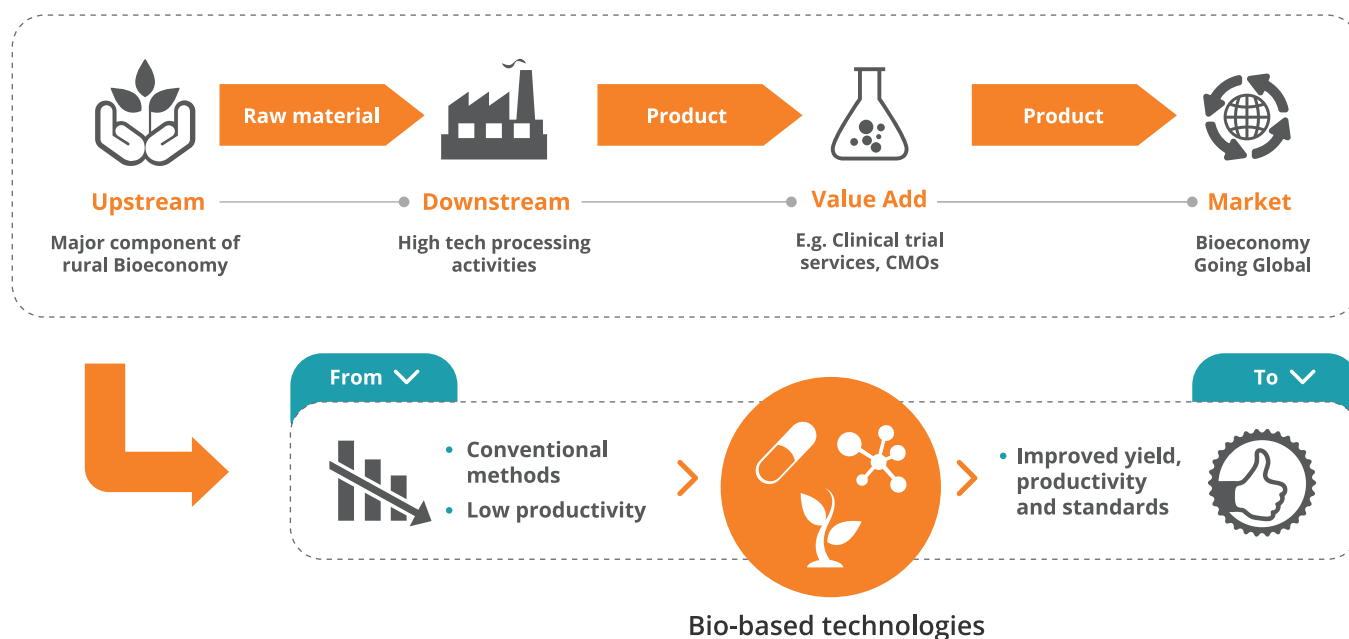
Mandated as the prime mover for the Bioeconomy, BiotechCorp acts to holistically develop the entire value chain and create a sustainable industry ecosystem.

Programmes currently being implemented like the Bioeconomy Community Development Programme (BCDP) serve to bolster the upstream portion of the supply chain. This ensures BioNexus companies and BTP projects can securely obtain high-quality raw material for downstream processing.

The BCDP is also part of an overall emphasis on maximising the contribution of existing strengths in our economy, i.e. primary agricultural activities like oil palm and rubber.

### Targeting upstream Bioeconomy as a key driver of the entire value chain - from supply to market

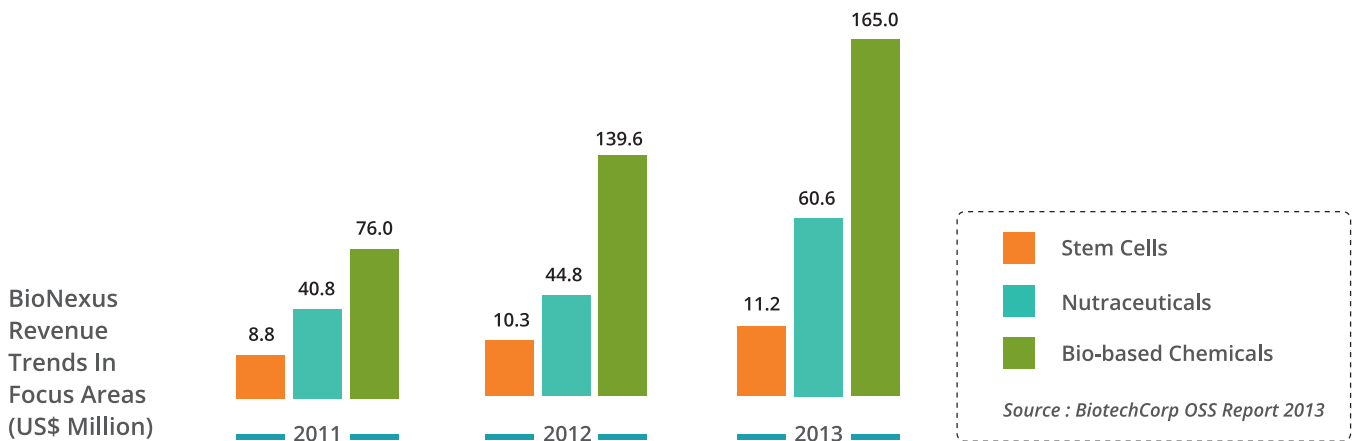
Developing upstream sector creates a ripple effect through the entire value chain



However, in the long term, newer downstream growth areas are crucial to the future advancement of the bio-based industry. Through extensive engagement with industry stakeholders, and in parallel with global and local Bioeconomy trends and opportunities, sectors with higher value markets can be identified and nurtured.

For example, Bio-cosmeceuticals, Wellness and Pharma Nutrition, Cellular Medicine and Stem Cells, as well as Bio-based Chemicals are all downstream activities that have compelling growth potential and are already attracting investment and generating revenue in the Malaysian Bioeconomy through BioNexus status companies.

## Examples of Growing Sectors in BioNexus



**41 in**  
**Bio-cosmeceuticals,  
Wellness & Pharma  
Nutrition**

**136 AgBiotech**



**7 in Cellular  
Medicine &  
Stem Cells**

**65 BioMedical**



**10 in Bio-based  
Chemicals**

**40 BioIndustrial**

This “Complete value chain approach” is the bedrock of what will be the Bioeconomy Strategic Industry Innovation Masterplan: a blueprint for the accelerated expansion and development of the Bioeconomy for the 11th Malaysian Plan.

In conjunction with other core strategies like “Strengthening SMEs” and “Engaging Society”, BiotechCorp seeks to build on the achievements of these early years of the BTP: enhancing existing strengths of our Bioeconomy, while laying the foundations for our future.

# 5 BENEFITS OF THE BIOECONOMY TRANSFORMATION PROGRAMME



## BIO-ACCELERATORS

Opportunity to **participate in the Bioeconomy Malaysia Accelerator Programmes (Bio-Accelerators)** including Bioeconomy Community Development Programme, Technology Development & Innovation, BioNexus Go Global and Bio-Entrepreneurship to enhance and accelerate the growth of bio-based businesses.

