



# Bioeconomy Transformation Programme

Enriching the Nation, Securing the Future

Annual Report **2013**



---

## Enriching the Nation, Securing the Future

The logo is designed by MIMOS Berhad with double helix deoxyribonucleic acid (DNA), symbolising the root of bioeconomy which is based on biotechnology. The double helix also denotes the complementary relation between the private and public sectors that the Bioeconomy Transformation Programme seeks to foster. Colours green and orange were chosen to represent the Bioeconomy Transformation Programme logo: green symbolises nature, growth and sustainability while the colour orange symbolises innovation, vibrancy and dynamism. With the implementation of Bioeconomy Transformation Programme, Malaysia will become a smart, sustainable and inclusive economy.



**AgBiotech**



**BioMedical**



**BioIndustrial**

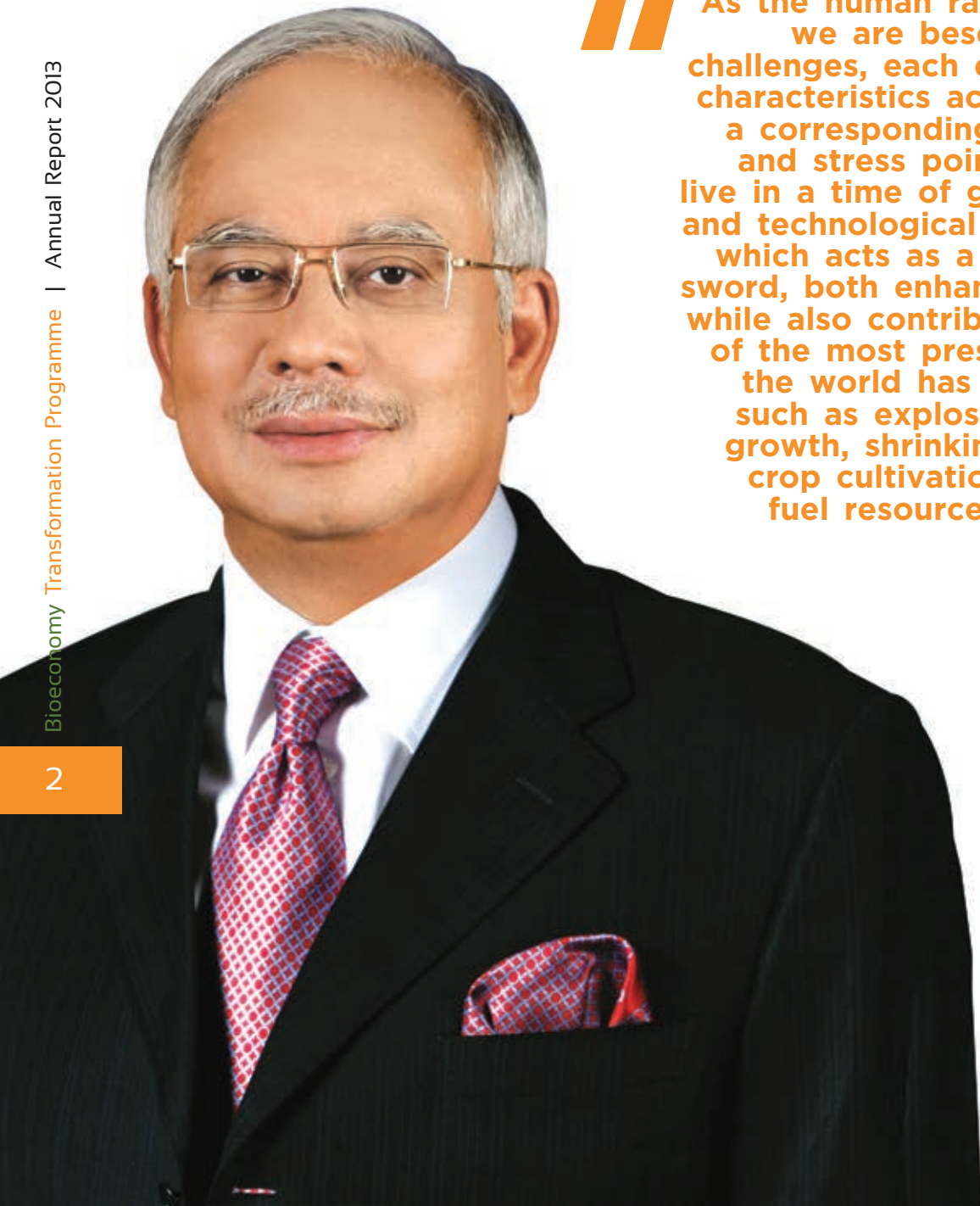
# In This Report

A Note from the Prime Minister	2
A Note from the Minister of Science, Technology and Innovation	4
Statement from the Chairman of Malaysian Biotechnology Corporation	6
Chief Executive Officer's Report	8
Global Bioeconomy Review	10
Malaysian Biotechnology Corporation	14
Bioeconomy Transformation Programme	20
List of Entry Point Projects and Selected Trigger Projects	22
• AgBiotech	22
• BioMedical	28
• BioIndustrial	34
Trigger Projects Progress Updates	40
New Trigger Projects Pipeline	43
Key Events Highlights	44
Moving Forward	56

# A Note from the PRIME MINISTER



As the human race progresses, we are beset by evolving challenges, each era marked by characteristics accompanied by a corresponding set of issues and stress points. Today, we live in a time of great industrial and technological advancement, which acts as a double-edged sword, both enhancing our lives while also contributing to some of the most pressing concerns the world has experienced – such as explosive population growth, shrinking acreage for crop cultivation, diminishing fuel resources, and climate change.



**// WHILE ALL NATIONS AIM TO CONTINUE ALONG THEIR TRAJECTORIES OF SOCIAL, TECHNOLOGICAL AND ECONOMIC ADVANCEMENT, THERE IS GROWING REALISATION THAT SUCH PROGRESS HAS TO TAKE INTO ACCOUNT CURRENT GLOBAL CHALLENGES. THERE HAS TO BE GREATER EFFICIENCY IN ALL MANUFACTURING AND PRODUCTION TECHNOLOGIES TO MINIMISE WASTE; AGRICULTURAL PROCESSES HAVE TO BE ENHANCED; AND ALTERNATIVE, RENEWABLE FORMS OF ENERGY NEED TO BE DEVELOPED. JUST AS CRITICALLY, AS WE PLOUGH AHEAD WITH THESE DEVELOPMENTS, WE NEED TO ENSURE WE LEAVE AS SMALL A CARBON FOOTPRINT AS POSSIBLE TO SAFEGUARD OUR ENVIRONMENT.**

The one word that has cropped up over the years as an economic salvation to current challenges is: 'biotechnology'. Although biotechnology has been practised for thousands of years in medicine, agriculture and food production, its full potential to revolutionise global economies has begun to be unravelled only in recent years. As our understanding of biotechnology deepens, we are now looking at what used to be a sector in the economy as an entire value-chain of economic activity in its own right. Accordingly the term 'bioeconomy' has gained currency in economic powerhouses such as the US, China and the European Union, where it is seen as holding the key to greater, more efficient and sustainable development.

Malaysia, being one of the world's 17 megadiverse countries, has a rich source of biodiversity to tap into in support of a bioeconomy, and the country has been promoting biotechnology in a defined manner since the National Biotechnology Policy (NBP) was launched in 2005. Today, I am proud to say, we are the first country in ASEAN and the second in Asia after China to have implemented a Bioeconomy initiative, known as the Bioeconomy Transformation Programme (BTP) as a natural progression of the NBP. The BTP further complements the more wide-ranging Economic Transformation Programme to accelerate our attainment of high-income status by the year 2020.

Much progress has been made and I am proud to note Malaysia's bioeconomy has been delivering a commendable performance since the launch of the BTP in October 2012. The bioeconomy has swiftly become a game changer for Malaysia to become a high-income developed nation and would be a key contributor to economic growth for a productive, competitive and innovative economy.

Suffice to say that the Government of Malaysia recognises the immense potential of the BTP in buttressing our national aspirations and is committed to providing the most conducive fiscal and regulatory environment to ensure the as yet nascent programme is allowed to blossom, and in so doing contribute to our gross national income and hence the well-being of the rakyat.

I would like to take this opportunity to commend the Ministry of Science, Technology and Innovation (MOSTI) and Malaysian Biotechnology Corporation Sdn Bhd (BiotechCorp) for having rolled out the BTP and for their dedicated efforts in driving this far-reaching, critical programme. I am confident that the coming years will see the development of a more robust bioeconomy for the country that will further contribute to the prosperity of the nation.



**Y.A.B. Dato' Sri Mohd Najib bin Tun Abdul Razak**  
Prime Minister of Malaysia

# A Note from the **MINISTER OF SCIENCE, TECHNOLOGY & INNOVATION**

**//** Over the years, through concerted efforts by the Ministry of Science, Technology and Innovation, Malaysian Biotechnology Corporation Sdn Bhd and industry players, the biotechnology industry now begins to integrate into the value chains of existing industries, resulting in the creation of a bioeconomy for Malaysia.

---

**// MALAYSIA HAS THE RIGHT INGREDIENTS FOR BIOECONOMY AND IS BLESSED WITH RICH NATURAL BIOLOGICAL RESOURCES. BY UTILISING INNOVATIVE TECHNOLOGIES AND STRATEGIC DEVELOPMENT OF IMPORTANT COMPONENTS OF THE VALUE CHAINS, THE LOCAL BIOLOGICAL RESOURCES CAN BE CONVERTED INTO VALUE-ADDED PRODUCTS SUCH AS BIOENERGY, FOOD & FEED, BULK AND FINE CHEMICALS, WELLNESS PRODUCTS AND BIOMATERIALS.**

Recognising on the economic benefits of the emerging bioeconomy, the Ministry of Science, Technology and Innovation (MOSTI) announced the launch of the Bioeconomy Transformation Programme (BTP) as a new icon under the Malaysia's Economic Transformation Programme in October 2013. With the implementation of the BTP, MOSTI and Malaysian Biotechnology Corporation Sdn Bhd (BiotechCorp) are reaffirming its commitment and focus on developing bio-based technologies and businesses that has the capacity to convert Malaysia's wealth of biological resources into high value products that can positively contribute to Malaysia's sustainable development agenda, improve industry competitiveness and bring socio-economic benefits to the people.

With an initial 20 Trigger Projects identified and the possibility of including 13 new Trigger Projects as part of the initiative, the BTP is set to optimise the undiscovered potential of the country's economy and at the same time enhancing the multiplier effect of the economy, thus strategically placing Malaysia within the global biotechnology market that is projected to be worth around USD\$321 billion by 2015. The BTP is designed to foster public-private interaction to identify and develop more high impact bioeconomy projects.

The BTP has broader goals that go beyond investments and Gross National Income (GNI) growth; it is also focusing on the long-term societal dimension of development – aiming for sustainability, improved health and well-being of the people, reducing carbon footprint, value chain development and inclusiveness. This is an important agenda for our nation's future well-being as nurturing a sustainable bioeconomy and our natural competitive edge will ultimately propel Malaysia's socio-economic position to greater heights.

As the lead Ministry for the implementation of the BTP, MOSTI seeks to engender a spirit of collaboration among the various industry stakeholders and to serve as a key interface, especially between the public and private sectors, to enhance inter-agency cooperation and communication. I am pleased to share that our efforts proved to be particularly fruitful over the past year as we supported BiotechCorp and the relevant local development authorities in efforts to identify suitable Trigger Projects in the different regions.

MOSTI believes fully in the potential of biotechnology and its applications in the bioeconomy to provide novel solutions and insights to society's growing challenges - from nourishing our nation and enhancing the well-being of local communities to fuelling our industries and helping the nation to develop in a sustainable manner. We are encouraged by the first steps that the country has taken this past year to develop a coherent plan for our bioeconomy, and by the close working ties that have been established between the stakeholders.

We believe that with continued multi-stakeholder cooperation and collaboration, we can look forward to the continued growth of the bioeconomy as one of the key drivers of our nation's further development.



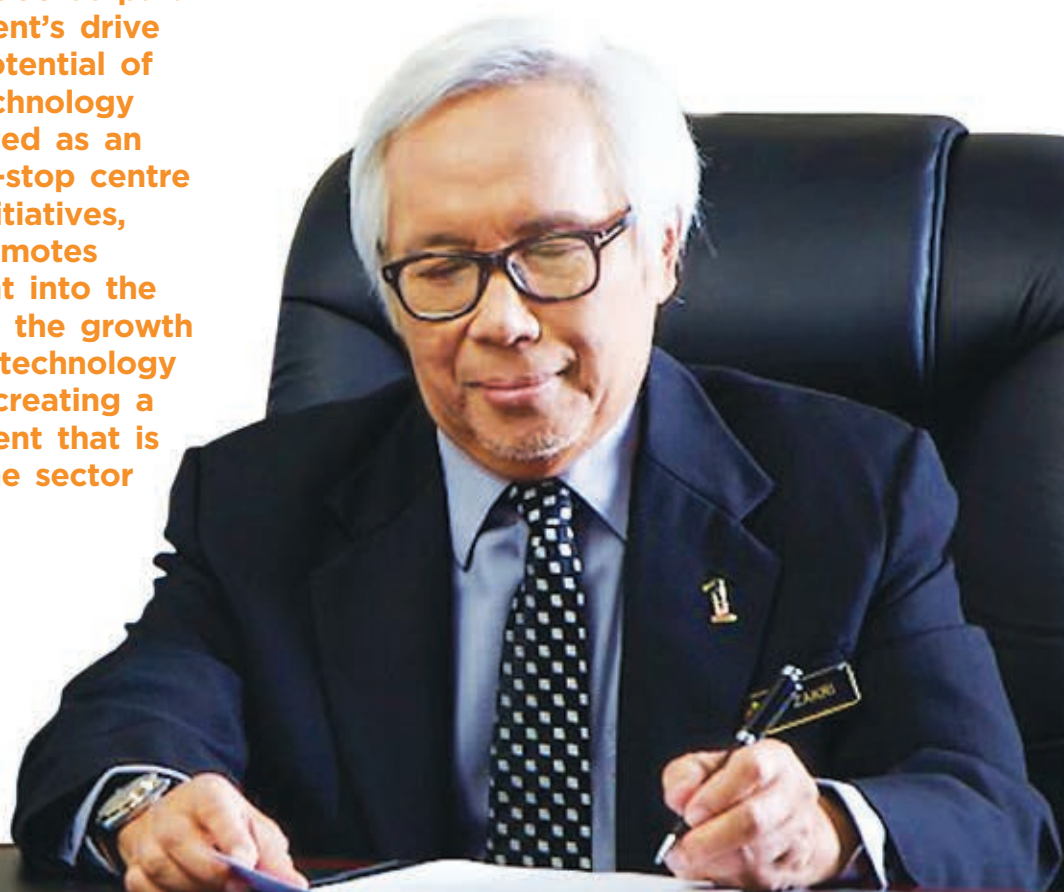
**Y.B. Datuk Dr. Ewon Ebin**  
Minister of Science, Technology and Innovation



# Statement from the CHAIRMAN of MALAYSIAN BIOTECHNOLOGY CORPORATION

## Malaysian Biotechnology

Corporation Sdn Bhd (BiotechCorp) was established in 2005 as part of the Government's drive to realise the potential of Malaysia's biotechnology industry. Mandated as an all-purpose, one-stop centre for bio-based initiatives, BiotechCorp promotes direct investment into the sector, nurturing the growth of Malaysian biotechnology companies and creating a stable environment that is conducive for the sector to thrive.





---

**// GUIDED BY THE NATIONAL BIOTECHNOLOGY POLICY (NBP), BIOTECHCORP FOLLOWS A 15-YEAR STRATEGIC ROADMAP THAT OUTLINES THREE FIVE-YEAR PHASES FOR THE GROWTH OF THE BIOTECHNOLOGY INDUSTRY. DURING THE FIRST PHASE WHICH ENDED IN 2010 - CAPACITY BUILDING - BIOTECHCORP SUCCESSFULLY BUILT A PLATFORM FOR FUTURE GROWTH OF THE INDUSTRY VIA THE BIONEXUS STATUS PROGRAMME, AMONG OTHER INITIATIVES.**

As we venture into the second phase of the NBP - Science to Business - BiotechCorp is focusing on the integration of biotechnology into existing value chains, development of human capital and skills, commercialising research and product development, and further promote foreign as well as domestic investment in agricultural, healthcare and industrial biotechnologies. The emphasis going forward is to empower the private sector as the primary driver of the bioeconomy for Malaysia.

Towards this end, Bioeconomy Transformation Programme (BTP) has been introduced as an implementation strategy under the Economic Transformation Programme (ETP). The BTP provides the private sector with a platform to maximise commercial opportunities in the bioeconomy, working closely with government agencies to put in place the necessary mechanisms to facilitate the flow of foreign and domestic investments in the application of biotechnology in agricultural production, industrial manufacturing and human health.

Launched by Y.A.B. Prime Minister Dato' Sri Mohd Najib bin Tun Abdul Razak at the National Bioeconomy Council Meeting in October 2012, the BTP complements the efforts of the ETP in transforming the country into a highly skilled, high-income nation by the year 2020.

Since the launch of the BTP, we have continued to identify and evaluate high-potential Trigger Projects for inclusion in the programme. As the numbers grow, so have the targets for Gross National Income (GNI), job creation and investment. These quantitative targets aside, the BTP aims to support national development through breakthroughs in agricultural productivity, discoveries in healthcare and the adoption of sustainable industrial processes, which will uplift lives across national economic and geographical divides.

BiotechCorp is forging ahead to establish Malaysia as a regional and international leader in the emerging global bioeconomy. We are committed to stimulate a conducive environment for growth of bio-based industries, and to strengthen Malaysia's network globally.



**Professor Emeritus Dato' Dr Zakri Abdul Hamid**  
Chairman

# Chief Executive Officer's Report

**//** Much has been accomplished in the first year of the Bioeconomy Transformation Programme (BTP). Many new Entry Point Projects and Trigger Projects have been identified; the foundation has been laid down to accommodate this new and exciting industry; and Malaysia has established a firm foothold in the global bioeconomy. As Chief Executive Officer of Malaysian Biotechnology Corporation Sdn Bhd, the implementation agency of the BTP, it is an honour to report on the accomplishments made since the launch.



