



Photo Credit: Idaho National Laboratory via Flickr

Scaling up Biotechnology and Bioenergy for Southeast Asia's Energy Transition

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Bioenergy is one of the many diverse resources available to help meet our growing demand for energy. It is a form of renewable energy that is derived from biological sources. [Modern bioenergy](#) is currently the largest source of renewable energy globally, accounting for 55% of the world's total renewable energy supply and over 6% of the global energy supply. From biofuels to energy-efficient processes, biotechnology manages to provide cleaner and more sustainable bioenergy products. For example, it allows scientists to manipulate the [genetic makeup of plants](#) to enhance their characteristics for biofuel production. This includes improving traits such as biomass yield, stress tolerance, and the composition of plant material to maximise energy content.

Biotechnology and Its Role in Sustainable Energy Production

One of biotechnology's most prominent contributions to the energy sector is its aid in the development of biofuels. [Biofuels](#), increasingly being used to replace fossil fuels, are liquid fuels or blending components made from biomass materials known as *feedstocks*. They can include methane derived from landfill gas, as well as biogas and hydrogen produced from renewable resources. While biofuels are primarily used as transportation fuels, they can also serve purpose such as heating and electricity generation. By using biological processes, biotechnology enables the [conversion of organic materials](#), such as algae, agricultural waste or other biomass, into renewable energy resources. In addition, advancement in [genetic engineering](#) have allowed scientists to optimise microorganisms and plants for more efficient production of bioenergy, thereby increasing yield and lowering costs.

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[New projects](#) are emerging around the world. One such initiative is a biorefinery project by Honeywell in collaboration with USA BioEnergy, which aims to convert wood waste into sustainable aviation fuel (SAF). This US\$2.8 billion venture, part of a 20-year agreement with Southwest Airlines, is expected to produce 680 million gallons of SAF, addressing the growing demand for cleaner aviation fuels.

Biotechnology is used to support the design, optimisation and [operation of biorefineries](#), which convert biomass into a variety of products, including fuels, chemicals, and materials. Enhancing biorefinery processes requires some fine-tuning measures such as adequate temperature, pH, and nutrient levels, along with integrating multiple operations such as fermentation, separation, and purification. Biotechnology utilises computational models and simulation software to design and refine these processes, while sensors and automation systems enable real-time monitoring and control of production.

Southeast Asia's Bioenergy Production

Southeast Asia has a strong need to decarbonise its economies and modernise its energy systems. In 2018, around 80% of primary energy demand in the region was met by fossil fuels such as oil, coal and gas. A recent study by the International [Renewable Energy Agency](#) demonstrates an abundance of untapped [bioenergy](#) in Southeast Asia, with at least 7.1 EJ of bioenergy per year by 2050. Southeast Asia, with its vast agricultural base, can leverage biotechnology to convert organic materials like palm oil, sugarcane, and rice husks into biofuels.

According to the [ASEAN Energy Outlook](#), bioenergy in Southeast Asia is expected to grow significantly, reaching 11.5% of total power generation capacity by 2050, up from 3.4% in 2020. Promoting the switch to bioenergy in the transportation sector would reduce reliance on imported oil, thereby enhancing energy security and reducing CO2 emissions.

In 2020, biofuel production saw its most substantial growth, reaching 222 times the level recorded in 2005. Indonesia, Malaysia, and Thailand have implemented policies to replace oil products with biofuels, particularly palm oil. Bioenergy can also be used in power plants, such as by incorporating 5% biomass feedstock in existing coal co-fired plants.

However, the production of biofuel feedstocks can have negative impacts on ecosystems, environments, and food supplies. Therefore, significant research and development (R&D) efforts are required to enhance the production of high-quality biofuel while minimising these adverse effects.

Ethical and Environmental Considerations

While Southeast Asia holds substantial bioenergy potential, the main challenge lies in implementing practical, technically feasible, and economically viable solutions that enable sustainable bioenergy production.

Despite the many benefits biotechnologies brings to the energy sector, it also poses risks.

There are ethical and environmental concerns regarding the use of biotechnology and bioenergy, particularly regarding the displacement of food crops by energy crops and the environmental impact of large-scale biofuel production. The benefits and risks of bioenergy need to be carefully balanced, with sustainability guarantees in place to attract more investment and increase consumer confidence. It is essential to ensure that bioenergy production does not come at the cost of environmental degradation.