## MARKET ACCESS

Opportunity to **expand market access** via BiotechCorp collaboration with the economic corridors and State development agencies to initiate collaborative bioeconomy clusters for wealth creation and sharing the benefits of Bioeconomy throughout the country by expanding existing value chains and creating new ones.

## FUNDING ACCESS

Private Sector can **access the Bioeconomy Transformation Programme (BTP) Fund to part-finance the commercialisation and expansion of their business**, and be connected to alternative financing options from various agencies.

## GOVERNMENT SUPPORT

Direct **assistance and endorsement from the Government, represented by the relevant ministries**, with continuous facilitation and advisory support through BiotechCorp which acts as the BTP Secretariat and Implementing Agency.

## NATIONAL VISIBILITY

Opportunity for the private sector to participate in a key Government agenda, achieving visibility among important stakeholders in the public sector, investment community, and ordinary Malaysians. As a contributor to the nation's Bioeconomy Initiatives, **participants benefit from being a part of Malaysia's greater Economic Transformation Programme (ETP).**



If the right projects are selected and implemented properly, BTP can be a powerful tool to transform whole communities by improving their incomes using biotechnology as the change agent and ultimately giving them a sustainable livelihood. At the end of the day, each BTP project has to be treated like a business. Like all business, it can only be sustained if it makes money, which can be channeled to improve the lives of the local communities. To me, this is what the "transformation" programme is all about: improving the lives of Malaysians.

*En. Razali Mohamed | JHR Aquaculture*

# Enriching the Nation, Securing the Future



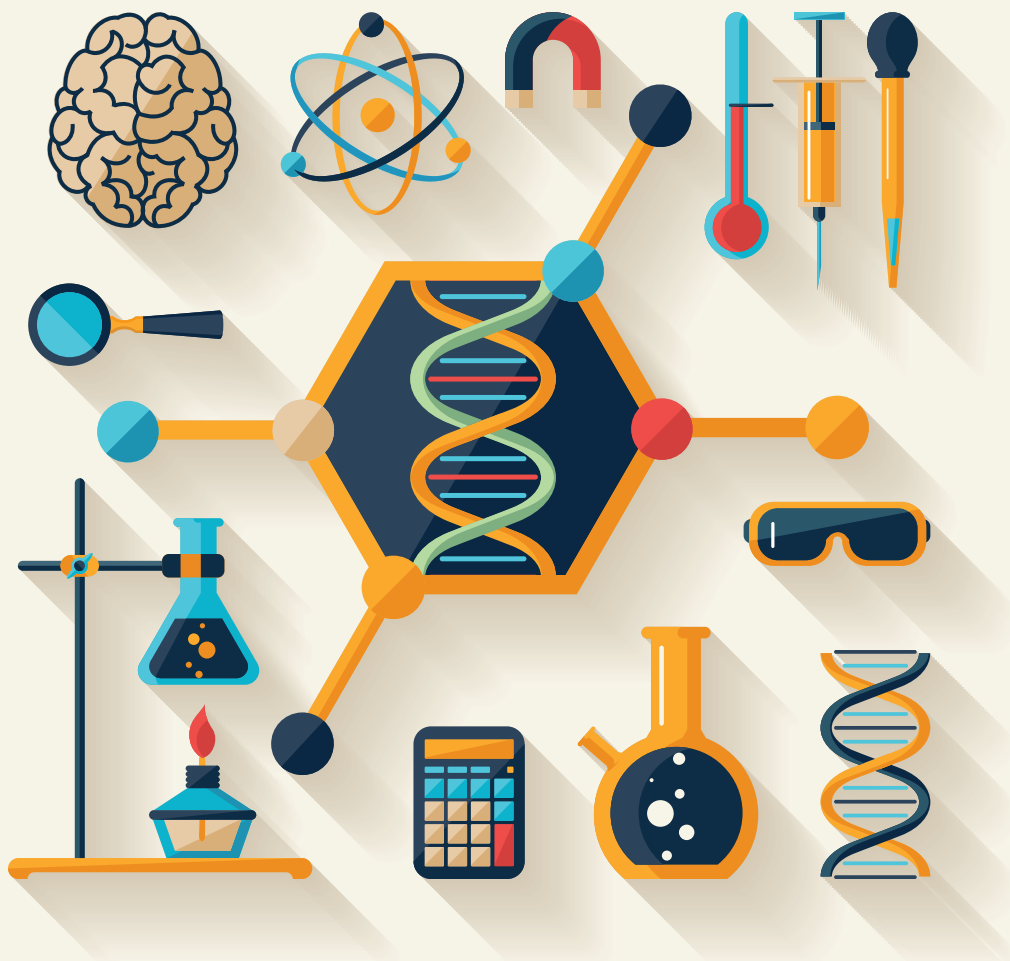




# READY TO INSPIRE

KEY PERFORMANCE HIGHLIGHTS

2013



[www.biotechcorp.com.my](http://www.biotechcorp.com.my)





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# ABOUT BIOTECHCORP

## Introduction

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**Malaysian** Biotechnology Corporation Sdn Bhd (BiotechCorp) (Company No. 691431-D) was incorporated under provisions of the Companies Act 1965 on 13 May 2005 to identify value propositions in research, development and commercialisation (R&D&C) as well as to support and facilitate these ventures through financial assistance and advisory services.

BiotechCorp is an agency of the Ministry of Science, Technology and Innovation (MOSTI) and owned by the Ministry of Finance Incorporated and Federal Lands Commissioner.

It is governed by the National Bioeconomy Council (NBC) (formerly known as Biotechnology Implementation Council) and counselled by the Bioeconomy International Advisory Panel, both are chaired by the Honourable Prime Minister of Malaysia.

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### Key Mandates

- Act as a focal point for all biotechnology initiatives in Malaysia.
- Nurture and accelerate growth of Malaysian biotechnology companies.
- Actively promote foreign direct investments in biotechnology.
- Create a conducive environment for biotechnology in Malaysia.

### Vision

To enhance the economic, health and social well being of the nation.

### Mission

Lead the development of the biotechnology industry in Malaysia.

### Corporate Values

- **Teamwork :**  
In a relationship based on mutual respect & understanding, we work together with our colleagues, clients and partners to achieve common goals.
- **Integrity :**  
We conduct our business with uncompromising integrity.
- **Excellence :**  
We strive to achieve excellence in all that we do.
- **Accountability :**  
We drive the delivery of results for the organisation and the nation.

## 2013 HIGHLIGHTS

### Key Indicators for the Biotechnology Industry

as at 31 December 2013

Indicators	Target			Phase II Achievements as of 2013
	Phase I (2005-2010)	Phase II (2011-2015)	Phase III (2016-2020)	
Investment	RM 6 Billion	RM 9 Billion	RM 15 Billion	RM 14.8 Billion
Number of BioNexus Companies	25	25	50	228
Employment	40,000	80,000	160,000	83,400
Annual Revenue	RM 20 Billion	RM 50 Billion	RM 100 Billion	RM 2.9 Billion*

\* Based on Online Submission System (OSS) reporting by BioNexus Status companies.