The National Biotechnology Policy (NBP) launched in 2005 has provided us with the targets for developing the bio-based industry, taking into account of its contribution to the nation's economy. Following the significant progress made in the initial years of the NBP, it is of emerging importance to maintain the momentum built in facilitating a shift to a vibrant, private-sector driven industry. Pursuant to this, the BTP was formulated as a progression of the strategies and action plans to achieve these targets as outlined in the NBP, serving as a platform for the private sector to maximise commercial bio-based opportunities in Malaysia.

In October 2012, Y.A.B. Prime Minister Dato' Sri Mohd Najib bin Tun Abdul Razak officially endorsed and launched the BTP. Aimed at encouraging greater private sector participation in developing a bioeconomy, the programme identified 20 high-impact, quick-win Trigger Projects, which together were estimated to result in an increased Gross National Income (GNI) of RM3.6 billion by the year 2020, the creation of 16,300 high-quality job opportunities, and the cumulative attraction of RM10 billion in foreign and domestic direct investments, largely to be privately sourced.

The core strategies of Malaysia's bioeconomy are the complete value chain approach, to increase the multiplier effects and optimising carbon footprint. Malaysian Biotechnology Corporation Sdn Bhd (BiotechCorp) focuses on developing and enabling access to technologies via BioNexus Status companies and multinational companies and to link industrial value chains together, to achieve greater productivity and sustainable development. BiotechCorp intends to facilitate Malaysia's transition from the old bio-based industry to a new bio-based industry, adding value through modern biotechnological techniques.

BiotechCorp is working closely with the economic corridors and State development agencies to initiate collaborative biotechnology clusters for wealth creation and sharing the benefits of bioeconomy throughout the country. Throughout 2013, BiotechCorp, alongside the Sabah Economic Development and Investment Agency, Sarawak State Planning Unit and the Northern Corridor Implementation Agency, had conducted BTP Workshops and Lab Sessions to further assess other new high-potential projects from Sabah, Sarawak and the Northern Corridor. Cumulatively, the potential Trigger Projects shortlisted throughout the year are estimated to contribute to nearly RM1 billion of GNI in 2020, while creating more than 1,700 new jobs and attracting RM3.8 billion in foreign and domestic direct investments.

Overall, the BTP Workshops and Labs conducted thus far afforded us with a comprehensive picture of the industrial landscape in the regions visited, confirming the potential for a vibrant bioeconomy. From our

engagement with industry stakeholders, we have been able to develop roadmaps for the bioeconomy of each region visited leading to the year 2020 and beyond. BiotechCorp continues to monitor the status of all the projects. Some projects may require guidance and further facilitation as they approach commercialisation.

In addition to identifying new Trigger Projects for inclusion into the BTP, the year 2013 has seen us establish links at the international level. Participation in the global bioeconomy network provides a platform for greater collaboration in the fields of AgBiotech, BioIndustrial and BioMedical.

The past year has seen Malaysia's bioeconomy take a leap forward as we begin our journey towards shaping the sector into a pillar of the nation's economy. Building on the initial 20 Trigger Projects, we will continue to add more projects to the programme from across the nation. In addition to quantitative economic impact, we expect the social and environmental benefits of the BTP to lead to a better standard of living for all Malaysians in the near future.

Malaysia has the correct ingredients to develop a successful bioeconomy. As a nation blessed with abundant biological resources, there is a clear opportunity to focus on developing technologies for conversion of these materials into higher value products. While the NBP has provided us with the targets for developing the bio-based industry, the strategy and action plan to achieve these targets are in the BTP.

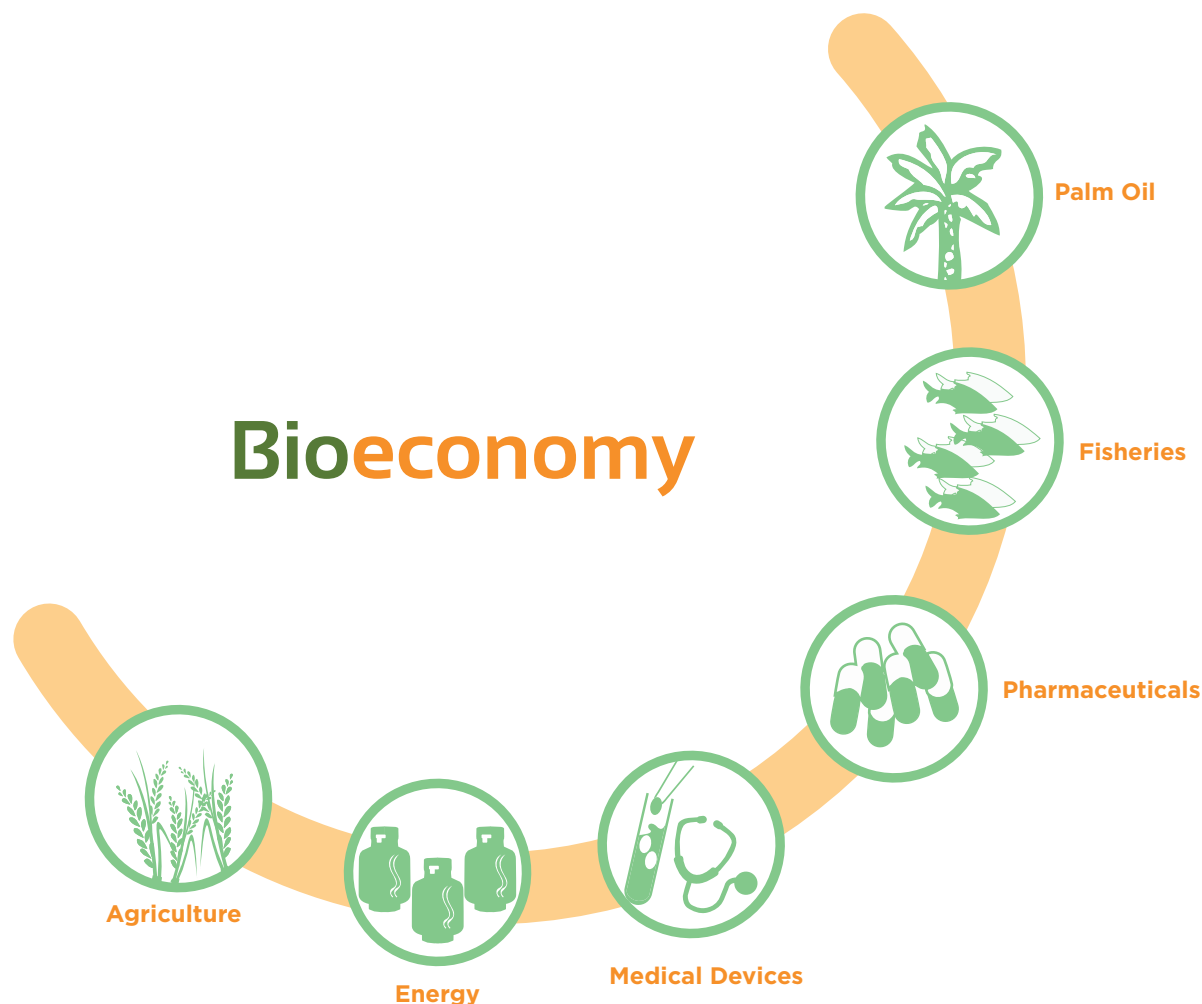
In the bold words of Thomas Edison, "Vision without Execution is Hallucination". The overall vision of the NBP and the BTP provides clear direction for fostering growth in the bio-based sector. However it is crucial that the implementation of these strategies is executed effectively if we aspire to realise consistent and meaningful results.

Moving forward, we at BiotechCorp will continue to facilitate the nation's transition to a developed bioeconomy to the best of our ability. While we have achieved a noteworthy rate of growth in this first year, we will continue to revise, reassess and re-strategise our implementation as the needs arise. I would like to acknowledge and thank the industry stakeholders and our collaborative partners from the public and private sectors for their contributions towards unlocking the potential of the bioeconomy. I look forward to our continued journey together towards a better, more sustainable Malaysia driven by a dynamic bioeconomy.



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

# GLOBAL BIOECONOMY REVIEW

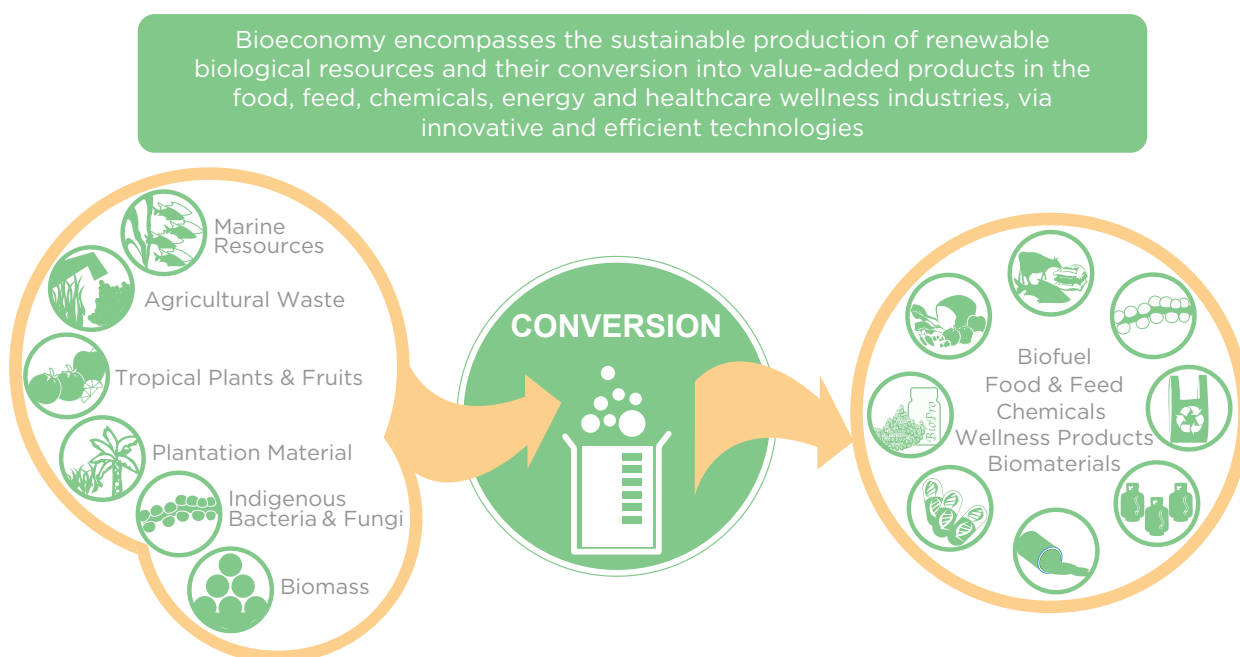


The world has benefited tremendously from the evolution of biotechnology and its applications in industry. Over the past two decades, countries across the globe have substantially increased their economic outputs in an environmentally conscious manner through commercial applications of biotechnology and life sciences. The increasing use of biotechnology in primary production, healthcare and industry has led to a strategic interest in the development of a bio-based economy, or bioeconomy.

Broadly speaking, a bioeconomy is the sustainable production of renewable biological resources and their conversion into food, feed, chemicals, energy, and healthcare and wellness products via innovative and efficient technologies. In addition to biotechnology, the bioeconomy encompasses all industries and economic sectors that produce, manage and utilise biological resources. This includes agriculture, forestry, fishery, food production, healthcare, chemicals and renewable energy.

In addition to being a key contributor to economic growth, the bioeconomy benefits society via breakthroughs in agricultural productivity, discoveries in healthcare and the adoption of sustainable industrial processes, while helping to meet the most pressing global challenges, such as increasing global populations, food scarcity, the depletion of fossil fuels and natural resources, and tightening environmental pressures and climate change. It is thus becoming the focal point of public policymakers, corporate leaders, researchers as well as world governments.

## BIOECONOMY: CONVERTING BIOLOGICAL RESOURCES INTO HIGH VALUE PRODUCTS



The Organisation for Economic Cooperation and Development (OECD) has estimated that by 2030, the global bioeconomy will contribute an average of 2.7% to the world's Gross Domestic Product (GDP). Recognising the significance of the bioeconomy to national growth and strength, major world economies such as the United States, the European Union, Canada, China, Australia, Finland and Russia have embarked on national bioeconomy strategies and policies that offer attractive incentives along with programmes and significant investments to boost the sector.

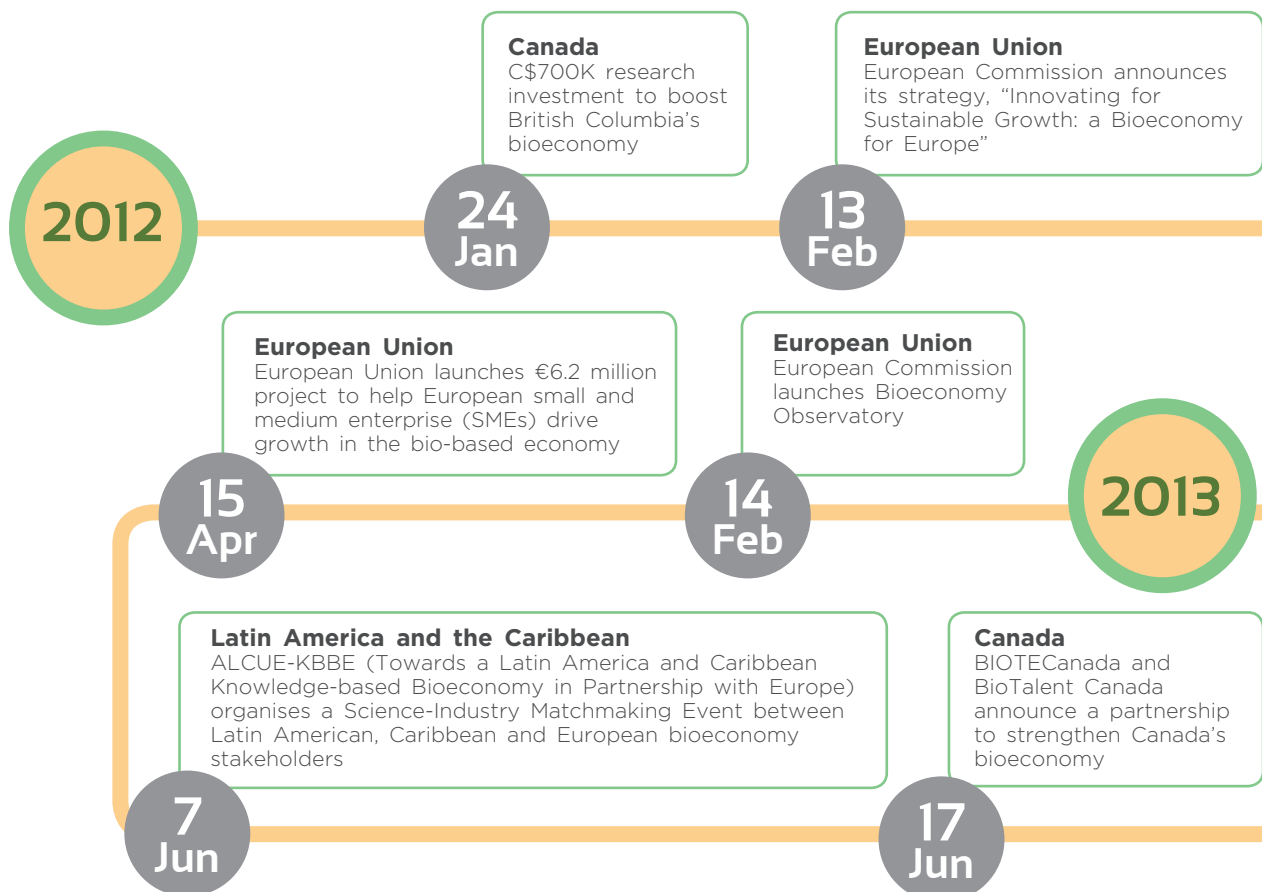
Malaysia, one of the most competitive biotechnology hubs in the Asia-Pacific region, has also taken critical early steps to coordinate and intensify national efforts to harness the potential of the bioeconomy. Most significantly, the Bioeconomy Transformation Programme (BTP) was launched in October 2012, making the country only the second in Asia, after China, and the first in ASEAN, to establish its own national bioeconomy initiative.