The increasing integration of biotechnology into the energy sector necessitates a framework of governance that addresses both the opportunities and risks associated with these technologies.

Additionally, ethical considerations must be at the forefront of discussions surrounding biotechnology in energy. A proactive approach to risk assessment is needed to anticipate and mitigate any negative impacts biotechnology and bioenergy might have on ecosystems and communities.

By fostering collaboration among biotechnology, energy and environmental security experts, industry stakeholders, and policymakers, the energy sector can harness the full potential of biotechnology and bioenergy while minimising associated risks.

SUGGESTED READINGS

R. El-Araby (2024). *Biofuel production: Exploring renewable energy solutions for a greener future. Biotechnology for Biofuels and Bioproducts. Vol. 17, No. 10*

International Renewable Energy Agency (2022). *Scaling up biomass for the energy transition: Untapped opportunities in Southeast Asia. Abu Dhabi: IRENA.*

Soumitra Nath (2024). *Biotechnology and biofuels: Paving the way towards a sustainable and equitable energy for the future. Discover Energy. Vol 4, No. 8.*

M. Wang, X. Ye, H. Bi, et al (2024). *Microalgae biofuels: Illuminating the path to a sustainable future amidst challenges and opportunities. Biotechnology for Biofuels and Bioproducts. Vol. 17, No. 10.*

CLIMATE CHANGE



NEWS & COMMENTARIES

Takeaways from Hurricane Milton: The 'fingerprints of climate change'

Florida residents are reeling after Hurricane Milton swept across the state with roaring rains and winds, killing at least 18 people, wrecking more than 100 buildings and causing mass power blackouts. According to a flash study published by researchers at World Weather Attribution, human-caused climate change can be blamed for boosting Milton's rainfall 20 to 30 percent as well as for amplifying its winds by about 10 percent.

Al Jazeera

12 October 2024

Will climate change turn shipwrecks to polluters?

As climate change increases, more extreme storms are created and ocean temperatures rise, meaning shipwrecks - some with fuel in - are degrading fast. Wrecks with fuel remaining onboard could pose serious pollution problems as the metal breaks down.

Rowenna Hoskin

BBC | 13 October 2024

War, trade tensions, politics and economics: The global factors shaping our response to climate change

Are armed conflicts, trade tensions and political shifts hurting our ability to tackle climate change? The declining costs of energy-transition technologies can help counter those forces.

Ian Shine

World Economic Forum | 14 October 2024

Climate change finance could land at 'hundreds of billions', COP29 leaders say

Trillions of dollars are needed to help address the causes and impacts of climate change, but leaders of the upcoming COP29 say that "hundreds of billions" is realistic for a consensus decision. Negotiators will meet to agree on a new financing goal to replace wealthy nations' current commitment to provide \$100 billion each year in climate finance to developing countries.

Gloria Dickie and Nailia Bagirova

Reuters | 14 October 2024

SELECTED PUBLICATIONS

Climate change psychological distress is associated with increased collective climate action in the U.S.

Many Americans are experiencing psychological distress from climate change, and those who do are more involved in collective climate action. People experiencing such distress may benefit from resources to support mental health and engagement with climate change.

Matthew T. Ballew, et al.

npj Climate Action 3:88 | 2024

Climate change key driver of catastrophic impacts of Hurricane Helene that devastated both coastal and inland communities

Climate change is enhancing conditions conducive to the most powerful hurricanes like Helene, with more intense rainfall totals and wind speeds. This is in line with other scientific findings that Atlantic tropical cyclones are becoming wetter under climate change and undergoing more rapid intensification.

Ben Clarke, et al.

World Weather Attribution | 2024

EVENT & ANNOUNCEMENT

Sixteenth meeting of the Conference of the Parties to the Convention on Biological Diversity (COP 16)

At COP 16, governments will be tasked with reviewing the state of implementation of the Kunming-Montreal Global Biodiversity Framework. Parties to the Convention are expected to show the alignment of their National Biodiversity Strategies and Action Plans with the Framework. COP 16 will further develop the monitoring framework and advance resource mobilisation for the Global Biodiversity Framework.