## FACTS & FIGURES

### BioNexus Companies

Approved Investment by Industry	Total 2012 (RM'Million)	Total 2013 (RM'Million)	Total (2005-2013) (RM'Million)
AgBiotech	783.6	614.6	2,312.7
BioIndustrial	39.4	0	513.8
BioMedical	28.3	83.1	519.0
	<b>851.3</b>	<b>697.7</b>	<b>3,345.5</b>
Realised Investment by Industry	Total 2012	Total 2013	Growth (%)
AgBiotech	1,028.9	1,113.4	8.2%
BioIndustrial	524.4	566.00	7.9%
BioMedical	936.5	948.0	1.2%
	<b>2,489.8</b>	<b>2,627.4</b>	<b>5.5%</b>
R&D Expenses by Industry	Total 2012	Total 2013	Growth (%)
AgBiotech	35.9	46.2	28.7%
BioIndustrial	7.0	7.6	8.6%
BioMedical	54.1	45.7	-15.5%
	<b>97.0</b>	<b>99.5</b>	<b>2.6%</b>
Employment by Industry	Total 2012	Total 2013	Growth (%)
AgBiotech	1,416.0	1,485.0	4.9%
BioIndustrial	643.0	653.0	1.6%
BioMedical	898.0	868.0	-3.3%
	<b>2,957.0</b>	<b>3,006.0</b>	<b>1.7%</b>
Knowledge Workers by Industry	Total 2012	Total 2013	Growth (%)
AgBiotech	577.0	619.0	7.3%
BioIndustrial	245.0	275.0	12.2%
BioMedical	548.0	540.0	-1.5%
	<b>1,370.0</b>	<b>1,434.0</b>	<b>4.7%</b>
Revenue by Industry	Total 2012	Total 2013	Growth (%)
AgBiotech	324.4	342.2	5.5%
BioIndustrial	476.0	551.7	15.9%
BioMedical	218.9	275.4	25.8%
	<b>1,019.3</b>	<b>1,169.3</b>	<b>14.7%</b>