## Emerging Trend: Countries Establishing Bioeconomy Initiative/Roadmap

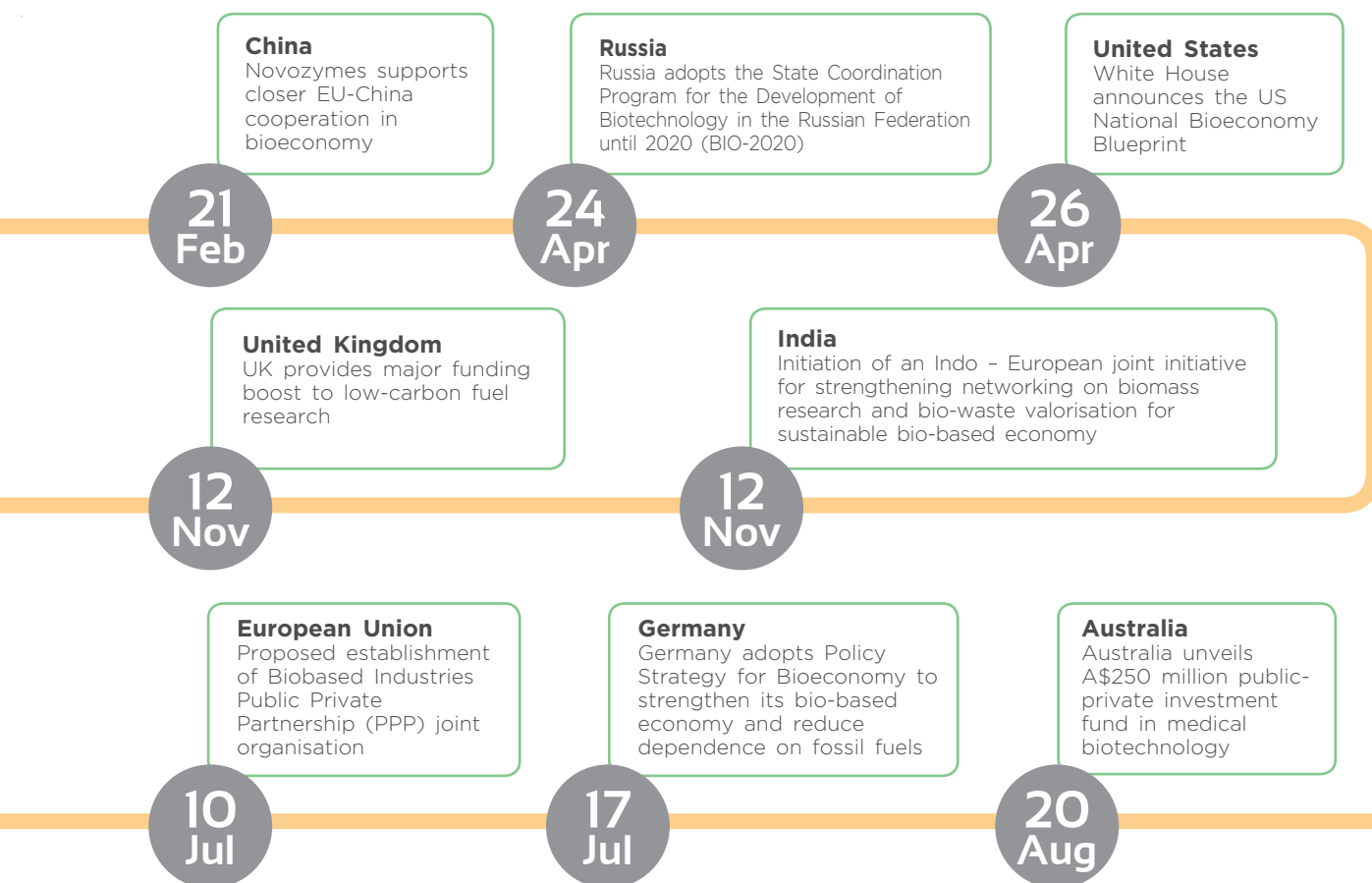
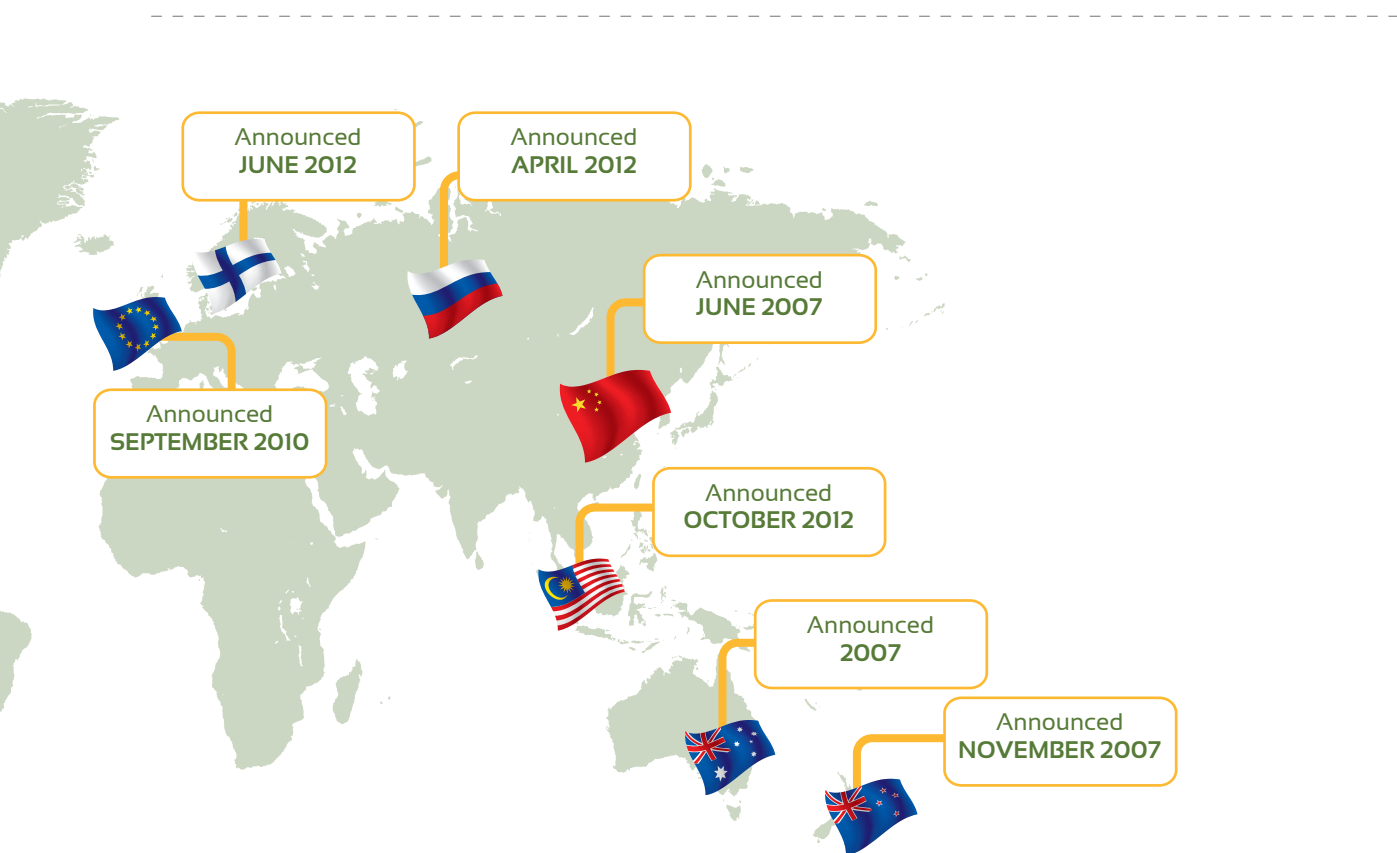
**Bioeconomy**  
to contribute a global average of  
**2.7 %**  
to GDP by 2030  
OECD estimates



## GLOBAL DEVELOPMENTS IN BIOECONOMY (2012-2013)







# MALAYSIAN BIOTECHNOLOGY CORPORATION

THE MALAYSIAN GOVERNMENT HAS IDENTIFIED BIOTECHNOLOGY AS ONE OF THE KEY STRATEGIC DRIVERS TO ELEVATE THE NATION'S SOCIO-ECONOMIC DEVELOPMENT. THE NATIONAL BIOTECHNOLOGY POLICY (NBP) WAS LAUNCHED IN 2005 TO OVERSEE THIS EMERGING INDUSTRY, AND THE MALAYSIAN BIOTECHNOLOGY CORPORATION SDN BHD (BIOTECHCORP) WAS SET UP AS A DEDICATED AGENCY TO DRIVE ITS DEVELOPMENT.

BiotechCorp falls under the purview of the Ministry of Science, Technology and Innovation (MOSTI). Based on the NBP's objectives and guidelines, BiotechCorp acts as the chief driver for biotechnology development by providing strategic direction, operational assistance for businesses and developing specialised infrastructure. BiotechCorp, owned by the Ministry of Finance Incorporated and the Federal Lands Commissioner, is governed by the National Bioeconomy Council and advised by the Biotechnology International Advisory Panel, both chaired by the Prime Minister of Malaysia.

## NATIONAL BIOTECHNOLOGY POLICY

### The 9 Thrusts

01

#### Agricultural

Enhance the value creation of the agricultural sector



02

#### Healthcare

Commercialising the discoveries of health related natural products and bio-generic drugs



05

#### Human Capital Development

Build the nation's human capital through education, training and research activities



04

#### Research & Development

Establish centres of biotechnology excellence, through research and development



03

#### Industrial

Increase opportunities for bio-processing and bio-manufacturing



As the agency responsible for executing the objectives of the NBP, BiotechCorp identifies value propositions in both Research and Development (R&D) and commercial ventures, and provides support via financial assistance as well as developmental services.

BiotechCorp's key mandates are:

- To act as a one-stop-centre for the development of biotechnology
- To nurture and accelerate growth of Malaysian biotechnology companies
- To actively promote foreign direct investments in biotechnology
- To create a conducive environment for biotechnology

## THE NATIONAL BIOTECHNOLOGY POLICY (NBP)

The NBP is underpinned by nine key thrusts, which are to be implemented in three five-year phases leading to an international competitive edge by the year 2020. These phases consist of Capacity Building (2005-2010), Science to Business (2011-2015) and Global Business (2016-2020).

Now, in the second phase of the NBP, BiotechCorp is promoting the transition of Science to Business by providing a facilitative environment for the private sector to drive the nation's bioeconomy. This is encapsulated in the Bioeconomy Transformation Programme, launched in October 2012.

06

### Financial Infrastructure



Provide the right financial support via competitive lab to market funding and incentives

07

### Legal & Regulatory Framework



Reviewing ownership of intellectual properties and regulations relating to biotechnology processes and business

09

### Government Support & Commitment



Dedicated and professional Government agency to spearhead the development of the biotechnology industry with the incorporation of BiotechCorp

08

### Strategic Development



Build international recognition for Malaysian biotechnology

## THE SENIOR MANAGEMENT TEAM

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



**Tuan Syed Agil  
Syed Hashim**  
Chief Financial Officer



**Encik Razwin Sulairee  
Hasnan Termizi**  
Chief Operating Officer





**Dr. Abdul Manaf  
Mohamad Radzi**  
Senior Vice President,  
Special Projects,  
CEO's Office



**Cik Sharifah Hanifah  
Syed Abdul Aziz**  
Senior Vice President,  
Legal & Secretarial



**Mr. Jay Christopher  
George Padasian**  
Senior Vice President,  
Business Development &  
Investment – BioMedical



## THE SENIOR MANAGEMENT TEAM

### **Encik Zainal Azman**

#### **Hj. Abu Kasim**

Senior Vice President,  
Business Development &  
Investment – BioIndustrial



### **Dr. Kodi Isparan Kandasamy**

Senior Vice President,  
Business Development &  
Investment – AgBiotech



### **Encik Adrian Abdul Ghani**

Senior Vice President,  
BioNexus Development







**Puan Zurina Che Dir**  
Senior Vice President,  
Bioeconomy Development



**Dr. Harcharan Singh**  
Senior Vice President,  
Technology Management  
Office

# BIOECONOMY TRANSFORMATION PROGRAMME



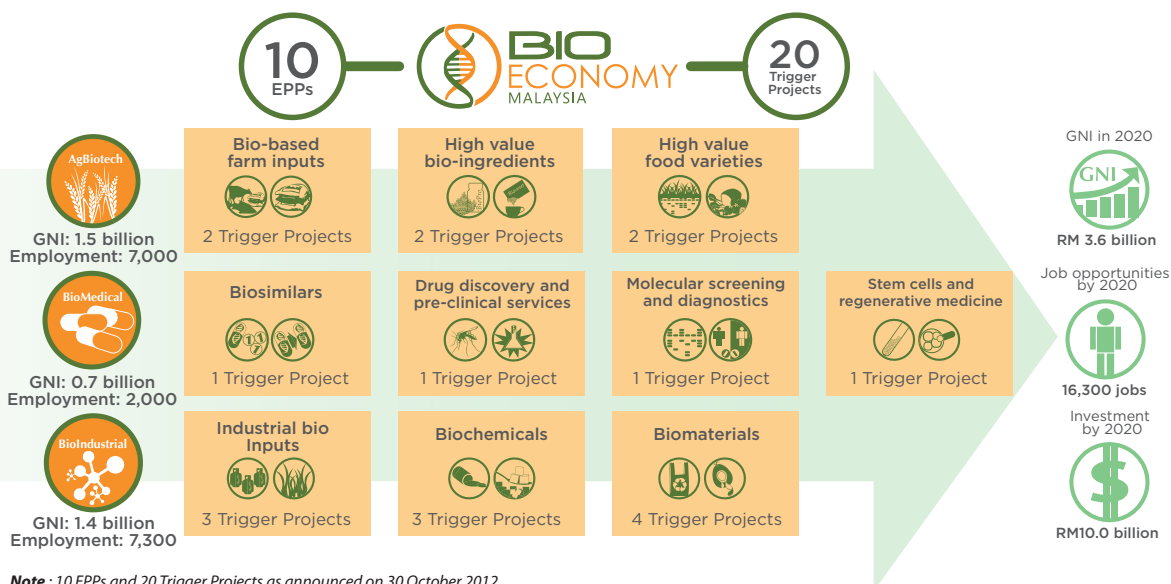
## Enriching the Nation, Securing the Future

The Bioeconomy Transformation Programme (BTP) is a progression of the strategies outlined in the National Biotechnology Policy (NBP) and serves as a platform for the private sector to maximise commercial opportunities based on biotechnology to drive this sector. Through the BTP, the government and leading industry players will work in tandem to set national goals for the application of biotechnology, put in place the structural conditions required and develop necessary mechanisms to ensure that policy can flexibly adapt to new opportunities. The objective is to create a conducive ecosystem that can be driven by the private sector.

The BTP was launched by Prime Minister Dato' Sri Najib bin Tun Abdul Razak at the National Bioeconomy Council on 30 October 2012 to further develop the bio-based industry in Malaysia. It is in line with the Government's objective to develop Malaysia into a high-income nation by the year 2020. The BTP aims to achieve this by focusing on bio-based industries in Malaysia, a sector that has been identified as having enormous potential to further develop the nation due to the abundance of natural resources available.

The BTP is expected to promote a knowledge-based bioeconomy through the establishment of a sustainable ecosystem of R&D, commercialisation in the areas of agriculture, healthcare and industrial biotechnology and fostering public-private interactions in developing and exploring high-impact opportunities. The Ministry of Science, Technology and Innovation (MOSTI) is the lead Ministry while Malaysian Biotechnology Corporation Sdn Bhd (BiotechCorp) has been appointed as the implementation agency for the BTP.

Accordingly, BiotechCorp has been instrumental in driving the BTP by collaborating with various government agencies, the private sector, institutions of higher learning and research institutes to identify Entry Point Projects (EPPs) to be included in the programme. This has been achieved via a series of Workshops and Lab Sessions, which are ongoing.



The BTP has identified 10 Entry Point Projects (EPPs) to kick-start the growth of Malaysia's bioeconomy in the AgBiotech, BioMedical and BioIndustrial sectors. The 10 EPPs include industrial bio-inputs, biochemicals, biomaterials, bio-based farm inputs, high value bio-ingredients, high value food varieties, biosimilars, drug discovery and pre-clinical services, molecular screening and diagnostics (MSD), as well as stem cells and regenerative medicine. Within these 10 EPPs, 20 private sector-driven Trigger Projects constitute the initial tranche of ventures launched.

The 20 Trigger Projects have been comprehensively assessed for potential benefit to the nation from the perspective of Gross National Income (GNI) generated, employment created and investment attracted. It was projected that the BTP projects will create RM3.6 billion of GNI, attract RM10 billion in investment and create 16,300 jobs by the year 2020.

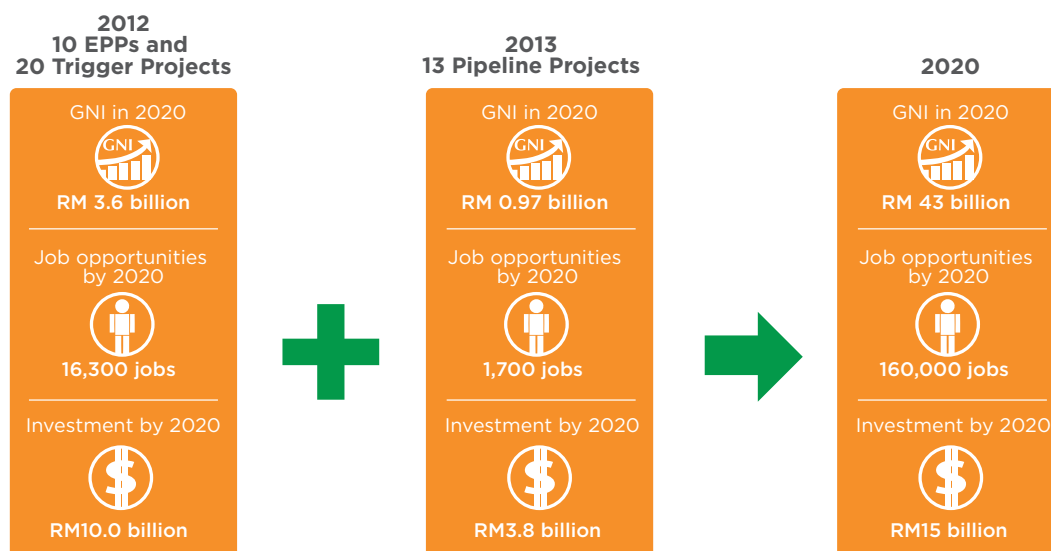
In addition to these significant economic impacts, the BTP will also benefit society and the nation in the following ways:

- Improve the income of the rakyat, and especially rural communities, through projects and programmes with high inclusiveness factors. This can be achieved through the implementation of Trigger Projects involving contract farming mechanisms.

- Promotion of a green economy, contributing to long-term economic and environmental sustainability. BioIndustrial Trigger Projects such as energy crop plantation, the production of renewable biomaterials and bio-based chemicals, and production of compressed biomethane gas are expected to contribute to Malaysia's target of reducing its carbon footprint and emissions by 40% by 2020.
- Improve the health and well-being of the rakyat. Biosimilars (as opposed to innovator biologic drugs) will drive down treatment costs by 30-40%, while MSD will make early disease detection and mitigation possible, significantly reducing healthcare costs to the Government and people.

Since BTP's launch in October 2012, BiotechCorp has continued to identify and evaluate high-potential proposed Trigger Projects to be added under the programme. Through recent BTP Workshops and Labs conducted in Sabah, Sarawak and the Northern Region (encompassing Perak, Perlis, Kedah and Penang), as well as ongoing engagement with the private sector, 13 pipeline projects under the BTP will further supplement the bioeconomy landscape by contributing to GNI, attracting investment and new jobs. Over the period 2013-2020, the BTP is projected to identify projects contributing up to RM43 billion in GNI, attracting a targeted RM15 billion in investment, and creating 160,000 new jobs.