Cali, Colombia

21 October -1 November 2024

ENERGY SECURITY



Photo Credit: freepik.com

NEWS & COMMENTARIES

Over 500 GW of solar power to be installed in 2024

The world is on track to install 593 gigawatts (GW) of solar power this year, which is 29% more than what was installed last year.

Asian Power

20 September 2024

Energy technologies and decarbonisation in South-east Asia

Across Southeast Asia, governments face a gap between aspirations and reality. They must contend with growing demand that will require major investments not only in mature renewables but also in unproven emerging technologies including small modular nuclear reactors (SMRs) and carbon capture.

Lauren Mai and Andreyka Natalegawa

CSIS | 30 September 2024

The transition to Net Zero emissions: Competing perspectives on the use of nuclear power

Climate change, geopolitical risks linked to fossil fuel imports, and dependence on unreliable energy-exporting countries have revived plans for expanding nuclear power use worldwide. However, the global dependence on Russia's nuclear fuel supply chain, cost-competitiveness, and uncertain promises of Small Modular Reactors have also raised doubts about whether the global nuclear plans will be realised.

Frank Umbach

RSIS Commentary | 30 September 2024

As interest in nuclear energy heats up, Southeast Asia countries are closely watching each other's moves

Research and development into nuclear energy has been going on in Southeast Asia for the past 40 years or so but the region is still far from getting its first operational nuclear power plant, experts say.

Taufiq Zalizan and Nikki Yeo

Channel News Asia | 7 October 2024

SELECTED PUBLICATIONS

Renewable energy and jobs: Annual review 2024

The headline finding of this edition is that renewable energy employed 16.2 million people directly and indirectly in 2023. This number represents a dramatic rise from 7.3 million in 2012, with the biggest contributions from solar photovoltaic (PV) installations, wind power, hydropower and bioenergy.

IRENA and ILO

2024

The elusive quest for sustainable mini-grid electrification: New evidence from Indonesia

This report finds that many "mini-grids" for rural electrification in Indonesia did not operate properly a few years after commissioning. This finding corroborating older concerns about the sustainability of mini-grids that have been voiced for several years.

Mike Duthie, et al.

Energy for Sustainable Development, Vol. 80 | 2024

EVENT & ANNOUNCEMENT

Asia Clean Energy Summit

ACES is the region's leading event focusing on clean energy technology, policy and finance supported by leading government agencies, research institutes and industry in Singapore.

Singapore

22-24 October 2024

FOOD SECURITY



Photo Credit: Freepik.com

NEWS & COMMENTARIES

India eases rice export curbs, cushioning global consumers

India's rice export restrictions previously led to rising food prices globally, creating potential for creating conflict and political instability in Asia and Africa. In September, following the recent elections and an over-supply of rice, the country loosened its export curbs.

Bloomberg

Business Times | 28 September 2024

Preparing the ground for national food security

El niño-related rice crop failures led to a 4 million tonne shortage in rice stocks in Indonesia. The article highlights potential areas for government support, including irrigation for water availability; supply chain measures to ensuring sufficient fertiliser availability; and modernisation through machinery, within a 'modern agricultural cluster'.

Azis Kurmala et al.

Antara News | 3 October 2024

Philippines seeks Vietnam's food security aid

Building on earlier interactions such as through the formation of a rice industry alliance, Philippine President Ferdinand Romualdez Marcos Jr. expressed his hope that Vietnam would keep supporting the Philippines in ensuring food security, during a meeting with Vietnamese Prime Minister Pham Minh Chinh in Vientiane, Laos.

Tieu Bac, Thanh Hien

Tuoi Tre News | 9 October 2024

The post-2025 ASEAN agrifood landscape: What next?

The ASEAN agrifood landscape has changed much since the ASEAN Vision and Strategic Plan of Action for Food, Agriculture and Forestry, 2016-2025 was announced. With new players and new influencing factors are now at the forefront, ASEAN will need to balance economic growth-related food security while safeguarding the environment while considering sustainable food systems that provide livelihoods for smallholder farmers and affordable, safe food for consumers.