## CALENDAR OF EVENTS

### ▶ January

7 - 9 , 2013

**JP Morgan Healthcare  
Conference**  
*San Francisco, USA*

### ▶ February

19 - 20 , 2013

**Bio Borneo 2013**  
*Sabah, Malaysia*

21 - 22 , 2013

**Bioeconomy Transformation  
Programme (BTP) Workshop**  
*Sabah, Malaysia*

### ▶ March

18 - 21 , 2013

**BioPharma Asia  
Convention 2013**  
*Singapore*

### ▶ April

22 - 25 , 2013

**BIO International  
Convention**  
*Chicago, USA*

### ▶ June

6 - 7 , 2013

**9th Malaysian International  
Agro-bio Business Conference 2013**  
*Kuala Lumpur, Malaysia*

10 - 11 , 2013

**Bioeconomy Transformation  
Programme (BTP) Workshop**  
*Sarawak, Malaysia*

12 - 14 , 2013

**2nd Biogas Asia Pacific  
Forum**  
*Kuala Lumpur, Malaysia*

16 - 19 , 2013

**10th Annual World Congress  
on Industrial Biotechnology**  
*Montreal, Canada*

25 - 26 , 2013

**Bioeconomy Investor  
Forum (BIF)**  
*Kuala Lumpur, Malaysia*

## ▶ July

15 - 18, 2013

**Asian Food and Agribusiness Conference**  
*Taipei, Taiwan*

9, 2013

**Biotechnology Entrepreneur Special Training (BeST) Programme**  
*Universiti Malaysia Pahang (UMP), Malaysia*

15, 2013

**Biotechnology Entrepreneur Special Training (BeST) Programme**  
*Universiti Putra Malaysia (UPM), Malaysia*

22, 2013

**Biotechnology Entrepreneur Special Training (BeST) Programme**  
*AIMST University, Malaysia*

29, 2013

**Biotechnology Entrepreneur Special Training (BeST) Programme**  
*Universiti Malaysia Perlis (UniMAP), Malaysia*

23, 2013

**Sabah BTP Lab Session**  
*Sabah, Malaysia*

24-25, 2013

**Sarawak BTP Lab Session**  
*Kuching, Malaysia*

## ▶ August

29 - 30, 2013

**Bioeconomy Transformation Programme (BTP) Workshop**  
*Penang, Malaysia*

## ▶ September

24, 2013

**Biotechnology International Advisory Panel (Bio-IAP)**  
*San Francisco, USA*

## ▶ September - October

30 - 2, 2013

**6th Annual European Forum for Industrial Biotechnology (EFIB)**  
*Brussels, Belgium*

## ▶ October

21 - 23, 2013

**Asia Bio Markets**  
*Johor, Malaysia*

## ▶ October

21 - 23, 2013

**BioMalaysia & Bioeconomy Asia Pacific 2013 and BioCareer & BioEducation 2013** *Johor, Malaysia*

## ▶ November

20 - 21, 2013

**Northern BTP Lab Session**  
*Penang, Malaysia*

## ▶ November

20 - 23, 2013

**Medica 2013**  
*Dusseldorf, German*

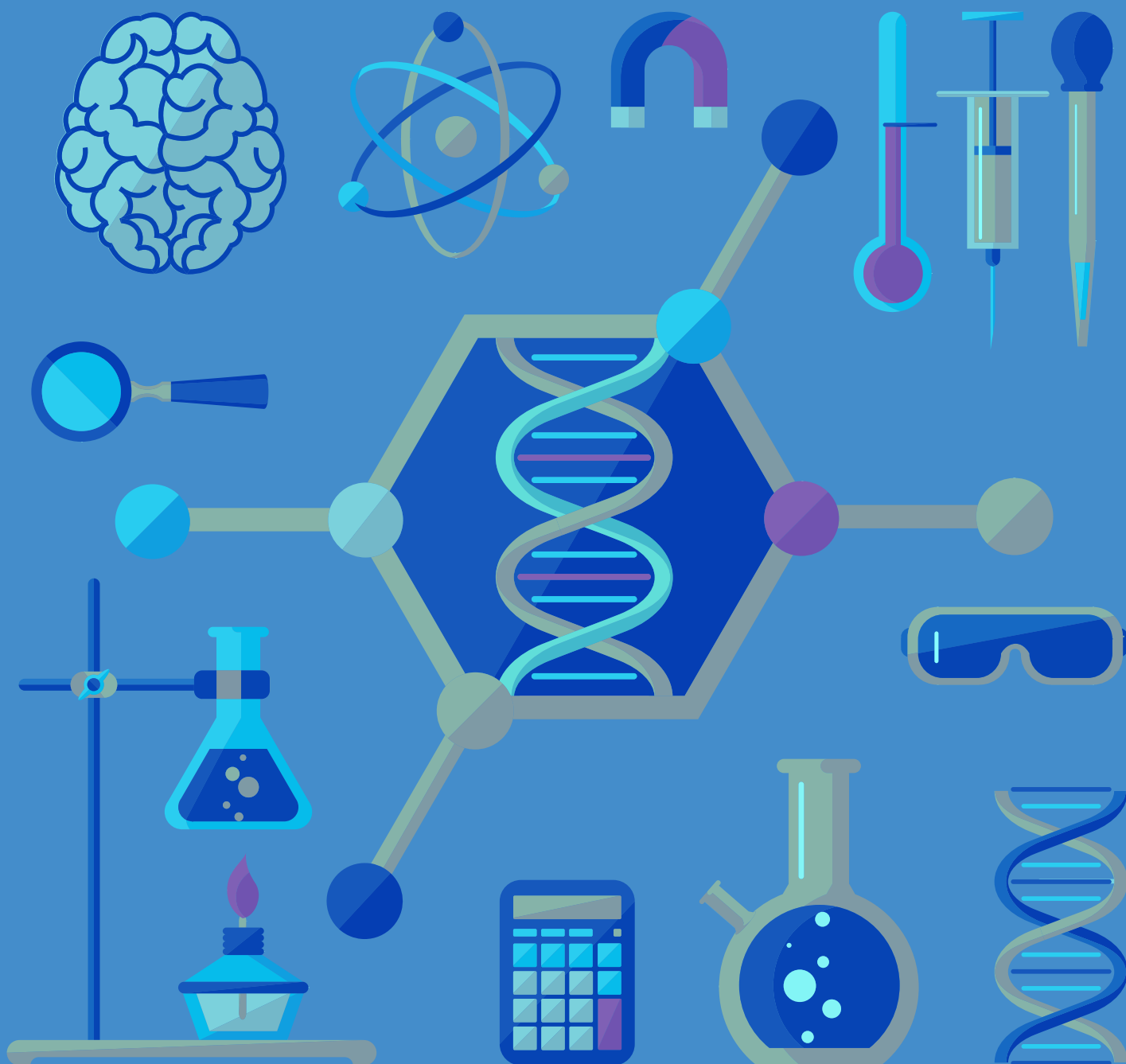
## ▶ December

3 - 5, 2013

**Malaysian Genomics Congress**  
*Putrajaya, Malaysia*

## KEY RESULTS

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## BIOECONOMY DEVELOPMENT

Bioeconomy Transformation Programme (BTP) Workshops				
LOCATION	TOTAL COMMERCIALY READY PROJECTS	AgBiotech	BioIndustrial	BioMedical
Sabah	32	15	13	4
Sarawak	14	12	2	—
Northern Region	13	7	4	2

**Projects** are identified as commercially ready based on the Technology Readiness Level (TRL) assessment system adapted from United States National Aeronautics and Space Administration (NASA) and Michigan State University Bioeconomy Institute. TRL1-6 (Stage 1) includes basic research and feasibility demonstration, TRL7-8 (Stage 2) refers to pilot scale demonstration, and TRL 9 (Stage 3) is defined as large-scale commercial operations.

	2012	2013	2020
	10 EPPs and 20 Trigger Projects	13 Pipeline Projects	Target
 GNI in 2020	RM 3.6 BILLION	RM 0.97 BILLION	RM 48 BILLION
 Job Opportunities by 2020	16,300	1,700	170,000
 Investment by 2020	RM 10 BILLION	RM 3.8 BILLION	RM 50 BILLION

## Strategic International & Domestic Partnerships

- 1 **MOU Exchange between BiotechCorp and Department of Statistics Malaysia**  
*Bio Borneo 2013, Kota Kinabalu*
  - MoU signing to enhance the quality of official statistics for bio-based industry.
- 2 **Collaboration Proposal between BiotechCorp and Michigan State University**  
*BIO-IAP 2013 Meeting, San Francisco, United States*
  - To strengthen US-Malaysia Bioeconomy business and research communities.

## Key Announcements & Events

- 1 **Global Launch of BTP**  
*BIO Chicago 2013, United States*
  - Highlight Malaysia as the second in Asia after China and the first in ASEAN, to establish its own Bioeconomy initiative.
- 2 **Announcement of the Bioeconomy Community Development Programme (BCDP) and Bioeconomy R&D Incentives** *Parliament Building, Kuala Lumpur*
  - Announced by the Prime Minister of Malaysia during the 2014 National Budget briefing.
- 3 **Announcement of BTP Fund**  
*BIO-IAP 2013 Meeting, San Francisco, United States*
  - To announce the RM85 million allocation to develop Malaysia's bioeconomy.
- 4 **Announcement of the Bioeconomy Malaysia Accelerator Programme**  
*BIO-IAP 2013 Meeting, San Francisco, United States*
  - Programme to accelerate bioeconomy development involving stakeholder collaborations with the Economic Corridors, universities, research institutions, finance institutions and inter-ministerial agencies.
- 5 **Launch of the California Institute for Quantitative Biosciences (QB3) Malaysian Bio-entrepreneurship Accelerator Programme**  
*BIO-IAP 2013 Meeting, San Francisco, United States*
  - One of the implementation strategies to create a conducive environment for Malaysian businesses to become global in scale and skill.
- 6 **Launch of the BTP 2013 Annual Report**  
*BioMalaysia 2013, Johor*
  - The annual report aims to provide the public and private sectors with an overview of the current status and progress of the BTP in 2013 as well as its future plans.
- 7 **Activities with Consortium Libraries**
  - Exchange of books between RC and Petronas Resource Centre for a period of three months. Books can be borrowed and used as reference within this period.
- 8 **Get to Know RC**
  - Sessions arranged for new comers and members to explore RC collections and services. The session is to encourage usage via RC's website and enhance searching capabilities using databases subscribed by RC for maximum use of news and information in performing daily work.
- 9 **Bookfair@RC**
  - Two-day book fair organized on the 22 and 23 July 2013, showcasing a wide range of subjects with an aim to provide a platform for internal and external members in selecting items for BRC collection and also for the members to expand their own personal book collection.

## BUSINESS DEVELOPMENT & INVESTMENT

### AgBiotech



### Investment

- ▶ Approved investments:

**RM919.3** MILLION

- ▶ Realised investments:

**RM272.7** MILLION



**FDI**

(Foreign Direct Investment)



**RM850.1** MILLION  
of total investments



**DDI**

(Domestic Direct Investment)



**RM69.2** MILLION  
of approved investment

- ▶ From the 13 newly approved (investment) projects, 6 are classified as FDI (Foreign Direct Investment), with investments coming from countries like Taiwan, France, and Japan. The largest share of FDI came from Taiwan in the aquaculture biotechnology, with investment amounting up to RM 400 million (whole project valued at RM 2.2 billion). In addition, 7 DDI (Domestic Direct Investment) projects with investments exceeding RM 68 million were also approved in 2013.

### Job Creation

- ▶ Creating **1,615 JOBS**  across the AgBiotech sector

## Strategic International & Domestic Partnerships

**1**

Technology Transfer Agreement between Amplio Ingredients Sdn Bhd (Amplio) and Pharma Foods International Co., Ltd. (PFI) on setting up a manufacturing plant in Malaysia for the production of "OVOPRON™", Defatted Egg Yolk Powder and Egg Oil.

**2**

Joint Business Collaboration Agreement between Tropical Oyster Sdn Bhd and Bio Desaru Sdn Bhd, to develop an integrated hatchery, nursery and grow-out farm at Bio Desaru Food Valley, Johor, for the cultivation of tropical oysters for the global market.