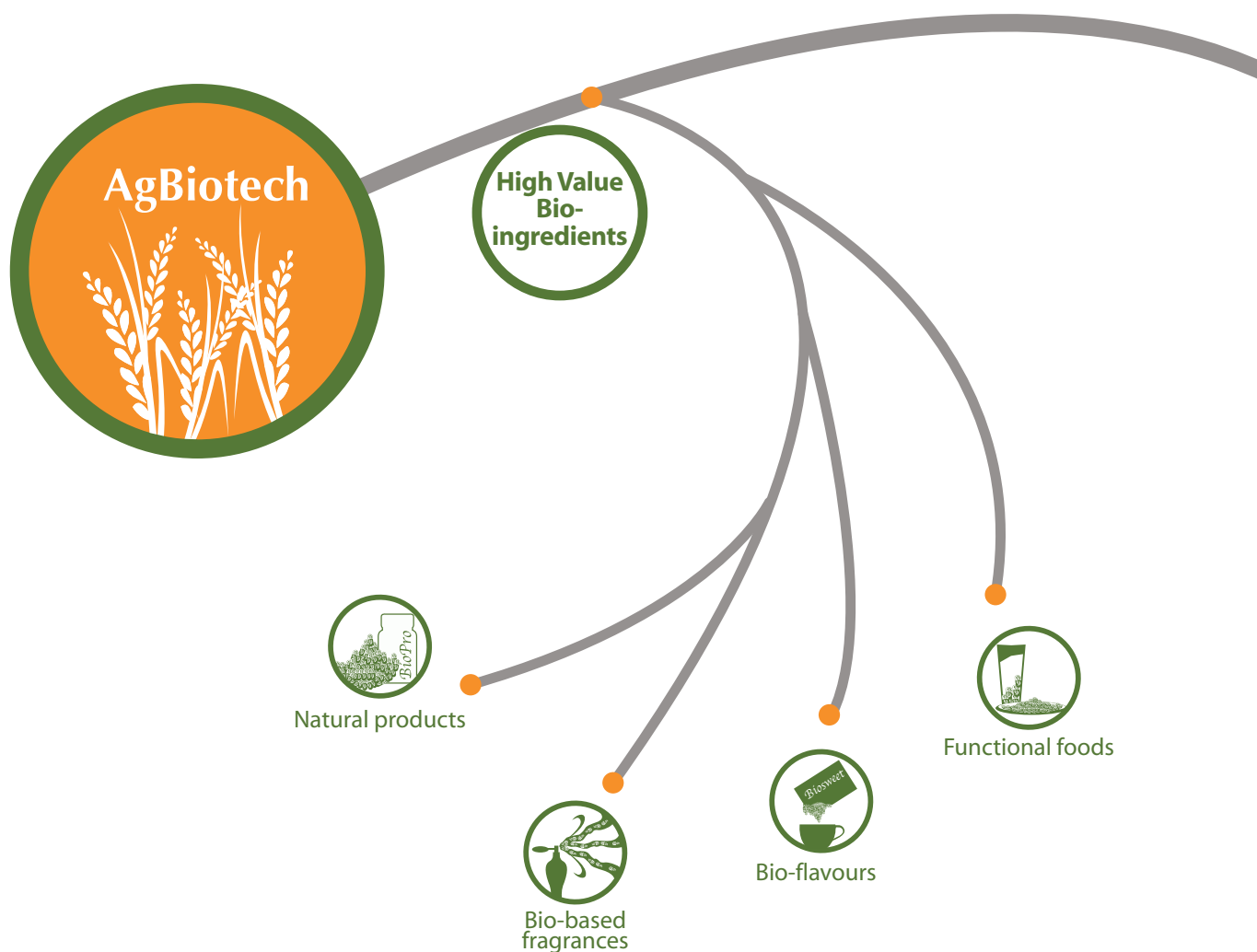
## BTP ACHIEVEMENTS IN 2012 – 2013 (AS AT SEPTEMBER 2013) AND TARGETS FOR 2020

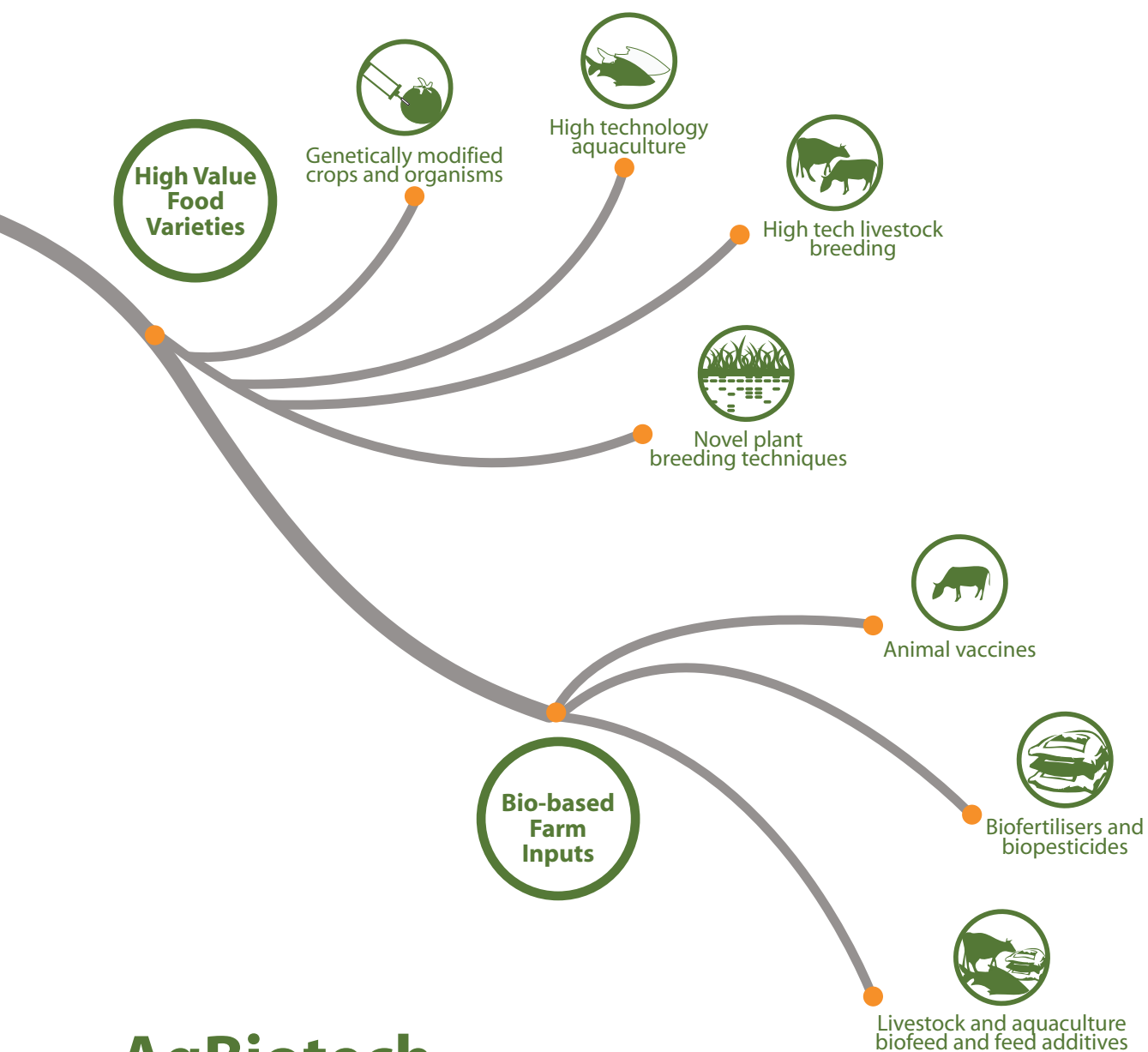


# LIST OF ENTRY POINT PROJECTS AND SELECTED TRIGGER PROJECTS

---

## AgBiotech





# AgBiotech (As at 30 October 2012)

GNI: **RM 1.5 billion**

Employment: **7,000**

Investment: **RM3.0 billion**

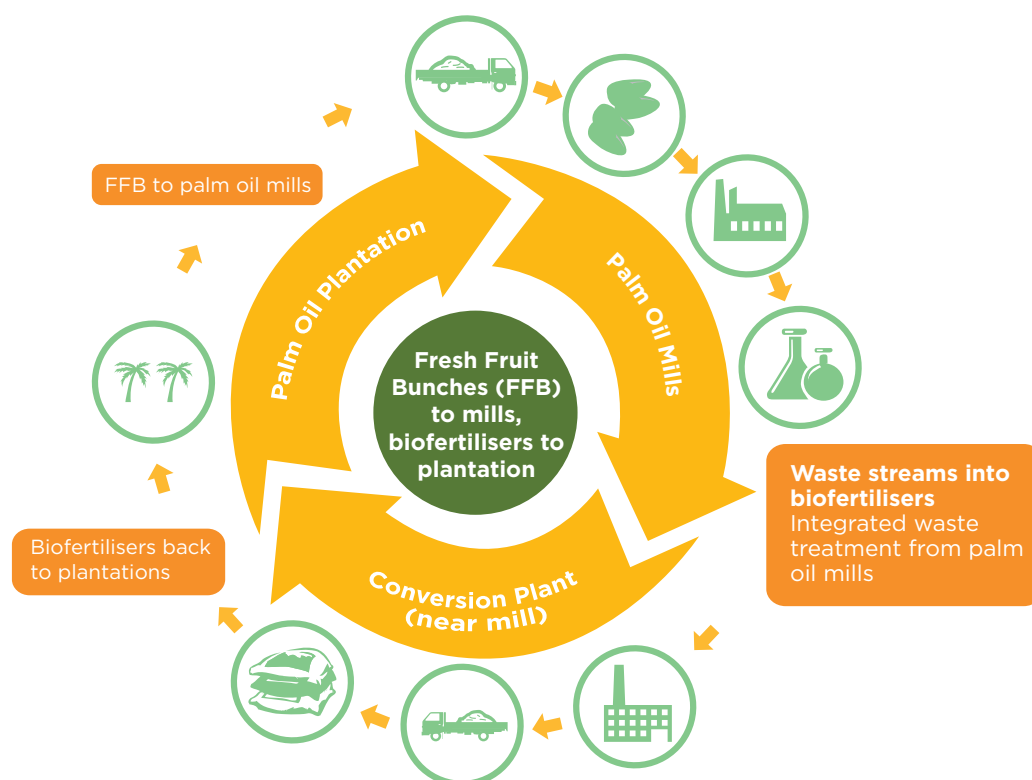
# LIST OF ENTRY POINT PROJECTS AND SELECTED TRIGGER PROJECTS

## EPP A1

### SECURE LOCAL BIO-BASED FARM INPUTS

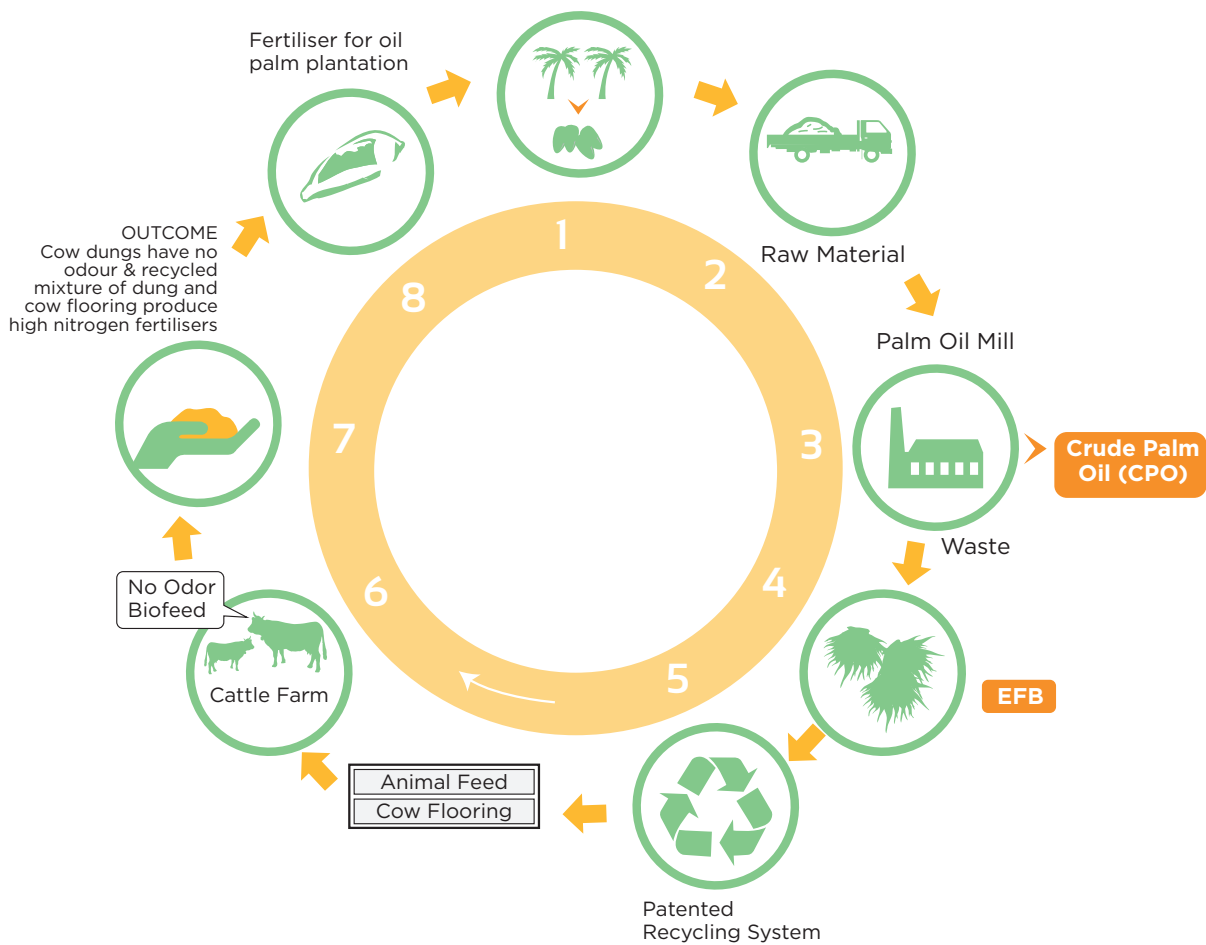
The significant size and diversity of the Malaysian farming and agricultural sector indicates its importance to the national economy. It is crucial to identify, approach and overcome critical issues impacting the industry. These include maintaining land and soil quality, safeguarding against disease and infections, as well as improving yields of crops. Utilisation of biotechnology to create high value farm inputs can address these issues in a sustainable, zero-waste manner.

For example, agri-waste from palm oil mills can be converted into environmentally friendly biofertilisers. These can displace conventional chemical-based fertilisers, improving sustainability and reducing pollution. One Trigger Project identified to develop this opportunity targets to deploy commercial scale waste treatment plants at palm oil mills throughout the nation. Concurrently, it will implement a collaborative programme for bio-formulation, precision agriculture and agronomic practices via a Clean Development Mechanism scheme.





Similar to fertilisers, another farm input that can be enhanced is feed for livestock. Capitalising again on the biomass available from the palm oil industry (specifically empty fruit bunches – EFBs), a second Trigger Project has been identified to convert EFBs into a higher value biofeed. Utilising a patented recycling system with specific indigenous microorganisms, EFB can be processed into biofeed. This will simultaneously ensure sustainable milling practices at palm oil mills, while enhancing and adding value to conventional farm inputs.



The long-term vision of the EPP is to establish Malaysia as a major producer of bio-based farm inputs like biofertilisers and biofeed. The successful implementation of the two Trigger Projects currently identified will result in a network of processing facilities in palm oil mills across the nation that will supply the global agriculture industry. This will improve sustainability, reduce carbon emissions, and increase yields in the sector. In the future, these benefits will be supplemented by new Trigger Projects targeting other potential farm inputs.

# LIST OF ENTRY POINT PROJECTS AND SELECTED TRIGGER PROJECTS

## EPP A2

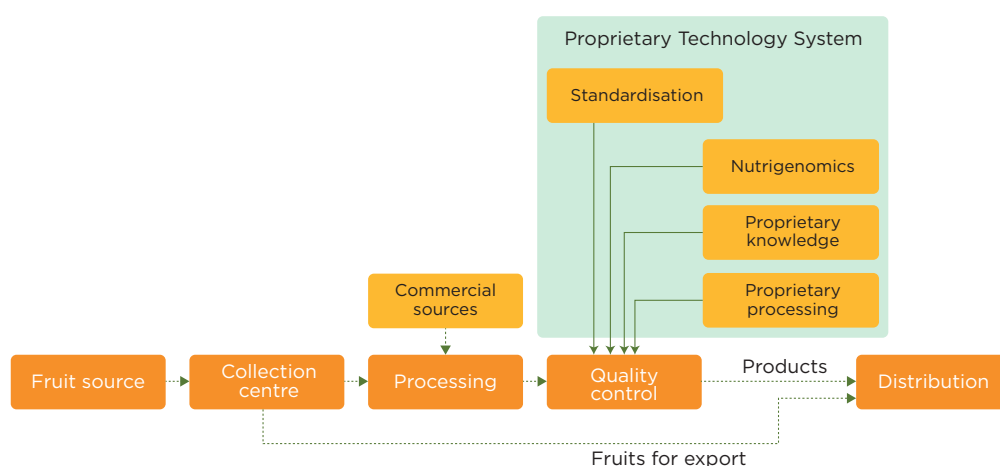
## IDENTIFY, PRODUCE AND COMMERCIALISE HIGH-VALUE LOCAL BIO-INGREDIENTS

The naturally tropical ecology of Malaysia is perfect for cultivating many varieties of agricultural produce. Many of these have chemically active constituents or bio-ingredients that confer health and medical benefits upon consumption. As such, they have high value as inputs for a range of industries including food production, dietary supplements, nutraceuticals and cosmeceuticals.