Paul Teng

RSIS Commentaries | 10 October 2024

SELECTED PUBLICATIONS

Geostrategic dimensions of recent food policy decisions

This article, co-authored by RSIS Research fellow Jose Ma. Luis Montesclaros, explores whether a geostrategic shift in food policies could be observed amid COVID-19 and the Russia's war on Ukraine, in selected countries which were not directly implicated by the war. Briefly, such policy shifts have indeed occurred, but the context and domestic political trajectories strongly influence these developments.

Wieck, Rudloff, Mensah, Montesclaros, et al.

Applied Economic Perspectives and Policy | 2024

The decline and transformation of smallholders in Chinese agriculture: National trends

This article provides interesting insights using a nationally representative survey, such as the a 50% decline in agricultural labour force in China since 2001. It highlights the key challenge of inter-generational continuation of farming as a livelihood, given the aging workforce left behind.

Qian Forrest Zhang and Meiling Wu

The Journal of Peasant Studies | 2024

EVENT & ANNOUNCEMENT

Asia Pacific Agri-Food Innovation Summit

This event will focus on accelerating climate resilience and nutrition in Asia, a region that produces over half of the world's food. This is given that background that climate change is detrimentally impacting our food systems, causing unpredictable weather events affecting food production and supply worldwide.

Singapore

19-21 November 2024

HEALTH SECURITY



Photo Credit: Freepik.com

NEWS & COMMENTARIES

US is beefing up mpox testing, vaccine access against new strain, officials say

The U.S. has enhanced mpox testing, ensuring vaccine availability in pharmacies and health centres. While no cases of the more transmissible clade 1b strain are confirmed, experts are preparing after a WHO global health emergency declaration.

Julie Steenhuysen

Reuters | 7 September 2024

New USAID project award to improve local health security in Vietnam

On September 5, USAID granted \$21.5 million for a five-year project to enhance health security in seven Vietnamese provinces, focusing on disease surveillance, zoonotic prevention, and community engagement, pending government approval.

USAID

13 September 2024

14 million patients impacted by US healthcare data breaches in 2024

In 2024, over 14 million patients in the U.S. healthcare sector experienced data breaches due to ransomware attacks. Cybercriminals target healthcare organisations for their sensitive data, exploiting the urgent need to restore operations and expanding vulnerabilities through digital tool adoption.

James Coker

Info-Security Magazine | 24 September 2024

Superbugs could jeopardise food security for over two billion people and increase annual health care costs by US\$ 159 billion annually by 2050, finds most extensive modelling to date

A recent study warns that antimicrobial resistance (AMR) could jeopardise food supplies for over 2 billion people and raise healthcare costs by \$159 billion annually by 2050. Urgent investment in drug innovation and healthcare improvements is crucial to address these escalating threats.

World Organisation for Animal Health

26 September 2024

SELECTED PUBLICATION

Geospatial analysis of contagious infection growth and cross-boundary transmission in non-vaccinated districts of North-East Indian states during the COVID-19 pandemic

During the COVID-19 pandemic, India's northeastern region faced isolation due to lockdowns. Utilising geospatial analysis of 0.35 million cases, researchers found an uneven spread pattern, revealing dynamics that can inform targeted public health strategies in similar isolated areas.

Mousumi Gupta et al.

The Lancet Regional Health - Southeast Asia, Volume 28, 100451 | 2024

EVENT & ANNOUNCEMENT

15th Asian Post-Disaster Counselling & Psychological Support Conference (APDCPC) 2024

The conference shares insights on counselling, psychological support, and disaster education gained from assisting Asian disaster survivors. The conference brings together policymakers, educators, mental health experts, government officials, academics, and NGOs to enhance post-disaster and mental health support services to local and broader communities.

Johor Bahru, Malaysia

26-28 October 2024

HUMANITARIAN ASSISTANCE AND DISASTER RELIEF



Photo Credit: DFID - UK Department for International Development via Flickr.com/Creative Commons

NEWS & COMMENTARIES

From vision to action: Envisioning Quad-ASEAN partnership for regional resilience

As ASEAN faces growing pressure to achieve its Vision 2025 for disaster management and meet the Sendai Framework targets by 2030, the Quad's focus on regional HADR cooperation, even without directly referencing ASEAN, underscores the importance of aligning efforts to bolster regional resilience.