**3**

Memorandum of Understanding between Terra Garden Biotech (M) Sdn Bhd and Bio Solar Wind Energy Pte Ltd., to explore the potential of a hybrid napier grass (var. Hi-Cross) for biomass production for applications in animal feed and renewable energy projects.

**4**

Memorandum of Agreement between Green World Genetics Sdn Bhd and Yuksel Seed Co., Ltd., to jointly develop and market high value hybrid seed in Malaysia and Asia Pacific.

**5**

Memorandum of Understanding between Inno Integrasi Sdn Bhd and Microwell Bio Solutions Sdn Bhd, for the joint production of homogenous and pathogen-free bio-organic fertiliser (Gro Agro 6 and other proprietary blends).

## BioIndustrial



### Investment

▶ Approved investments:

**RM2.29** BILLION

▶ Realised investments:

**RM432** MILLION



**FDI**

with total approved investment:



**RM1.67** BILLION  
of total investments



**DDI**

with total approved investment:



**RM617** MILLION  
of approved investment

### Job Creation

▶ Creating

**390 JOBS**



across the  
BioIndustrial sector

### Strategic International & Domestic Partnerships



1

Memorandum of Agreement between BiotechCorp and Johor Biotechnology and Biodiversity Corporation (J-Biotech). The agreement is to facilitate further discussions between the two parties for the exchange of confidential and sensitive information necessary towards the preparation of proposals in relation to Project DAFFLESIA.

2

Memorandum of Understanding between Airestec Innovation Sdn Bhd and Automotive Development Centre (adc)-utm to establish cooperation on the activities of research, development & commercialisation programs relating to, but not limited to:-

- i) HVAC-automotive and building
- ii) decontamination and treatment
- iii) anti-corrosion and anti-microbial
- iv) health and indoor air quality
- v) bio and green technology

## Strategic International & Domestic Partnerships



3

Collaboration Proposal between BiotechCorp and Malaysia Timber Industry Board (MTIB) in relation to the setting up of a joint developmental programme to study and assess the performance of *Leucaena leucocephala* or "Petai Belalang" (as a forest plantation) and subsequently to establish the required best agricultural practices for the species as commercial forest plantation for biomass production.

4

Memorandum of Understanding between BiotechCorp, Malaysia Debt Ventures Berhad (MDV) and Malaysia Palm Oil Board (MPOB) in relation to the production of second generation fermentable sugar which will be utilised to support needs and requirements of the industrial biotechnology and life-sciences projects in Malaysia. The project will be called MY2GEN.

5

Collaboration Proposal between BiotechCorp, Sabah Economic Development and Investment Authority (SEDIA) and Sabah Green Development Sdn Bhd in relation to the setting up of *Leucaena leucocephala* trial plot for research and development purposes and subsequently on the development of *Leucaena leucocephala* forest plantation in Sabah.

6

Collaboration Proposal between BiotechCorp & POIC Sabah Sdn Bhd in the areas of Industrial Biotechnology Development, Healthcare Biotechnology Development, Human Capital Development and BioNexus Development in Sabah.

7

Announcement of "Petai Belalang" pioneer project in Kota Marudu, Sabah, Malaysia. This initiative promoted by Sabah Green Development Sdn Bhd is in relation to the setting up of *Leucaena leucocephala* pilot project for research and development purposes and upon completion of feasibility studies, the project may be extended into the development of *Leucaena leucocephala* forest plantation in Kota Marudu, Sabah.

## BioMedical



### Investment

▶ **Approved investments:**  
**RM948** MILLION

▶ **Realised investments:**  
**RM442** MILLION

▶ **Biopharmaceutical sector contributes**



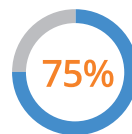
**RM477.56**  
MILLION

▶ **Medical Devices & In vitro Diagnostics (IVD) contribute**



**RM464.1**  
MILLION

From the total **Approved Investment** in 2013



**was contributed by DDI.**  
*Domestic direct investments*

▶ with total investments **RM 709.2 MILLION**. **The domestic investments** primarily came from the Northern region where the matured & established medical devices sector contributed **50%** of the accumulative investment.

**BiotechCorp offers facilitation** for companies from the pre-investment to post-investment stage. Regulatory Approval, Local Authority Approval, Talent Resource and Immigration Applications are among the facilitation scopes which BiotechCorp provides to the industry.

### Job Creation

▶ **Creating**

**2,613 JOBS**



*opportunities from the approved investments.*

## Strategic International & Domestic Partnerships

1

Build and Lease Agreement between Bio-XCell & Stelis Biopharma (formerly known as Agila Biotech Malaysia). Bio-XCell and Stelis Biopharma signed a Build and Lease Agreement (BLA) in March 2013. This agreement is towards the establishment of a customised biotech facility in the Bio-XCell Malaysia.

2

CCM Acquisition of Stake in PanGen Biotech Chemical Company of Malaysia Berhad (CCM) accelerated its foray into the biosimilars business with the purchase of equity stake in PanGen Biotech, Inc, (PanGen) a Korean biotechnology company.

In this regard, CCM's equity stake in PanGen allows its Pharmaceuticals Division to have strategic access to a biosimilar that is being produced as there are very few start-up biological companies globally with the expertise, track record and range of cell lines already developed by PanGen. This is pursuant to the collaboration facilitated by BiotechCorp between these parties to conduct clinical trials of Erythropoietin (EPO) in Malaysia to treat end stage renal failure patients.

## BIONEXUS DEVELOPMENT

### Industry Support & Evaluation



The concept store of promoting bio-based products by BioNexus Status companies was successfully set up during BioMalaysia & Bioeconomy Asia Pacific 2013 held on 21 – 23 October 2013 at Persada Johor International Convention Centre, Johor

- i. **More than 100** types of products promoted
- ii. **Promotion and awareness** of biotechnology - based products to the public

7

**Market Access**

Participated & organised the participation of BioNexus status companies in local & international exhibitions, events & trade missions

- ▶ **International Exhibitions & Events**  
- Potential deal value recorded



**RM 48.75**  
MILLION

- ▶ **Organised workshop** for biotechnology industry with the support MOF, MDV, MTDC, Agrobank, SME Corp & other industry players.

8

**Facilitation on Funding**

- ▶ **List of BioNexus Status companies participated in a pitching session with Bank Negara Malaysia on 25 June 2013 and 20 November 2013:**

- Inno Integrasi Sdn Bhd
- Ligno Biotech Sdn Bhd
- Biofactlife Sdn Bhd
- Bionestro Sdn Bhd
- Green World Genetics Sdn Bhd

- ▶ **As a result** of continuous facilitation in sourcing funding facilities for BioNexus status companies, a total:



**RM 59**  
MILLION

*funding facilities were approved during the year.*

9

**In line with the BioNexus Bill of Guarantee No. 8, "Access to Shared Laboratories & Facilities"** as well as to facilitate the translation of "Science to Business" as aspired under Phase II National Biotechnology Policy, the Shared Facilities Unit's (SFU) role is to support Malaysia's biotechnology and life sciences industry's R&D&C needs for high-end research facilities, services and expertise.