An EPP has been established to identify such varieties that can be commercially developed and marketed. One of the Trigger Projects for this EPP is the planting and extraction of *Stevia rebaudiana*, which is a natural sweetener for food and beverage products. The project aims to establish an end-to-end production chain for stevia-based natural sweeteners in Malaysia. As a healthier alternative to other sweeteners, stevia sweeteners can play a major role in improving the health standard of Malaysians by reducing excessive sugar consumption. This project thus fits in with national efforts to enhance the overall quality of life of Malaysians.



Another local crop that can be commercialised for its bio-ingredients is the mangosteen. Mangosteen has been found to confer various benefits for both age and non-age related health issues, its crude extracts being used as key natural ingredients in functional beverages and cosmeceuticals. As the major producers of mangosteen are located in Southeast Asia, Malaysia is ideally positioned to capture a significant share of the global market for this fruit and its by-products through the mangosteen Trigger Project.



The mangosteen Trigger Project will see the development of extraction facilities across Malaysia supplied by commercial scale plantations as well as contract farmers. By implementing proprietary technology systems and cutting-edge nutrigenomics, projects like the mangosteen Trigger Project will establish Malaysia as a global producer of bio-ingredients for an array of industries. At the same time, income for rural settlers can be increased substantially through the contract farming mechanism. Going forward, this EPP will continue identifying local agricultural sectors that can yield similarly high-value products for commercialisation.

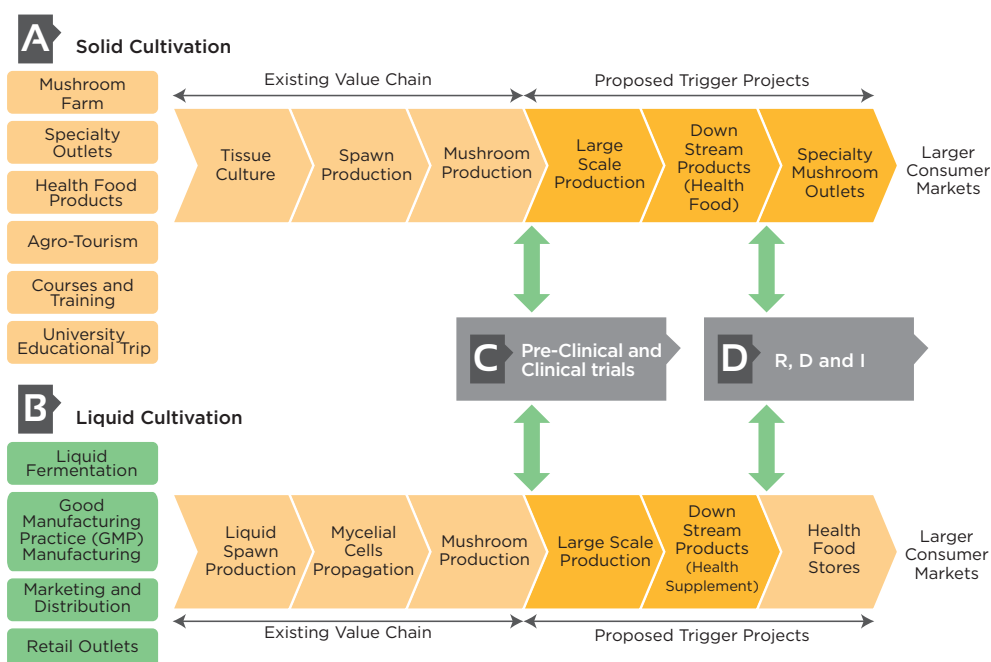
## EPP A3

### DEVELOP AND COMMERCIALISE FOOD VARIETIES

As a core component of Malaysia's economy, the agricultural sector has evolved throughout the years in tandem with advances in technology. With the advent of improved biotechnology applications in recent years, the industry is looking to grow further by applying such technologies to conventional agriculture. The development and commercialisation of improved food varieties is expected to generate substantial value to the sector by increasing yields and enhancing product quality.

Despite rice being Malaysians' staple food, the country still relies heavily on imports of 700,000 tonnes of rice annually, costing over RM1 billion. As such, paddy farming is the focus of one of the Trigger Projects in this EPP, which will introduce indigenous hybrid paddy seeds to support Malaysia's ambition to be rice self-sufficient. The development of hybrid paddy farming areas will provide food security and increase paddy farmers' net disposable income. The project would reduce the current risk of dependence on a single paddy variety, namely MR219, and improve Malaysia's balance of trade, reducing foreign exchange loss through a reduction in rice imports.

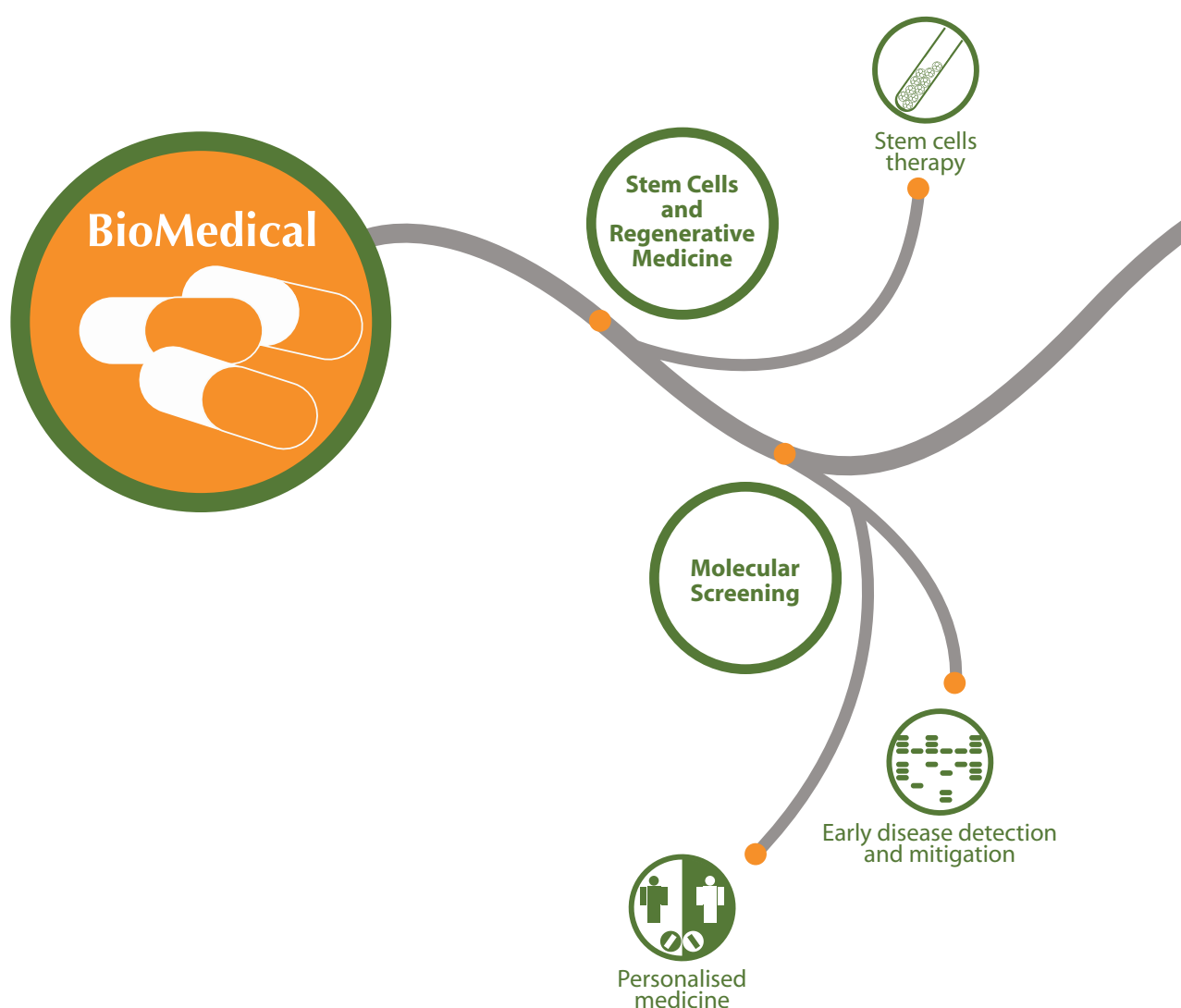
Another local agricultural product that has been identified for development is mushrooms, specifically high-value mushroom varieties like the Tiger's Milk mushroom. Although Malaysia is blessed with rich and diverse fungi, the mushroom industry is still relatively young (about 20 years) and has great growth potential, with current supply failing to meet existing market demand. A Trigger Project to develop production of mushroom varieties will be implemented, encompassing solid cultivation, liquid cultivation, clinical and pre-clinical trials, as well as Research, Development and Innovation (R, D, and I).

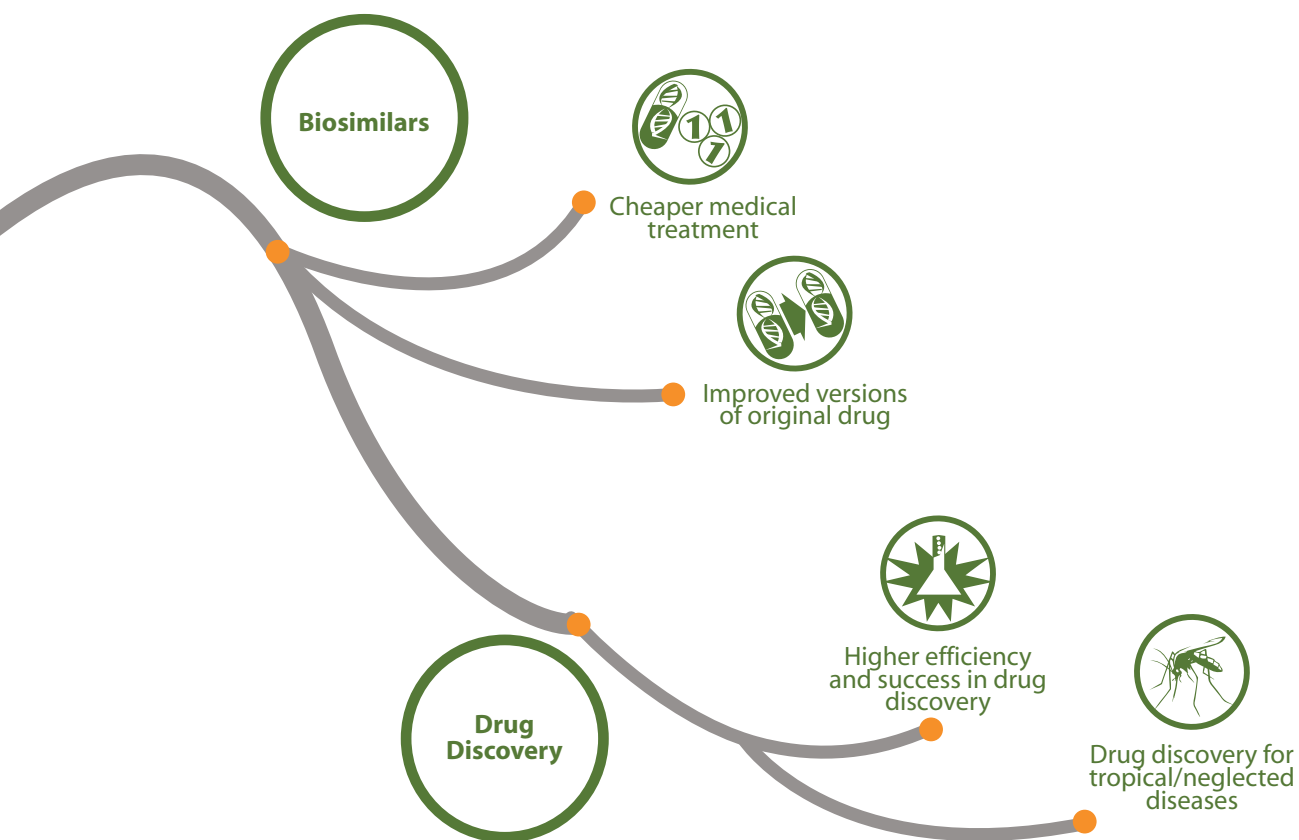


The hybrid paddy project is the first step towards developing an alternative supply of high-quality rice for the nation. Over the coming years, the project owner targets to increase its hybrid seed production and farming area exponentially to achieve this target. Similar expansionary steps are being taken to establish Malaysia as a major producer of high-value mushroom varieties. By encapsulating the entire value chain of planting, growing, producing and processing, we can add value to staple food crops like paddy, as well as carve out new niches for products like the Tiger's Milk mushroom. The application of new technologies to existing crops will open new avenues for commercialisation in the future, and additional Trigger Projects will be introduced into this EPP in the coming years.

# LIST OF ENTRY POINT PROJECTS AND SELECTED TRIGGER PROJECTS

## BioMedical





# BioMedical (As at 30 October 2012)

GNI: **RM 0.7 billion**

Employment: **2,000**

Investment: **RM 0.7 billion**

# LIST OF ENTRY POINT PROJECTS AND SELECTED TRIGGER PROJECTS

## EPP M1

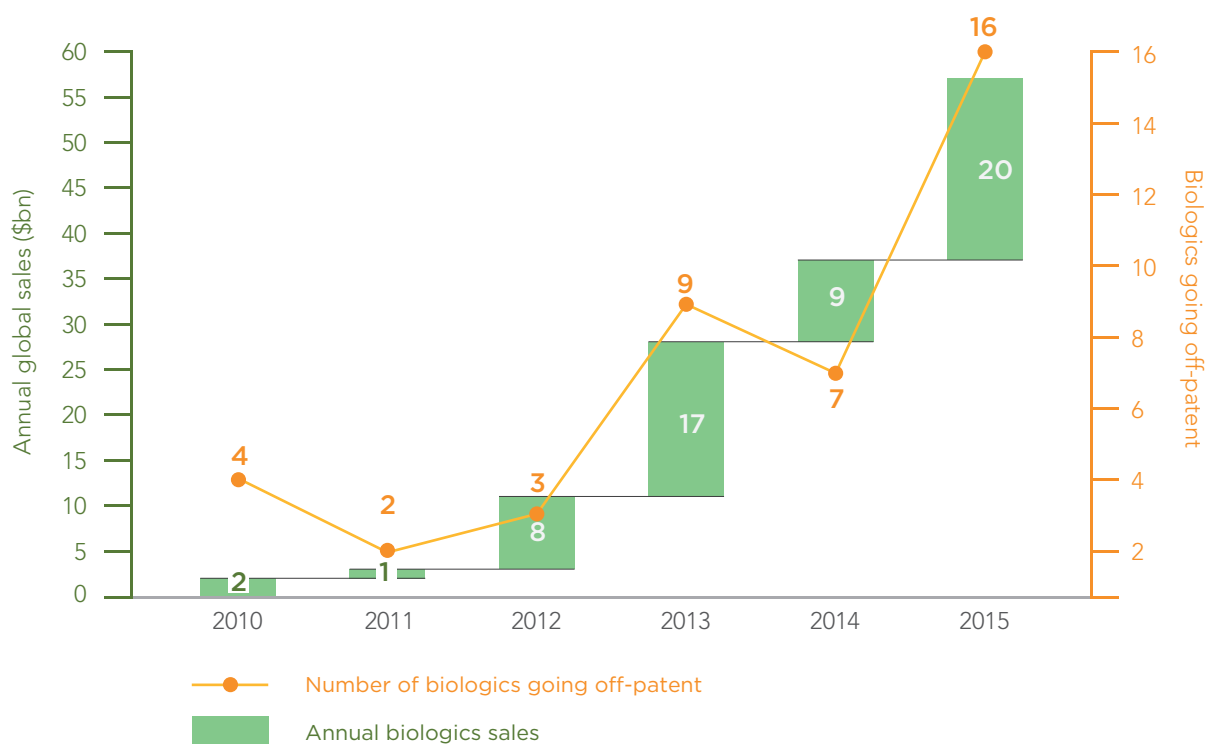
## DEVELOP AND COMMERCIALISE BIOSIMILARS/ BIOLOGIC DRUGS

“Biosimilars” refer to subsequent versions of innovator biopharmaceutical drug products for which the patents and exclusivity have expired. They represent an affordable source of biologic drugs, which are known to be effective in treating cancer and other life-threatening diseases. Between 2013-2015, more than 30 biologic drugs worth almost USD50 billion will lose their patent protection, opening the opportunity for Malaysian-made biosimilars to enter the market.

This EPP consists of a Trigger Project aiming to provide an affordable alternative source of biologic drugs to treat life-threatening diseases and reduce current dependency on imported biosimilars. This would also help to reduce currency exchange and transition losses.

The project covers the development and production of biosimilars for commercialisation at existing biopharmaceutical facilities in Malaysia. The facilities will be capable of producing active bulk substances while partners will be engaged to provide services such as fill and finish and market distribution. Three candidate molecules are currently the focus of the project for development.

In working toward the successful implementation of the project, the project owner is currently engaging with key stakeholders like the Ministry of Health to plan out a comprehensive roll-out scheme.