Keith Paolo C. Landicho

IDSS Paper | 27 September 2024

US emergency crews struggle as climate crisis fuels 'unprecedented' competing disasters

With the increasing scale of disasters and its back-to-back occurrences, federal resources are being continuously stretched thin. In order to prepare and adapt to the present, future planning is likely to become more essential.

Gabrielle Canon

Guardian | 9 October 2024

The case for digital disbursements: Making aid more efficient, flexible, and empowering in Asia Pacific

In post-disaster situations, it is key for aid to be distributed efficiently. With cash assistance rising in popularity, digital disbursements are the next step to ensure aid arrives quickly and at scale to those who need them most.

Aisling Quirke and Azrin Anuar Azlina

GovInsider | 14 October 2024

Why the Grand Bargain's future hinges on accountability

With change seemingly slowing down since 2016, the emphasis in this year's Grand Bargain meeting is on practicality. With several NGOs asking to be held accountable for promises missed and kept, as well as local NGOs pushing for 'local reference groups', accountability is a key.

Irwin Loy

The New Humanitarian | 15 October 2024

SELECTED PUBLICATIONS

Australia's humanitarian policy: Making a difference for people in crisis

This report outlines the new long-term direction and focus for Australia's humanitarian action. Maintaining a focus on the Indo-Pacific, it highlights three priorities: building readiness and preparedness, responding to crises, as well as reinforcing the international humanitarian system by adhering to international law.

Government of Australia

2024

Operating in crisis: 2023 annual report

In a year in which not just natural hazards, but conflicts raged around the world, the fragility of the global landscape was underscored. This highlighted the need for immediate and ongoing humanitarian response, testing global resolve and capability.

IOM

2024

EVENT & ANNOUNCEMENT

Summit of the Future

The recently held Summit of the Future aimed to accelerate efforts to meet our existing international commitments, and take concrete steps to respond to emerging challenges and opportunities. Countries around the world came together to discuss ways to mend eroded trust and demonstrate that international cooperation can effectively achieve agreed goals and tackle emerging threats and opportunities.

Recorded Conference

MIGRATION



Photo Credit: Wikimedia Commons

NEWS & COMMENTARIES

NTUC launches S\$2.5 million fund to help migrant workers upskill

The new fund will support some 6,600 migrant workers in upskilling themselves for better career advancement and higher wages, by taking courses such as forklift operation, technology application and construction work supervision in workplace safety and health.

Tessa Oh

The Business Times | 18 September 2024

Informal status of migrant workers may put them at risk of abuse, says ASEAN Gender Outlook 2024

The ASEAN Gender Outlook 2024 highlighted that migrant women, especially domestic workers and others living in the same household as their employers, are disproportionately at risk of sexual violence.

Soo Wern Jun

Malay Mail | 2 October 2024

G7 ministers adopt plan to clamp down on trafficking of migrants

As part of efforts to tackle irregular migration, G7 countries will set up specialised police units to investigate trafficking of migrants. The three-day meeting of G7 interior ministers also focused on threats arising from the crises in the Middle East and Ukraine.

Angelo Amante

Reuters | 4 October 2024

Lebanon's migrant workers stuck in limbo as thousands flee conflict

On 4 October, UN officials updated that most of Lebanon's 900 shelters were full, highlighting concern for tens of thousands of mostly female domestic workers being abandoned by their employers and left stranded.

The Straits Times

6 October 2024

SELECTED PUBLICATIONS

Making migration work for climate adaptation: Classifying remittances as climate finance

This policy report argues that climate-vulnerable populations should be given preferential access to labour migration programmes by countries of destination; and that this could be incentivised by classifying some remittances as mobilised private climate finance.

Center for Global Development

2024

Migration in Myanmar: Moving to cope

This report provides a comprehensive analysis of the migration patterns emerging across different states and regions in Myanmar. It also warns of the risk of further out-migration if employment opportunities within Myanmar do not improve.

United Nations Development Programme

2024

EVENT & ANNOUNCEMENT

Migrant Domestic Workers - Working in Freedom, Mobility with Choice

This webinar discusses the progress made and challenges faced by migrant domestic workers in accessing trade unions and expanding spaces for collective bargaining. Other topics covered include fair recruitment related challenges in sending and receiving countries and approaches developed by the International Labour Organisation (ILO) and IDWF.

Recorded Webinar

2024