**Access to Shared Laboratories & Facilities**

Access to a network of 52 BioNexus Partners (BNP) laboratories all over Malaysia from 13 IHLs, 3 RIs and 2 GLCs providing R&D&C support to bio-based companies.

- **200++ COLLABORATIONS & PROJECTS** with other bio-based companies, SME, entrepreneurs
- **42 COLLABORATIONS & PROJECTS** between BNP laboratories and units with BioNexus companies
- **4.1 OUT OF 5.0** average rating of client satisfaction with the BNP laboratories and units
- **RM 1.0** MILLION revenue generated by BNP laboratories

**Highlights for year 2013:**

- ▶ **3 Outstanding BNP laboratories** were awarded during the BioNexus Appreciation Night, 21 October 2013, Thistle Hotel, Johor Bahru:
  - BNP Award for Best Agriculture Biotechnology Partner is the Herbal Product Development Laboratory of FRIM
  - BNP Award for Best Healthcare Biotechnology Partner is the Animal Toxicity Unit of Universiti Kebangsaan Malaysia (UKM)
  - BNP Award for Best Industrial Biotechnology Partner is the Fermentation Technology Unit (FTU) of Universiti Putra Malaysia (UPM)
- ▶ **3rd BNP Centre of Excellence (BNP CoE)** under Universiti Teknologi Malaysia (UTM) established as an R&D&C reference centre for Industrial BioProduct Development
- ▶ **2 BNP laboratories** obtained the ISO 17025 certification in 2013:
  - Bioequivalence Laboratory, Faculty of Medicine, Universiti Malaya
  - Human Identification/ DNA Unit, School of Health Sciences, Universiti Sains Malaysia

## INDUSTRY DEVELOPMENT

### Development of National Occupational Skills Standards (NOSS)

#### Completed the following NOSS:

- 1) NOSS Enzymatic Bioconversion level 1-3
- 2) NOSS Enzymatic Bioconversion level 4-5
- 3) NOSS Agriculture Biotechnology Laboratory level 1-3
- 4) NOSS Agriculture Biotechnology Laboratory level 4-5
- 5) NOSS Spiny Lobster Hatchery level 1-3
- 6) NOSS Spiny Lobster Hatchery Level 4-5

BiotechCorp together with Department of Skills Development (JPK) had organised the NOSS promotion event during BioMalaysia & Bioeconomy Asia Pacific Conference & Exhibition 2013 at PERSADA Johor. A total of 38 companies comprising the BioNexus Status companies, J-Biotech and its subsidiaries and BioNexus Partners Lab have attended the NOSS Promotion session.

### Advanced Bioprocess Training at Korea Research Institute of Bioscience & Biotechnology (KRIBB)

- ▶ 10 biotechnology graduates attended the 2-month training at KRIBB supervised by renowned researchers of KRIBB. One of the graduates has been accepted to work as an Assistant Researcher at KRIBB to pursue Master course at University of Science & Technology (UST), Korea.
- ▶ One of the participants from the 2010 batch, Sasikumar Rajoo has completed his Master at University of Science & Technology Korea in early 2013 and has been accepted to pursue PhD at ETH Zurich, Switzerland. ETH Zurich is ranked 12 in the World University Rankings 2013.

### Biotechnology Entrepreneurship Special Training (BeST) Programme

▶ **244**   **GRADUATES** *from local and overseas universities attended the BeST Programme*

Organised by BiotechCorp, BeST Programme is a special edition of graduate employability programme for biotechnology & life sciences graduates.

### BioCareer & BioEducation 2013

▶ **30** **Biotechnology Career** posters displayed

**4** **Bio Cinemas** were opened for career talks & industry insight

**14** **Learning Partners** ran the shows

**12** **Career Coaches** shared their knowledge & experiences

**245** **Graduates** participated



**29**

**Johor Schools** participated



**1330**

**School Students** participated



**37%**

**Highly Interested** to study Biotech



**63%**

**Will Consider** to study Biotech



**76%**

**Said biotech is** very interesting

## POLICY & REGULATORY

### Biosafety Framework

- ▶ BiotechCorp continues to work closely with the Department of Biosafety, Ministry of Natural Resources & Environment (MONRE) in the operationalisation of the Biosafety Act and its Regulations, by facilitating biosafety submissions from BioNexus Status companies and potential investors.

BiotechCorp in collaboration with the Department of Biosafety, Ministry of Natural Resources and Environment organised a Workshop funded by the Asia Pacific Economic Cooperation (APEC) on 4 – 5 September 2013 titled “Workshop on Biotechnology Commercialisation and Trade in APEC Economies - A Biosafety Regulatory Perspective”. The proposal was submitted by BiotechCorp early 2012 and obtained approval in December 2012.

The objective of the Workshop is to facilitate knowledge and experience sharing among biosafety experts from national and international organisations and discuss best practices in biosafety compliance and encourage commercialisation of biotechnology.

### Access & Benefit Sharing (ABS)

- ▶ The Conference of the Parties to the Convention on Biological Diversity (CBD) in 2010 saw the finalisation and adoption of the “Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilisation to the Convention on Biological Diversity”. The Nagoya Protocol is an international agreement which aims at sharing the benefits arising from the utilisation of genetic resources in a fair and equitable way. Consistent with Malaysia's commitment and obligation as a member of the CBD, under the Nagoya Protocol, a comprehensive national regulatory framework on Access and Benefit Sharing (ABS) needs to be in place.
- ▶ BiotechCorp resumes regulatory engagements with MONRE in the consultation process for the ABS laws and will continue to provide input on behalf of the industry.
- ▶ While it was earlier anticipated that the draft ABS law was to be tabled in Parliament before the end of 2013, due to the needs and requirements to seek stakeholders' inputs especially from Sarawak and Sabah, the draft ABS law will mostly likely be tabled in 2014.
- ▶ Upon its promulgation, the domestic ABS framework should provide a balanced means to ensure that Malaysia will be able to combat biopiracy.

### Intellectual Property (IP)

- ▶ In support of the government's efforts and commitment in recognising IP collateralisation, BiotechCorp continues to work closely with the Intellectual Property Corporation of Malaysia (MyIPO) and Malaysia Debt Ventures Berhad (MDV) towards the realisation of this commendable initiative which includes :

- **Training of Local IP Valuers:** The pilot IP valuation training and certification course was introduced in March 2013 to train and develop a pool of local IP Valuers. To-date, there are a total of 23 certified IP valuers in Malaysia, of which 2 are personnel from BiotechCorp.
- **The IP Valuation Model (IPVM)** was launched in November 2013 with the aim of providing the much needed clarity and standards for various stakeholders and key players in supporting the acceptance of IP rights as collateral by lenders and financiers. The launch of the IPVM marks an important milestone for moving the monetisation of IP rights to the next level.
- **Intellectual Property Financing Scheme (IPFS)** was launched in December 2013 by MDV and a collaboration agreement between BiotechCorp and MDV was signed to bring about greater access to funding for BioNexus status companies. The creation of the IPFS is expected to provide funding alternatives for companies through monetisation of their valuable IPs.

## Pharma Regulations

- ▶ The Drug Registration Guidance Document (DRGD), revised December 2013, serves as a dynamic and comprehensive guidance document for medicinal product registration.