**Source:** Biosimilar Series - Forecast analysis (Datamonitor, June 2009).



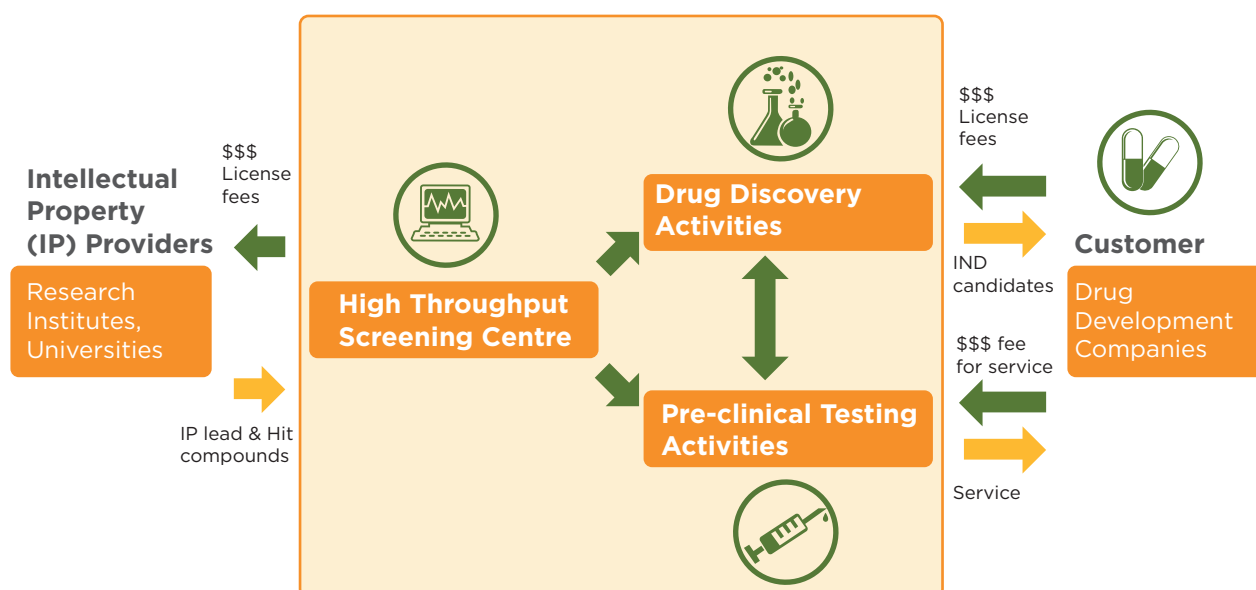
## EPP M2

## DEVELOP DRUG DISCOVERY AND PRE-CLINICAL SERVICES ECOSYSTEM

As global pharmaceutical companies are enhancing drug development, the global drug discovery outsourcing market is valued at more than USD7.4 billion, and Malaysia is one of the top 10 favoured pharma outsourcing destinations in Asia. This EPP focuses on the development of drug discovery services and Intellectual Property (IP) development around natural products.

The identified Trigger Project under this EPP aims to develop the local drug discovery and pre-clinical ecosystem via the establishment of a high throughput screening (HTS) centre to screen natural products, establish drug discovery programmes derived from natural products, and to create a drug discovery services ecosystem.

The project will be championed by a new joint venture company between a local research institute and an international computational biology company. The new entity will be in charge of daily screening and pre-clinical testing activities, profits from which will be channelled back for drug discovery activities. The HTS centre will encourage drug discovery partners to deposit their compounds at a national repository centre, and further R&D will be carried out into Investigational New Drugs (INDs). When the entire drug discovery microecosystem is ready, other Contract Research Organisations (CROs) will benefit from new business opportunities by providing complementary pre-clinical testing services in the drug discovery value chain. The project will also focus on the early development stages of drug discovery, and lead compounds will be sold to drug development companies for further clinical trials and product commercialisation.



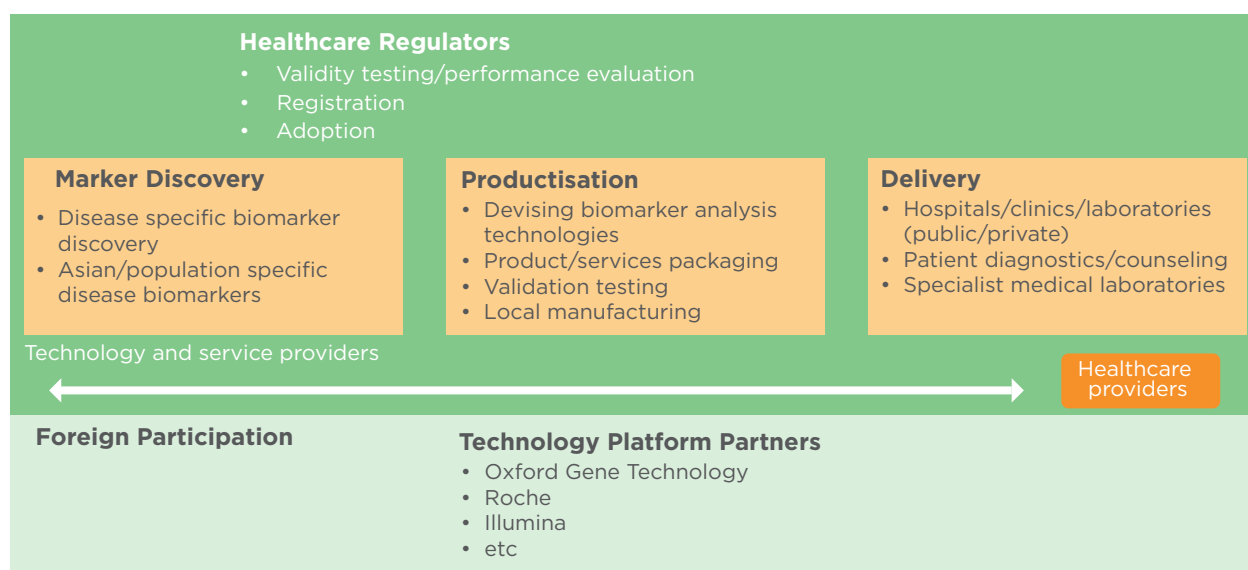
# LIST OF ENTRY POINT PROJECTS AND SELECTED TRIGGER PROJECTS

## EPP M3

## SCALE UP INNOVATIVE MOLECULAR SCREENING AND DIAGNOSTICS

A molecular screening or a molecular diagnostics test involves an analysis of human chromosomes, deoxyribonucleic acid (DNA), ribonucleic acid (RNA) or genes to detect heritable or somatic mutations related to disease or health. Molecular screening and diagnostics (MSD) enables earlier detection of diseases, and reduction in adverse drug reactions. This would help to defray the escalating cost of healthcare, which has a socio-economic impact on both the government and rakyat. The global MSD sector is growing annually at 26% and is expected to reach USD31 billion by 2015 (source: Global Genetic Testing Market Forecast to 2015 – RNCOS Industry Research Solutions, July 2012). However, it is fully dominated by foreign Multinational Corporations.

The Trigger Projects identified under this EPP focuses on the scale up of innovative MSD products and services. These projects aims to enable local players to catalyse the Malaysian market with the introduction and application of a range of genomics, metabolomics and proteomics-based, next-generation molecular screening and diagnostics kits and services, complete with a knowledge generation ecosystem. The projects will emphasise on innovative MSD for high-burden communicable and non-communicable diseases. It will cover multiple areas in the delivery of products and services where members of the EPP already have established businesses, operations and track records, with a market focus on hospitals across the nation.



## EPP M4

## SCALE UP STEM CELL AND REGENERATIVE MEDICINE

With a population of over 500 million, ASEAN represents a large potential market for stem cell therapies. Malaysia can take part in this golden opportunity to spearhead the development and proliferation of regenerative medicine in the region.

The proposed Trigger Project under this EPP will focus on expanding stem cell and regenerative medicine services in Malaysia and ASEAN via awareness/education/marketing programmes, with support from the government for access to health institutions, and approval for stem cell therapies to be conducted at selected hospitals, clinics and wellness centres.

Stem cells shipped by any reliable transport mode, now or in the future

### Clinics & Hospitals

#### Private and Public Hospitals

Currently no formal presence in hospitals beyond banking. EPP sponsor wishes to obtain approvals to conduct therapies which would enable presence at these hospital sites. Therapies conducted with specialists at various hospitals

- **Stem Cell Education and Collection at Clinics and Hospitals**

### Laboratory

Central laboratory for economies of scale screening facilities, clean rooms, quality assurance/quality control, cryopreservation facilities, training facilities

- **Processing, Storage at Central Facilities**

### Specialised Treatment Center

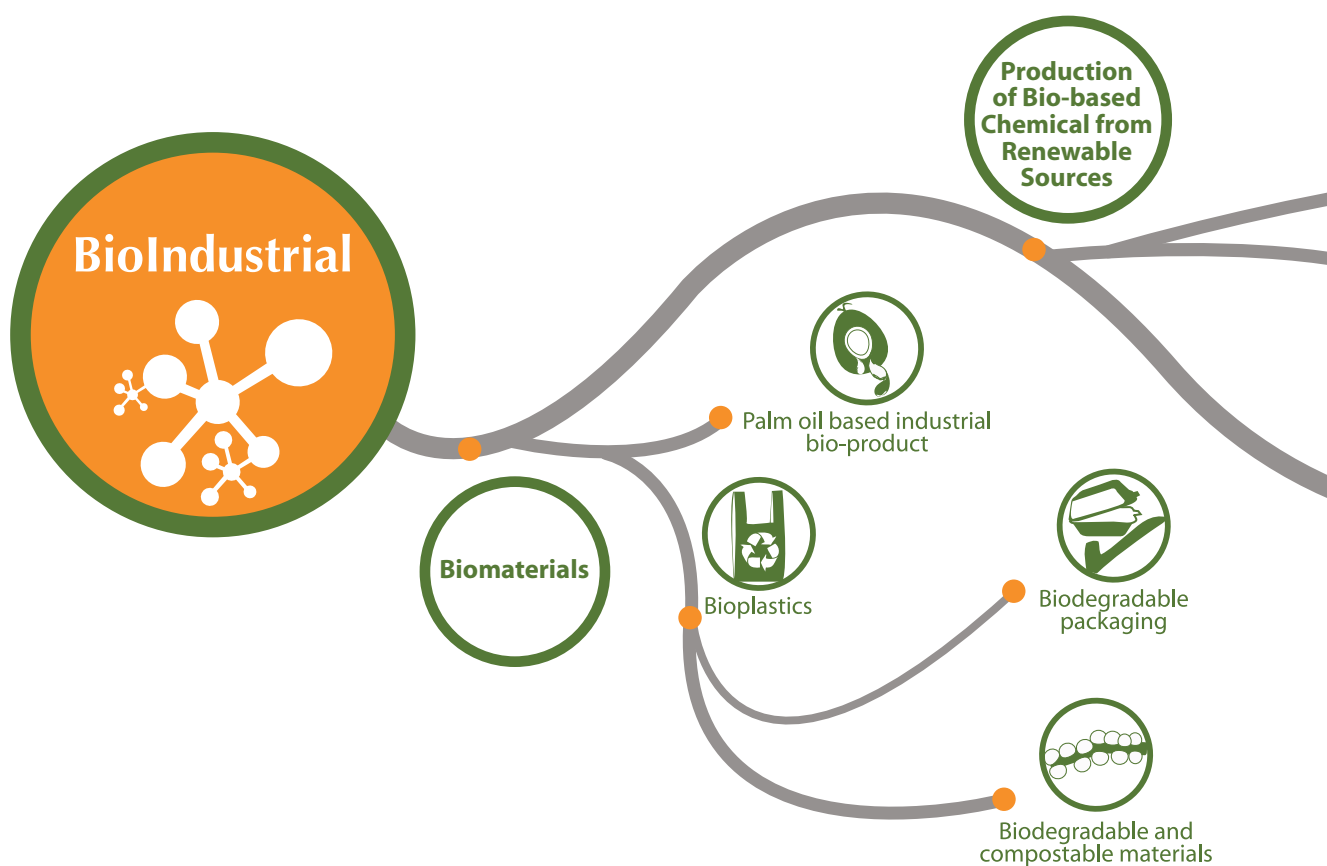
At collaborating hospitals, wellness centers, EPP Sponsor may also consider setup of new specialised units for treatment if approvals are provided

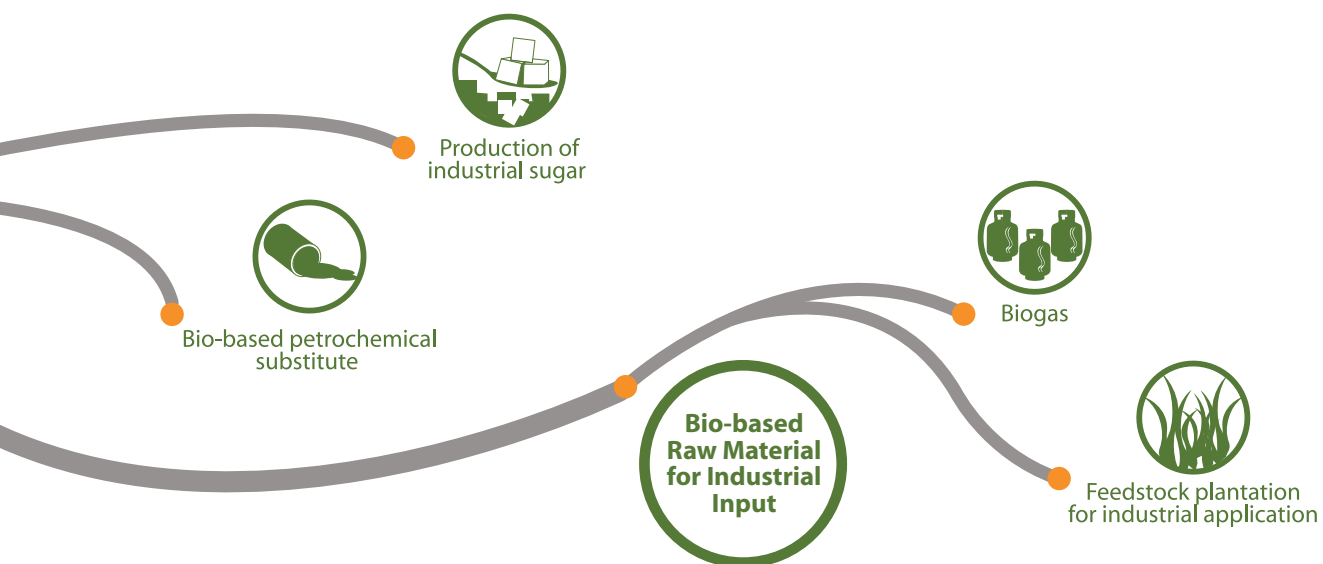
- **Collaboration and Use at Specialised Treatment Centers**

The project aims to kick-start and rapidly expand cellular therapeutic/treatment services in Malaysia with planned expansion in the ASEAN region, leveraging on established cutting-edge technology to deliver the service via world-class wellness centres. It also aims to tap into the medical tourism market by attracting wealthy foreign patients from across the region.

# LIST OF ENTRY POINT PROJECTS AND SELECTED TRIGGER PROJECTS

## BioIndustrial





# BioIndustrial (As at 30 October 2012)

GNI: **RM 1.4 billion**

Employment: **7,300**

Investment: **RM6.3 billion**

# LIST OF ENTRY POINT PROJECTS AND SELECTED TRIGGER PROJECTS

## EPP I1

### INDUSTRIAL BIOECONOMY UPSTREAM INPUTS

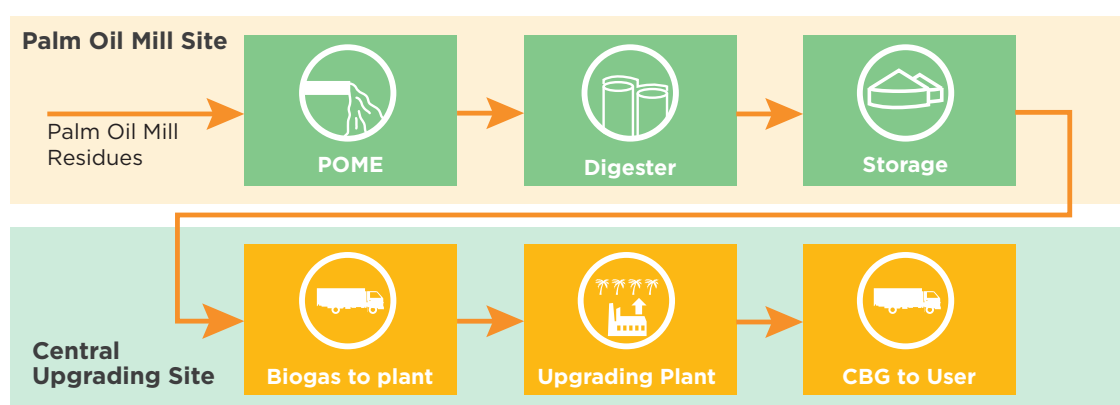
In the BioIndustrial sector, supply of raw materials is a crucial factor in the feasibility of projects and in tandem with the growth of the industry, this EPP seeks to develop a consistent, renewable supply of upstream inputs to ensure a sustainable model of growth.

The key Trigger Project under this EPP is the creation of a dedicated energy crop plantation using the fast-growing species *Leucaena leucocephala*. It will supply wood chips, which is an essential input to downstream products like syngas (for electricity production), steam, and cellulose-based, high-value biochemicals.



Another identified Trigger Project under this EPP is to develop syngas plants producing steam, using wood chips from sustainable sources like energy crop plantations. This steam can be sold as an input for other bioconversion platforms, particularly for process heating or electricity.

The third Trigger Project under this EPP aims to produce and utilise compressed biomethane gas (CBG) from palm oil mill effluent (POME). Currently, POME is treated using an open anaerobic system, but methane emitted from the process is a major source of greenhouse gases. It is proposed that the biogas can be compressed to a similar standard as natural gas for use in the transport and industrial sectors. This involves the collection of biomethane and transporting it to a centrally located upgrading unit where it is compressed and then distributed to users via pipeline or trucks.



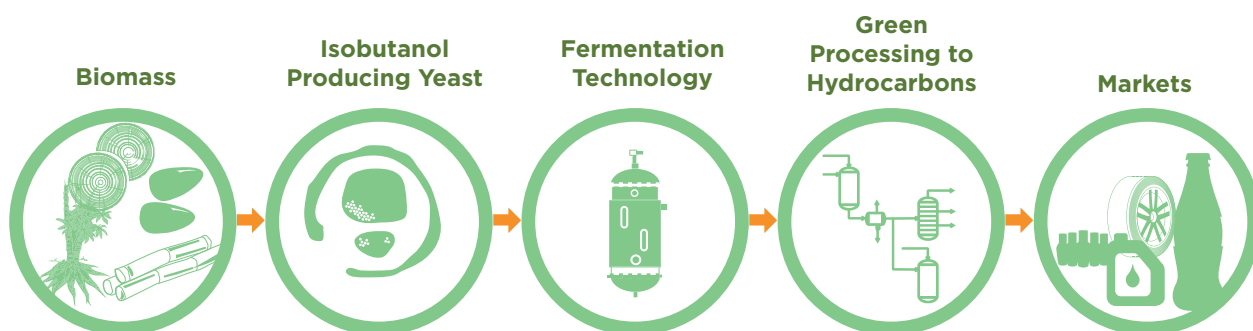
This EPP is critical, as securing reliable and high-quality upstream inputs to the bioindustrial processes will provide a strong and much-needed jumpstart to the sector. There will be a need to quickly meet challenges with workable sustainable solutions and to also consider new Trigger Projects under this EPP that will support the upstream end of the bioindustrial value chain.

## EPP I2

### BIOCHEMICALS FROM RENEWABLE RESOURCES

The extraction and production of valuable biochemicals from renewable resources is the focus of three cutting edge Trigger Projects from this EPP. Utilising biomass resources (e.g. wood chips from energy plantations, or existing, sustainably planted *Acacia mangium* plantations), these Trigger Projects are specifically looking into the potential of producing isobutanol, bioethanol/biomethanol and cellulosic sugars.

Isobutanol (a four-carbon building block for petrochemicals and hydrocarbons) can be produced using an easily replicable technology being considered for a Trigger Project under this EPP. The technology will be deployed in an integrated plant for the conversion of biomass to isobutanol, and will open up new opportunities for the downstream industry.



Other technology platforms will allow wood chips to be converted into bioethanol or biomethanol, or even cellulosic sugars for eventual production of industrial products like bio-based chemicals. These platforms are being considered for two other Trigger Projects under this EPP. These projects will develop a biorefinery system involving multiple partners to convert wood chips into value-added products while generating new job opportunities.

The development of projects producing highly valuable chemical precursors from biological resources will be of immense market value at the global scale. Such chemicals are critical building blocks in many of today's petrochemicals industry, as well as other associated sectors. Accordingly, there is a need to ensure that the current Trigger Project is on track. Other new Trigger Projects producing bio-based chemicals from renewable resources are expected to be identified in the near future.



# LIST OF ENTRY POINT PROJECTS AND SELECTED TRIGGER PROJECTS

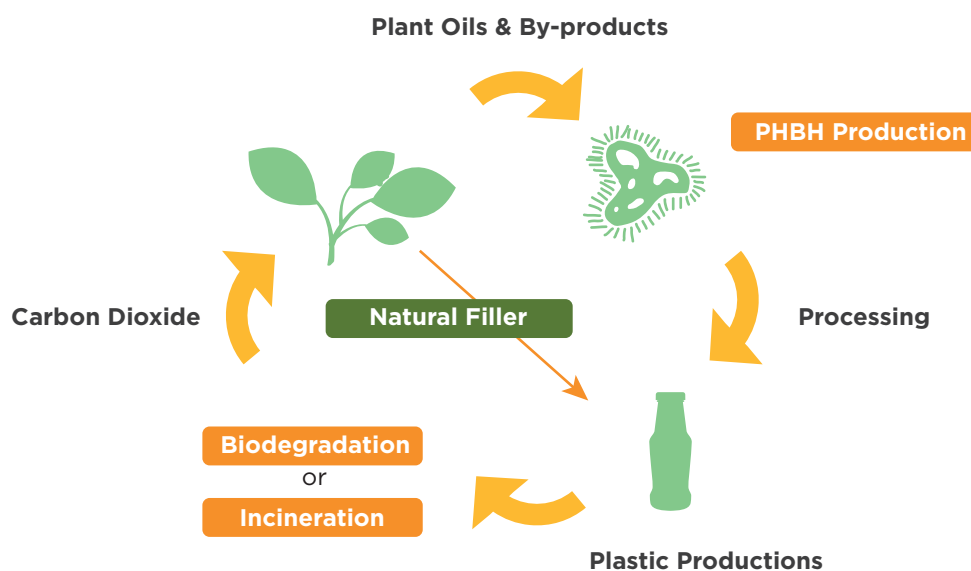
## EPP I3

### BIOMATERIALS FROM RENEWABLE RESOURCES

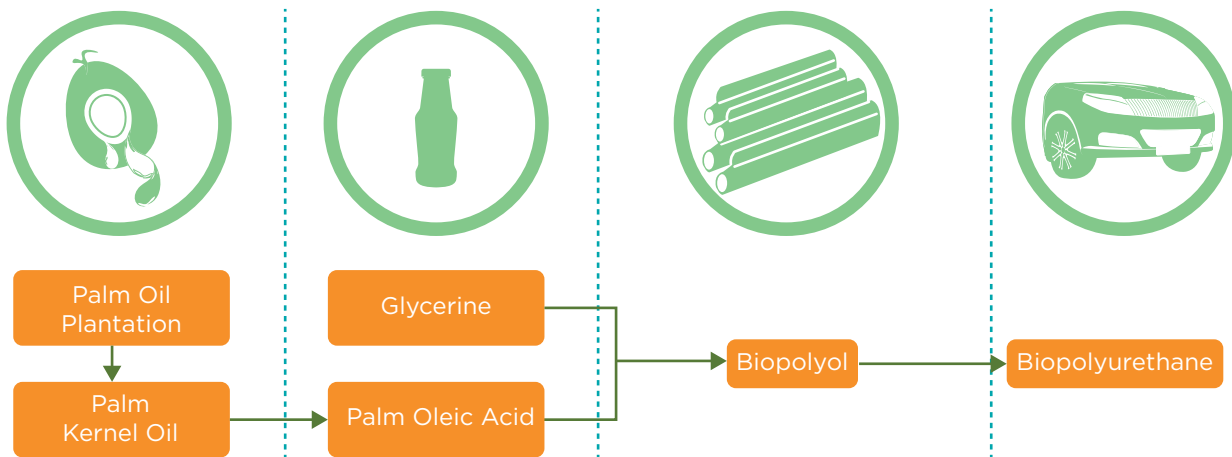
The worldwide demand for sustainably derived materials has given rise to an EPP focusing on commercialising biomaterials from renewable resources. The global bioplastic packaging market, for example, is growing at the rate of 19% per annum (source: European Bioplastics – Roland Berger). The intense interest in developing plastics from sustainable sources have also led to major brands like Nestle, McDonald's, KFC and Colgate-Palmolive introducing sustainable bioplastics in their products.

In light of this, the EPP has identified several Trigger Projects of high commercial potential like the production of polyhydroxy butyrate hexanoate (PHBH), bioresins, biopolyols, as well as biodegradable packaging products. These projects capitalise on the supply of raw biomaterial available in Malaysia from the agricultural and palm oil industries, and result in biodegradable products with significantly lower carbon footprints.

As an example, PHBH is a recently developed variant of Polyhydroxyalkanoates (PHA) plastics demonstrated to be qualitatively superior. It is biodegradable in either anaerobic or aerobic conditions in the natural environment, produces less carbon dioxide than fossil-based polymers and can be given a wide range of material properties from hard to soft.



Similarly, biopolyols can be converted from palm oil industry's oleic acids, for eventual production of biopolyurethanes. This production pathway will mitigate depleting fossil fuel reserves, and provides a sustainable and renewable alternative to existing methods.





As there is already a steady move towards renewable biomaterials globally, the focus on the production of biomaterials will enable Malaysia to become an important player in this area. The Trigger Project in this EPP will offer a renewable and environmentally friendly alternative to petrochemical-based packaging and plastics, circumventing landfill and waste-disposal issues. In addition, there is abundant local bioresources that can be used as raw material, thus ensuring a more stable, renewable and sustainable feedstock supply than petrochemical feedstock.



# TRIGGER PROJECTS

## PROGRESS UPDATES



### EPP A1: SECURE LOCAL BIO-BASED FARM INPUTS

Trigger Project	Progress	Notes
Production of biofertilisers through integrated waste treatment plants		This project is progressing adequately. Key engagements are continuing with government stakeholders in order to ensure smooth implementation.
Scale up production and commercialisation of biofeed for livestock industry		This project has identified purchasers for its product and continues on its path toward implementation.

### EPP A2: IDENTIFY, PRODUCE AND COMMERCIALISE HIGH-VALUE LOCAL BIO-INGREDIENTS


Trigger Project	Progress	Notes
Scale up plantation, extraction and commercialisation of Stevia as an alternative sweetener for food and beverage products		This project has achieved major milestones over the past year, particularly with regard to discussions and syndications with key suppliers and collaborators.
Develop sustainable collection, extraction and commercialisation of mangosteen		This project is progressing steadily, specifically in the identification of suitable project locations as well as establishing a key collaboration for plantation.

### EPP A3: DEVELOP AND COMMERCIALISE FOOD VARIETIES


Trigger Project	Progress	Notes
Develop, produce and commercialise indigenous hybrid paddy seed		A hybrid paddy farming area has been announced in Sabah earlier this year. Progress needs to be made on the commercial side to ensure timely implementation.
Scale up production of high value mushroom varieties		This project has successfully completed expansion of its facilities. Progress must be accelerated to continue toward targeted timelines.

Legend:  Good Progress  Moderate Progress  Low Progress


## EPP M1: DEVELOP AND COMMERCIALISE BIOSIMILARS/BIOLOGIC DRUGS

Trigger Project	Progress	Notes
Accelerate development, production and commercialisation of Malaysian-made biotech drugs (biosimilars/biologics)		Although efforts continue at the research and developmental level, progress needs to be made in implementation of the manufacturing and commercial offtake aspects.


## EPP M2: DEVELOP DRUG DISCOVERY AND PRE-CLINICAL SERVICES ECOSYSTEM

Trigger Project	Progress	Notes
Develop drug discovery services and intellectual property development around natural products		The framework for implementation of this project has been formulated, but efforts continue to identify project funding.




## EPP M3: SCALE UP INNOVATIVE MOLECULAR SCREENING AND DIAGNOSTICS

Trigger Project	Progress	Notes
Scale up innovative molecular screening and diagnostics products and services		The project is progressing along its implementation timeline. Moving forward, the Trigger Project will focus on the production and distribution of the screening kits.

## EPP M4: SCALE UP STEM CELL AND REGENERATIVE MEDICINE




Trigger Project	Progress	Notes
Promote, encourage and ensure progress of stem cell therapeutics and regenerative medicine in Malaysia		Engagements and discussions continue with key stakeholders in the public sector to develop a framework for project implementation in hospitals.

## EPP II: INDUSTRIAL BIOECONOMY UPSTREAM INPUTS





Trigger Project	Progress	Notes
Establishment of an energy crop plantation as input for the industrial bioeconomy		Existing plantation site has been identified which can produce sufficient wood chips for initial use before planting the new crop. Key action items remain in obtaining project funding.
Production of syngas for steam generation from solid biomass		Location has been identified and preliminary engineering design, procurement and construction has been initiated.
Production and utilisation of compressed biomethane gas for transportation and industrial sectors		Project continues finalising commercial and technical details in terms of technology, logistics, pricing and funding.

# TRIGGER PROJECTS PROGRESS UPDATES

## EPP 12 : BIOCHEMICALS FROM RENEWABLE RESOURCES

Trigger Project	Progress	Notes
Production of isobutanol from cellulosic feedstocks (wood chips)		Project is progressing smoothly. It will be placed at the Kertih Biopolymer Park within the East Coast Economic Region (ECER) Special Economic Zone.
Bioethanol and biomethanol production from wood chips		Project is under review as project owner is assessing other technology options and platforms.
Production of cellulosic sugars from woody biomass produced by energy crop plantations		Project will be placed at the Kertih Biopolymer Park in the ECER Special Economic Zone. Negotiations are ongoing with regard to procurement of feedstock as well as funding.

## EPP 13: BIOMATERIALS FROM RENEWABLE RESOURCES

Trigger Project	Progress	Notes
Establishment of commercial production of polyhydroxy butyrate hexanoate from palm oil and its by-products and derivatives		Gebeng Industrial Area in Kuantan has been identified as a potential location. This will expand an existing operational pilot plant. The project is currently securing supply of its feedstock.
Agro-based bioresin production for bioplastics use		This project has an established technology platform. It is currently exploring strategies for feedstock supply and identifying possible funding or investment.
Production of biopolyols for biopolyurethanes from palm oil derived oleic acid		The implementation is progressing steadily. Preliminary implementation considerations have been conducted. A market study is being finalised to strengthen commercial analysis.
Scale up production and promote usage of biodegradable and compostable packaging products from sustainable agro-waste		This Trigger Project is currently under review to explore alternative anchor companies.

Legend:  Good Progress  Moderate Progress  Low Progress

# NEW TRIGGER PROJECTS PIPELINE

IN ADDITION TO THE EXISTING 10 EPPS AND 20 TRIGGER PROJECTS THAT WERE IDENTIFIED TO DEVELOP MALAYSIA'S BIOECONOMY, BIOTECHCORP CONTINUES TO IDENTIFY AND EVALUATE HIGH-POTENTIAL PROPOSED TRIGGER PROJECTS TO BE INCLUDED UNDER THE BIOECONOMY TRANSFORMATION PROGRAMME (BTP). THE NUMBER OF EPPS AND TRIGGER PROJECTS ARE THEREBY EXPECTED TO GROW.

In 2013, BiotechCorp coordinated with state authorities such as the Sabah Economic Development and Investment Authority (SEDIA), Sarawak State Planning Unit (SPU) and Northern Corridor Implementation Agency (NCIA) to conduct BTP Workshops and Labs to engage potential projects in Sabah, Sarawak and the Northern Region (encompassing the states of Perlis, Perak, Kedah and Penang), respectively.

These pipeline projects will leverage on each state's natural strengths and capabilities such as the abundance of bio-resources and rich natural biodiversity to further enhance and add value to existing bio-based industries and realise the full potential of the bioeconomy of the various states. At the same time, these pipeline projects will encourage the creation of collaborative bio-based clusters and contribution in existing projects in the regional economic corridors like the Sabah Development Corridor, Sarawak Corridor of Renewable Energy and Northern Corridor Economic Region.

BTP Workshops and Labs conducted in 2013, as well as on-going engagement with the private sector, resulted in the identification and shortlisting of 13 high-potential projects, as at 30 September 2013 that can immediately be considered for inclusion in the BTP. These 13 pipeline projects are expected to potentially contribute nearly RM1 billion in Gross National Income (GNI), attract RM3.8 billion in investment and generate more than 1,700 new jobs by 2020.

As BiotechCorp continues to obtain the necessary data for a comprehensive evaluation of projects for the BTP, the next steps will be to present qualified projects for approval from the BTP Technical Working Committee and subsequently the BTP Steering Committee, comprising representatives from Performance Management & Delivery Unit, the Ministry of Agriculture, Ministry of Health, Economic Planning Unit and several other key ministries. The expected inclusion of these projects and others into the BTP, based on factors like their potential economic impact and commerciability, will further supplement Malaysia's development into a high-income global bioeconomy by 2020.

**These 13 pipeline projects identified in 2013 are expected to potentially contribute nearly RM1 billion in GNI, attract RM3.8 billion in investment and generate more than 1,700 new jobs by 2020.**



**RM0.97 billion**  
GNI in 2020



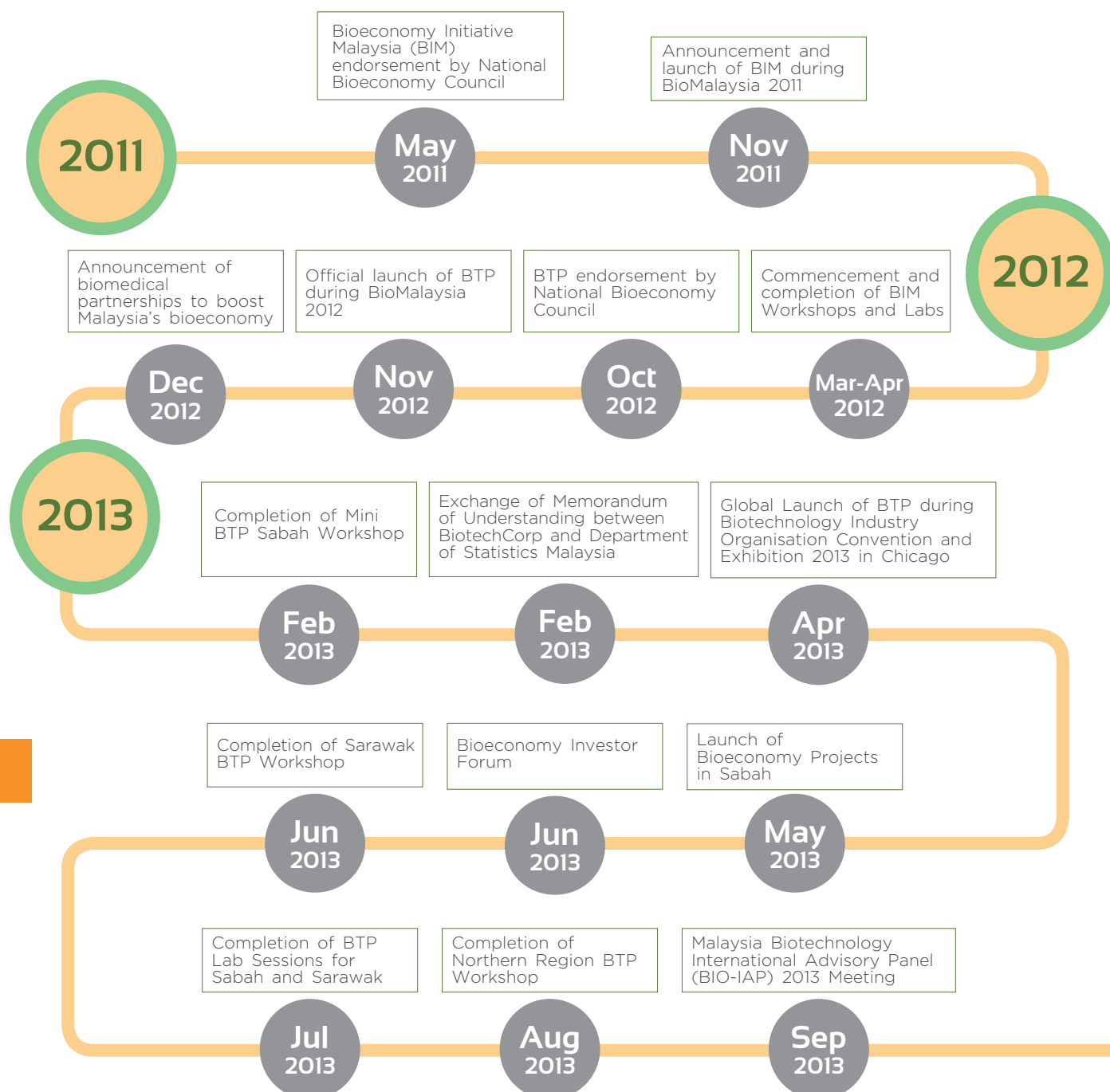
**More than 1,700**  
new jobs by  
2020



**RM3.8 billion**  
investment by  
2020

# KEY EVENTS HIGHLIGHTS

From its conception in early 2011 and its launch in 2012, the Bioeconomy Transformation Programme (BTP) has been set to propel the nation towards becoming a high-income, fully developed economy by 2020. Since then, a series of regional BTP Workshops and Labs has been held to gauge as well as to engage commercial opportunities in bio-based industries to included in the BTP. The primary objective of the workshops and lab sessions is to identify and evaluate significant low-hanging, quick-win private sector driven bio-based projects within a region that can be further fostered by foreign direct investments or domestic direct investments. In addition to this, several noteworthy announcements and collaborations had been made to strengthen the development of bioeconomy in Malaysia.