In 2013, the following directives / guidelines were issued and/or revised :

- Drug Registration Guidance Document (DRGD) (December 2013);
  - Draft Guidance Document & Guidelines for Vaccine Lot Release Malaysia (November 2013);
  - Guidelines on Good Distribution Practice (GDP) 2nd Edition (2013); and
  - Malaysian Variation Guideline for Pharmaceutical Products 1st Edition (2013).
- ▶ Throughout 2013, Malaysia continued to play an active role in harmonisation efforts through the ASEAN Consultative Committee for Standards and Quality (ACCSQ) Pharmaceutical Product Working Group (PPWG), the Traditional Medicines and Health Supplement Product Working Group (TMHS PWG) as well as the Medical Devices Product Working Group (MDPWG).
  - ▶ Through the ASEAN Consultative Committee for Standards and Quality (ACCSQ) Pharmaceutical Product Working Group (PPWG) participation, BiotechCorp was able to keep track on the work programme progress and the time frame targeted in harmonising standards and reducing technical barriers towards a single market by 2015.

## International Accreditation (GLP)

- ▶ Effective from 10th April 2013, Malaysia is officially a non-member with full adherence to the Organisation for Economic Cooperation and Development (OECD) Council Acts related to Mutual Acceptance of Data (MAD) in the Assessment of Chemicals on Good Laboratory Practice (GLP).
- ▶ The GLP Compliance Programme will help our test facilities gain acceptance of their non-clinical health safety studies into OECD countries and other members who adhere to OECD.

## TECHNOLOGY MANAGEMENT OFFICE

**Biotechnology Technology Management Sdn Bhd (BTM)** incorporated on 16 March 2011, is a wholly owned subsidiary of the Malaysian Biotechnology Corporation Sdn Bhd (BiotechCorp). BTM in the interim, functions as a division of BiotechCorp also known as the Technology Management Office (TMO). The key responsibilities of TMO are to manage, develop and commercialise the platform technologies acquired by BiotechCorp under the Biotechnology Acquisition Programme (BAP) during the 9th Malaysian Plan.

Following are the technologies being managed by TMO:

### Supercritical Fluid Extraction Platform Technology

- ▶ The Supercritical Fluid Extraction Centre (SFC) located at Universiti Putra Malaysia (UPM) has been successfully operationalised after having fulfilled the mandatory safety requirement set by the Department of Safety & Health (Dosh). TMO has also successfully facilitated the training for the operators of the hardware at SFC.

### Marker Assisted Selection Platform Technology

- ▶ The Centre for Marker Discovery and Validation (CMDV) has been fully set up and commenced its operations in 2011. The centre offers services to the industry with transactions valued at approximately RM 170,000 in 2013 and set to generate further increase in transaction value in the coming years.

### DotScan Platform Technology

- ▶ This platform technology with its two technology custodians, namely the Institute for Medical Research (IMR) and UPM are conducting research towards the development new applications utilising the DotScan Platform Technology. In addition, this platform technology has successfully obtained additional research funding from the Ministry of Science, Technology and Innovation (MOSTI) e-Science fund.

### Nanotechnology Platform

- ▶ The Nanotechnology Platform under the NanoBiotechnology Research and Innovation Cluster (NanoBRI) under the Institute for Research in Molecular Medicine (INFROMM), Universiti Sains Malaysia (USM). Research by NanoBRI includes the design and development of nanoparticles, nanocolloids, reagents, drug and molecule carriers, cellular imaging and diagnostic platforms in addition to developing a method of production of gold and iron oxide nanoparticles and its conjugation with biomolecules.

# MOVING FORWARD

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## BIOECONOMY DEVELOPMENT

### i) Evaluation & Implementation

- ▶ The Evaluation & Implementation (E&I) team will continue to identify potential high impact bio-based project to be part of the Bioeconomy Transformation Programme (BTP) through direct engagements with key stakeholders across the nation from both the public and private sectors. The team will continue working toward the targets set for the BTP (including the impact of the Bioeconomy Malaysia Accelerator Programmes):-
  - GNI contribution of RM 48 billion in the year 2020;
  - 170,000 job opportunities; and
  - RM 50 billion in investment by 2020
- ▶ In order to achieve the targeted KPI, the team will targeted KPI, the team will:
  - Continue organising and participating in flagship Bioeconomy events and roadshows locally and internationally to enhance Malaysia's presence and standing in Bioeconomy.
  - Identify and increase the number of Trigger Projects included in the Bioeconomy Transformation Programme through close collaboration with internal and external stakeholders.
  - Undertake continuous communication, awareness and promotion campaigns on the Bioeconomy Transformation Programme, targeting the private sector, ministries, financial institutions, researchers and academicians, media as well as the general public.
  - Increase collaboration and partnership with regional and international networks to enhance the Bioeconomy ecosystem.

### ii) Knowledge Management

- ▶ Knowledge Management will look into key issues specifically to retain crucial information and data within the organisation:
  - Develop value-added services for the stakeholders by repackaging information and data for productive use.
  - Implementation of knowledge management environment and programs aligned with Resource Centre's services and importance.

Knowledge Management needs to reposition and enhance itself to act as a knowledge centre for small and medium businesses, providing knowledge demanded by the entrepreneurs and business skills with competitive intelligence services.

## BUSINESS DEVELOPMENT & INVESTMENT

### i) AgBiotech

- Moving forward, the Business Development & Investment (AgBiotech) division hopes to enhance its efforts towards creating a more conducive ecosystem in order to enable the AgBiotech industry to grow, expand, and the companies to become global players. Emphasis will be made towards ensuring the food and feed security for the nation are met, which includes producing more and safe food in a sustainable manner. We strongly believe that the development of a more conducive ecosystem would be able to attract investments in agriculture biotechnology, thus, creating more high impact projects, job opportunities and value for the nation as a whole. The following are the focus areas for AgBiotech :-



#### AQUACULTURE

Promoting high value aquaculture projects that emphasise on efficiency & sustainability

- Fish
- Crustaceans
- Sea Cucumber
- Seaweed
- Algae
- Feed additives



#### CROP

Promoting biotech based agriculture practices to maximise productivity & sustainability

- Soil & Plant Enhancers
- Bio-fertilisers
- Bio-control
- Elite planting material
- Bio-pesticides



#### NATURAL PRODUCT

Promoting commercialisation and sustainable use of natural resources

- Nutraceuticals
- Flavours & Fragrances
- Stabilisers & Emulsifiers
- Cosmeceutical
- Botanical extracts
- Functional Food



#### LIVESTOCK

Promoting biotech based husbandry practices to maximise productivity & sustainability

- Animal Nutrition
- Downstream products
- Veterinary Health Products

## ii) BioIndustrial

- ▶ BiotechCorp will employ new strategies in building the industrial biotechnology sector. BiotechCorp will continue to anticipate new emerging sectors within Industrial Biotechnology, to seek and secure high impact nucleus investments; high impact investments are those that are high in quantum and will lead to a spillover and multiplier effect towards the broader economy.