---

## BIOECONOMY INITIATIVE MALAYSIA

The Bioeconomy Initiative Malaysia (BIM) was endorsed by the National Bioeconomy Council, chaired by the Honourable Prime Minister in May 2011 and officially launched during BioMalaysia on 21 November 2011.

BIM is the framework to implement the action plan outlined in the National Biotechnology Policy (NBP) for the development of the biotechnology industry in various fields as the engine to improve the national economy. This is in support of Malaysia's intention to achieve the status of high-income nation by 2020. It is intended to coordinate and intensify national efforts in capitalising the potential economic benefits of the entire biotechnology ecosystem and related value chains, in parallel with the Economic Transformation Programme (ETP) and eventually provide significant impact on Malaysia's economic growth.



### BIOECONOMY INITIATIVE MALAYSIA WORKSHOP

The Bioeconomy Initiative Malaysia Workshop was held in Putrajaya International Convention Centre (PICC) from 5 to 7 March 2012. The Workshop was graced by Y.B. Datuk Haji Fadillah bin Haji Yusof, Deputy Minister of the Ministry of Science, Technology and Innovation. The objective of the workshop is to identify and prioritise Bioeconomy Entry Point Projects (EPPs). Nearly 300 representatives from government's ministries and agencies, private sector, institutions of higher learning (IHLs) and research institutes (RIs) participated in the Workshop. The workshop successfully identified 35 EPPs for further evaluation.



## KEY EVENTS HIGHLIGHTS



### BIOECONOMY INITIATIVE MALAYSIA LAB SESSIONS

The Bioeconomy Initiative Malaysia Lab Sessions were conducted between 19 March 2012 to 27 April 2012 to validate and design the action plan for the EPPs identified during the Bioeconomy Initiative Malaysia Workshop. A total of 100 participants from government agencies, private sector and academia were involved in the lab sessions.

During the lab sessions, extensive discussions, data collection, analysis and evaluation for each Entry Point Project had been conducted, including 90 syndication meetings with relevant ministries, Performance Management & Delivery Unit (PEMANDU), Malaysian Innovation Agency and industry stakeholders.

By the end of the Bioeconomy Initiative Malaysia Lab Sessions, a total of 20 Trigger Projects under 10 EPPs were selected based on the same parameters and selection criteria used by PEMANDU in determining the EPPs under the National Key Economic Area (NKEA).



## OFFICIAL LAUNCH OF THE BIOECONOMY TRANSFORMATION PROGRAMME

The Bioeconomy Transformation Programme (BTP) was announced by the Prime Minister of Malaysia YAB Dato' Sri Mohd Najib bin Tun Abdul Razak on 30 October 2012, following the endorsement from the National Bioeconomy Council. The programme was officially launched during the BioMalaysia 2012 Conference and Exhibition, held on 5 to 7 November 2012.

With the tagline “Enriching the Nation, Securing the Future”, BTP’s vision is to develop Malaysia as a global high income bioeconomy by 2020. Through the BTP, the Malaysian government and leading industry players will work in tandem to set national goals for the application of biotechnology in agriculture production, industrial manufacturing and human health, put in place the structural conditions required and develop necessary mechanisms to ensure that policy can flexibly adapt to new opportunities.

The Ministry of Science, Technology and Innovation was announced as the lead agency for the BTP, with BiotechCorp as the lead implementation agency. Under the BTP, three Trigger Projects were announced:

- Under the Bio-based Chemicals EPP, the production of Isobutanol from cellulosic feedstocks (wood chips) is led by Gevo Inc. from the United States
- Under the Bio-based Farm Input Entry Point Project (EPP), the production of bio-fertilisers through integrated waste treatment plants to convert agri-waste to bio-fertilisers is led by Inno-Integrasi Sdn Bhd. from Malaysia
- Under High Value Bio-Ingredients EPP, the development of sustainable collection, extraction and commercialisation of mangosteen is led by Furley Bioextracts Sdn Bhd from Malaysia





## KEY EVENTS HIGHLIGHTS



### ANNOUNCEMENT OF BIOMEDICAL PARTNERSHIPS FOR BIOECONOMY MALAYSIA

On 14 December 2012, BiotechCorp announced biomedical partnerships with several parties in its efforts to boost the Malaysian Biomedical sector and further drive the BTP. The announcement and exchange of collaboration documents was witnessed by Minister of Health YB Dato' Sri Liow Tiong Lai; Chief Minister of Melaka YAB Datuk Seri Hj Mohd Ali bin Mohd Rustam; and BiotechCorp's Chief Executive Officer, YBhg Dato' Dr. Mohd Nazlee Kamal. The announcements were:

- BiotechCorp's engagement with Saudi Arabia-based Al-Jomaih Holding Company for investments in biomedical projects in Malaysia. Al-Jomaih Holding Company is one of the largest industrial conglomerates in the Kingdom of Saudi Arabia and a major investment group in the Middle East. Through BiotechCorp, Al-Jomaih Holding Company is considering various biomedical projects for implementation in Malaysia, including the set-up of a vaccine manufacturing facility in Malaysia between Al-Jomaih Holding Company and a European Multinational Company
- Announcement and exchange of a collaboration proposal between BiotechCorp, Melaka Biotechnology Corporation Sdn Bhd, DRB HICOM Berhad and Capipharm Sdn. Bhd. to develop a pharmaceutical park for the provision of a specialised ecosystem in support of the country's biomedical sector
- Exchange of a Distribution Agreement between India's Biocon Limited, through its wholly owned subsidiary Biocon SA, Switzerland (Biocon SA), and CCM Pharmaceuticals Sdn Bhd. Both parties have entered into an agreement to address the increasing demand for insulin in Malaysia





## MINI BIOECONOMY TRANSFORMATION PROGRAMME SABAH WORKSHOP

BiotechCorp in collaboration with the Sabah Economic Development and Investment Authority (SEDIA) had organised the Mini Bioeconomy Transformation Programme Sabah Workshop to identify low hanging, quick-win, private sector bio-based projects within Sabah that can be placed under the BTP. The workshop also mapped out biotechnology projects in Sabah and identified pipeline bio-based/life science projects to be further nurtured as potential domestic direct investment.



Held on 21-22 February 2013 at the Magellan Sutra Resort, Kota Kinabalu, the event which was officiated by YBhg. Professor Dato' Dr. Mohd Jamil Maah, Under Secretary of the National Biotechnology Division (BIOTEK) involved approximately 100 participants from private and public sectors. The workshop recorded 46 ongoing bio-based projects in Sabah, and identified additional 32 new projects that capitalise on Sabah's rich natural bio-resources.



## KEY EVENTS HIGHLIGHTS

### EXCHANGE OF MEMORANDUM OF UNDERSTANDING BETWEEN BIOTECHCORP AND DEPARTMENT OF STATISTICS MALAYSIA

As part of the ongoing efforts to measure the performance and growth of bioeconomy in Malaysia, BiotechCorp and the Department of Statistics Malaysia, had signed a Memorandum of Understanding to improve the quality of official statistics of the bio-based industry in Malaysia.

Via this partnership, both parties will share data and statistics on the bio-based industry in Malaysia, which will be instrumental in determining the industry's contribution to Malaysia's Gross Domestic Product. The signing and exchange of the memorandum was made on 19 February 2013, in conjunction with BioBorneo 2013.



### GLOBAL LAUNCH OF BIOECONOMY TRANSFORMATION PROGRAMME

The global launch of the Bioeconomy Transformation Programme (BTP) was announced on 22 April 2013 during Biotechnology Industry Organisation Convention and Exhibition 2013 in Chicago (BIO Chicago). The BTP launch was officiated by Deputy Secretary-General (Science and Technology) of the Ministry of Science, Technology and Innovation, Professor Datin Paduka Dr. Khatijah Mohd Yusoff, who also launched the Malaysian Pavilion during the convention.

The global launch aimed to drive Malaysia's bioeconomic growth by networking and unlocking potential growth areas with the United States of America and other international counterparts. The launch also highlighted Malaysia as the second country in Asia after China to announce a bioeconomy initiative.





## LAUNCH OF BIOECONOMY PROJECTS IN SABAH

On 2 May 2013, the Minister of Science, Technology and Innovation Datuk Seri Panglima Dr Maximus Ongkili launched the bioeconomy projects for Sabah as part of the expansion of the national biotechnology and bioeconomy development agenda under the BTP. In addition, there were announcements on two bioeconomy projects that will aid in the transformation of the agriculture sector and develop skilled farmers in Kota Marudu where agriculture is the main economic activity. The bioeconomy projects launched and announcements were:

- Announcement of Joint Collaboration between Inno Integrasi Sdn Bhd and Malaysian Palm Oil Board on Bio-organic Fertilisers (BOF) to provide sustainability for palm oil production
- Launch of Hybrid Rice Project in Kota Marudu by RB Biotech Sdn Bhd
- Announcement of Collaboration Proposal between BiotechCorp and Korporasi Pembangunan Desa to develop high value natural products in Sabah
- Exchange and Announcement of Collaboration Proposal between Borneo Scallops Sdn Bhd and Inno Fisheries Sdn Bhd on the Scallop Project
- Launch of “Petai Belalang” Project by Sabah Green Development Sdn Bhd



## BIOECONOMY INVESTOR FORUM

The inaugural Bioeconomy Investor Forum was held from 25-26 June 2013 at Kuala Lumpur Convention Centre to promote and highlight opportunities and value propositions of the Bioeconomy Transformation Programme (BTP) and other bio-based projects.

More than 200 participants attended the event which aimed to establish transparent, continual and consistent communication between private funding communities and the various BTP promoters as well as BioNexus status companies. The forum was also a platform for local and international investors to understand, deliberate and evaluate BioNexus status companies within the bio-based sphere with serious growth potential.



## KEY EVENTS HIGHLIGHTS



### BIOECONOMY TRANSFORMATION PROGRAMME WORKSHOP SARAWAK

In an effort to extend the outreach of the Bioeconomy Transformation Programme (BTP), BiotechCorp in collaboration with Sarawak State Planning Unit (SPU) organised a two-day BTP Workshop to identify potential bio-based projects in Sarawak that could be included under the BTP. The workshop was also targeted at creating visibility and awareness among local stakeholders on the BTP initiative in Sarawak.

The workshop, held from 10-11 June 2013, at the Hotel Pullman, Kuching, was officiated by the Deputy Secretary-General (Science and Technology) of Ministry of Science, Technology and Innovation, Professor Datin Paduka Dr. Khatijah Mohd Yusoff. With the participation of more than 100 representatives from the various sectors and agencies in Sarawak attended, a total of 27 new bioeconomy projects had been proposed at the end of the workshop.



## BIOECONOMY TRANSFORMATION PROGRAMME LAB SESSION SABAH

On 23 July 2013, the Bioeconomy Transformation Programme Lab Session Sabah was held at Pacific Sutera Resort, Kota Kinabalu. The objective of the lab session was to further assess and evaluate the most promising projects identified during the Mini Bioeconomy Transformation Programme (BTP) Sabah Workshop.

The project owners for seven bio-based projects from Sabah were invited for an intensive session to detail out project specifics, particularly to identify quantitative economic impacts, commercial feasibility, action plans and timelines. At the end of the lab session, three of the shortlisted projects had been successfully detailed and will undergo a final pre-evaluation process before being presented to the BTP Technical Working Committee for review.



## BIOECONOMY TRANSFORMATION PROGRAMME LAB SESSION SARAWAK

As a follow-up to the Bioeconomy Transformation Programme Workshop in Sarawak, nine project owners were invited to attend the Bioeconomy Transformation Programme (BTP) Lab Session at the Pullman Hotel, Kuching on 24-25 July 2013.

At the lab session, an intensive discussion was conducted to detail out the necessary project specifics, particularly to identify quantitative economic impacts, commercial feasibility, action plans and timelines. Six of the shortlisted projects successfully detailed out and will undergo a final pre-evaluation process before being presented to the BTP Technical Working Committee for review.



## KEY EVENTS HIGHLIGHTS



### BIOECONOMY TRANSFORMATION PROGRAMME WORKSHOP NORTHERN REGION

In a proactive effort to broaden the outreach of the Bioeconomy Transformation Programme (BTP) to the Northern Region states of Perlis, Kedah, Penang and Perak, BiotechCorp in collaboration with Northern Corridor Implementation Agency (NCIA) have organised a two-day Bioeconomy Transformation Programme Workshop in Penang.

Held on the 29-30 August 2013 at the Koridor Utara Biotech Centre, Penang Science Park, the main focus of the workshop is to identify prospective bio-based projects in the Northern Region with significant socio-economic value to be integrated under the BTP. The workshop also aims to create visibility and awareness on the BTP among local stakeholders in the Northern Region. About 100 participants from the various sectors and agencies in Perlis, Perak, Kedah and Perak attended the workshop and have successfully identified 28 proposed bioeconomy Trigger Projects. A BTP Lab Session Northern Region will be organised by the end of 2013 to further evaluate projects with the highest potential.

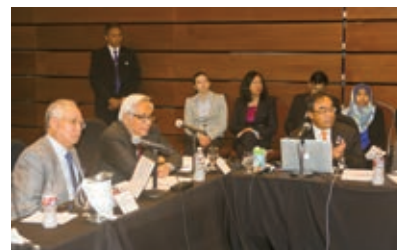




## MALAYSIA BIOTECHNOLOGY INTERNATIONAL ADVISORY PANEL (BIO-IAP) 2013 MEETING

On 24 September 2013, the Biotechnology International Advisory Panel (BIO-IAP) meeting was held in San Francisco, United States. The meeting was chaired by the Y.A.B. Prime Minister Dato' Sri Mohd Najib bin Tun Abdul Razak and attended by representatives of various Malaysian ministries, senior government officials and international expert advisors. The bioeconomy took centre stage at this year's BIO-IAP meeting as the members sought to address challenges for Malaysia's bioeconomy in enhancing national competitiveness and to contribute significantly to Malaysia's economic growth. In conjunction with the meeting, a host of announcements relating to bioeconomy development were made and witnessed by the Prime Minister Dato' Sri Mohd Najib bin Tun Abdul Razak:

- Announcement of an allocation of RM85 million for Bioeconomy Transformation Programme funding in an effort to develop Malaysia's bioeconomy
- Announcement of the Bioeconomy Malaysia Accelerator Programme, involving stakeholders collaborations with the Economic Corridors, universities, research institutions, finance institutions and inter-ministerial collaborations, to develop the bioeconomy
- The launch of the California Institute for Quantitative Biosciences (QB3) Malaysian Bio-entrepreneurship Accelerator Programme, one of the implementation strategies to create a conducive environment for Malaysian businesses to become global in scale and skill
- Announcement of BiotechCorp's awarding of BioNexus status to Verdezyne, and Verdezyne's significant investment in a planned biochemical production facility in Malaysia
- The exchange of a collaboration proposal between BiotechCorp and Michigan State University to strengthen and support the US-Malaysia Bioeconomy business and research communities



# MOVING FORWARD

---

AS WE ASPIRE TO BECOME A DEVELOPED NATION BY 2020, THE FOCUS ON BIOECONOMY IS TO BE ABLE TO PROVIDE SUSTAINABLE GROWTH AND PROSPERITY TO THE NATION. WITH THE INITIATION AND IMPLEMENTATION OF THE BIOECONOMY TRANSFORMATION PROGRAMME IN 2012, MALAYSIA HAS ACCELERATED ITS FOCUS FROM COMMODITY BUSINESSES INTO HIGHER VALUE PRODUCTS, VALUE-ADDED BY BIOTECHNOLOGICAL AND MODERN TECHNIQUES.



## Enriching the Nation, Securing the Future

Moving forward, BiotechCorp with the support of the Ministry of Science, Technology and Innovation will continue to build on the established momentum to attract greater private and public participation. In 2014, BiotechCorp will continue to promote and nurture the bioeconomy business environment via stakeholder engagement, promotion and awareness, and establishment of industry linkages at all levels.

The Bioeconomy Transformation Programme (BTP) will continue to engage the economic corridors and incubators, universities and research institutions, corporations and government-linked companies, financial and funding institutions, state development agencies and all related ministries to initiate collaborative bioeconomy clusters for wealth creation and share the benefits of bioeconomy throughout the country.

BTP Workshops and Lab Sessions have already been planned for the East Coast Region and Southern Region in 2014. Concurrently, BiotechCorp will also proactively look towards developing other aspects of the bioeconomy ecosystem through the establishment of new bioeconomy partnerships with networks and collaborators within the country and globally.

By optimising the nation's competitive edge through stakeholder engagement as well as private and public participation, BiotechCorp is confident that Malaysia will continue to strengthen and propel its local bioeconomy ecosystem to deliver the socio-economic benefits of bioeconomy for 2020 and beyond. With the implementation of bioeconomy, Malaysia will become a smart, sustainable and inclusive economy.



**MALAYSIAN BIOTECHNOLOGY CORPORATION SDN BHD  
(BIOTECHCORP)**

Level 23, Menara Atlan,  
161B, Jalan Ampang, 50450 Kuala Lumpur, Malaysia

[www.bioeconomy.my](http://www.bioeconomy.my)

Tel: +603 2116 5588 Fax: +603 2166 5528  
Email: [bioeconomy@biotechcorp.com.my](mailto:bioeconomy@biotechcorp.com.my)