The main feedstock that will be focused on are oil palm biomass, palm oil and its derivatives, such as glycerin and carotenoids. Additionally, feedstock from other crops is also being considered, such as *Leucaena leucocephala* and rice husk/straw as well as lignin from these crops. Gaseous feedstocks, such as methane will also be included.

The industrial biotechnology has to be inter-related with the existing industries in order for the industry to advance and sustain. For example, the Kertih Biopolymer Park (KBP) is leveraging on the existing oil and gas industry in the East Coast Economic Region (ECER).

The main strategy to move the industrial biotechnology forward in Malaysia is through the creation of bio-clustering. This includes the partnership of BiotechCorp with strategic economic corridors, such as ECERDC, NCIA, SEDIA, POIC, and SCORE. In addition, strategic partnership with international institutions will enhance BiotechCorp's capability to expand its network overseas.

In order to attract more investments in the industrial biotechnology industry in Malaysia, BiotechCorp will need to create conducive and attractive environment to increase Malaysia's competitive advantages over neighboring countries.

BiotechCorp will assist with the expansion of cluster supporting businesses by identifying relevant companies that have appropriate technology platforms required by incoming investments. The development of the clusters is seen as a strategic move for Malaysia, as it will lead to spillover of investments (i.e. power generation plants, feedstock plantations, waste management, etc.), which will support the companies in the said clusters. This will also maximise the value of the feedstock available in the region, thus leading to increase in the productivity of the companies in the cluster (located near the feedstock source). This strategy will also create momentum for BiotechCorp in which success stories such as the Kertih Biopolymer Park will attract further investments into Malaysia.

### iii) BioMedical

- ▶ Biomedical industry is expected to contribute to the nation's development by leveraging on the existing biomedical ecosystem, value chain and cross-ministries cooperation. The ultimate goal is to provide better and affordable healthcare solutions to improve rakyat's quality of life and the creation employment opportunities, increase the Gross National Income (GNI) contribution from biotechnology sector and increase in product export.

BiotechCorp outlines focus areas that are in line with the National Biotechnology Policy (NBP) and Bioeconomy Transformation Program (BTP) as well as Economic Transformation Program (ETP). The sectors are namely Biopharmaceutical, Medical Devices and In-Vitro Diagnostic and Emerging Biosciences. The three sectors are subcategorised into specific subsectors as below:



#### Biopharmaceuticals

Small molecules and large molecules



#### Medical Devices & Diagnostics

Orthopaedic, Cardiovascular (CVS), Molecular Diagnostics, Surgical and Other Medical Devices & Diagnostics



#### Emerging Life Sciences

Cellular & Gene Therapy Products, Bio Services (Contract Manufacturing & Contract Research), Pharma Nutrition and Other Biosciences

#### ▶ Building the ecosystem based on value chain approach and targeted focus areas:

- 1 **Increasing Clinical Research and Capabilities:** Clinical research is one of BioMedical's focus areas under Emerging Bioscience sector. BiotechCorp along with Clinical Research Malaysia (CRM) will continue to attract more clinical research to be conducted in Malaysia.
- 2 **Developing a Sustainable Biomedical Ecosystem:** BiotechCorp is strengthening Malaysian biomedical ecosystem which is clustered into four major components; Basic Research, Developmental Research, Manufacturing and Commercialisation & Care Delivery.
- 3 **Enhancing Market Access:** In order to position Malaysia as a preferred investment destination, access for the product/ service providers to the local, regional and global market is an important feature that they will take into consideration. BDI BioMedical has been significantly involved in industry dialogues and technical committee to provide regulatory, policy, trade and market access.
- 4 **Increasing Visibility of Malaysia as a Biomedical Hub:** BiotechCorp will leverage on Malaysia's advantages that are recognised globally: ease of doing business, cost-competitiveness, multi-lingual and trainable talents, well-established regulatory regime and pro-business government. BiotechCorp will participate in flagship events such as JP Morgan Healthcare Conference and BIO San Diego 2014 via sponsorship and speaking slots.

## BIONEXUS DEVELOPMENT

► Several key initiatives for BioNexus development are as follows:

- Intensify facilitation and engagement with BioNexus companies.
- Increase focus on market access penetration by BioNexus companies in Malaysia and also the global market.
- Create a retail market platform for locally produced biotechnology related products aiming at intensifying visibility and market acceptance.
- Collaborate with other agencies in growing / developing BioNexus companies (i.e. CradleFund, Malaysian Technology Development Corporation, Unit Peneraju Bumiputera, SME Corporation).
- Collaborate with Bank Negara, government funding agencies, local Developmental Financial institution (DFI) & Financial Institutions to assist BioNexus companies in sourcing funds to commercialise their products/services or expand their business.

## INDUSTRY TALENT DEVELOPMENT

- BiotechCorp will intensify its effort to ensure the biotechnology workforce will be strengthened through the development of human capital and supplying the right talent to the industry. A complete roadmap will be drawn on developing talent to ensure quality talent to be channelled to the industry.

► Strategic Initiatives

- 1 Intensify communication and awareness on biotechnology education and careers via career talks and career carnivals.
- 2 Bridge the industry updates into the universities through incorporating industry driven module in the universities' curriculum.
- 3 Extend the BeST Programme to more graduates in collaboration with Industry Centre of Excellence (ICOE) Biotechnology of Ministry of Education.
- 4 Prepare the workforce with competencies required to support global business phase by developing Executive MBA Biotechnology, co-developed by BiotechCorp & Universiti Malaysia Pahang (UMP).

## POLICY & REGULATORY

- As the Malaysian biotechnology industry moves to the final leg of the 2nd Phase of the NBP, future work in areas of focus include:

### 1 Biosafety and ABS

BiotechCorp to continue engagements with the Biosafety Department, in its efforts to advocate the development of a set of balanced and industry-centric regulations to ensure compliance and facilitate the growth of the biotechnology sector.

### 2 Intellectual Property

BiotechCorp to continue working closely with MyIPO and MDV to encourage and guide BioNexus status companies to avail themselves to the Intellectual Property Financing Scheme (IPFS).

### 3 Pharma Regulations

BiotechCorp will continue to participate and contribute to the development of pharmaceutical regulations including harmonisation of regulatory framework for ASEAN region. With our strong relationship with the regulatory stakeholders, we will provide continuous and constructive inputs from the industry perspective to drive the healthcare biotechnology development.

### 4 International Accreditation

BiotechCorp shall continuously support all initiatives in encouraging test facilities from BioNexus status companies to be OECD certified for easy access to the international market without going through duplicative testing thus saving cost, time and resources as well as reducing trade barriers.

## TECHNOLOGY MANAGEMENT OFFICE

- Technology Management Office will continue to manage and commercialise the four platform technologies in addition to expanding its role to serve the industry via the following strategies:
- Offering IP commercialisation and transaction services to universities, research institutes, BioNexus Partner laboratories and BioNexus companies.
  - Intensifying engagement with targeted industry players and commercial partners to enhance awareness and accelerate the adoption of the technologies as well as expanding the client base for the same.
  - Boosting utilisation of the platform technologies via comprehensive research and development projects, collaborations with industry as well as funding assistance for national interest projects.

# NOTES



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# NOTES



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