

Promoting Innovation in the Bioeconomy

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Ministry of Economy, Trade and Industry (METI)

Oct. 10. 2023

Usage of Biomanufacturing contributing to the environmental issues



For Decarbonization, Forest preservation,
Preventing marine pollution

■ High functional material / Bio fiber

Fiber products made from proteins produced by microorganisms. No microplastics are generated during washing, and the generated laundry scraps are biodegradable, contributing to the prevention of marine pollution.

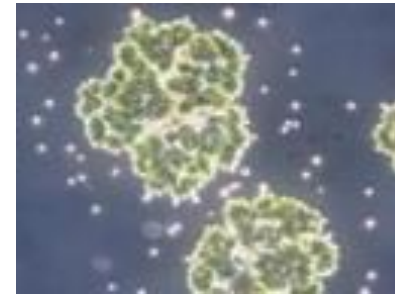
 Spiber



For Preventing water
pollution and
resource depletion

■ Bio fertilizer

Agricultural materials made from microorganisms in soil that promote plant growth.



For Decarbonization

■ Bio fuel / SAF

Fuel derived from plants and microorganisms without using petroleum resources

 Total energies

 Royal Dutch Shell

 Bayer

For Decarbonization

■ Imitation meat / Cultured meat

Meat made from plant-derived proteins or cultured animal cells.




For Decarbonization


■ Bio chemical

Raw materials of rubber products and bioplastic made from renewable resources such as sugar

 Versalis

 Bioamber

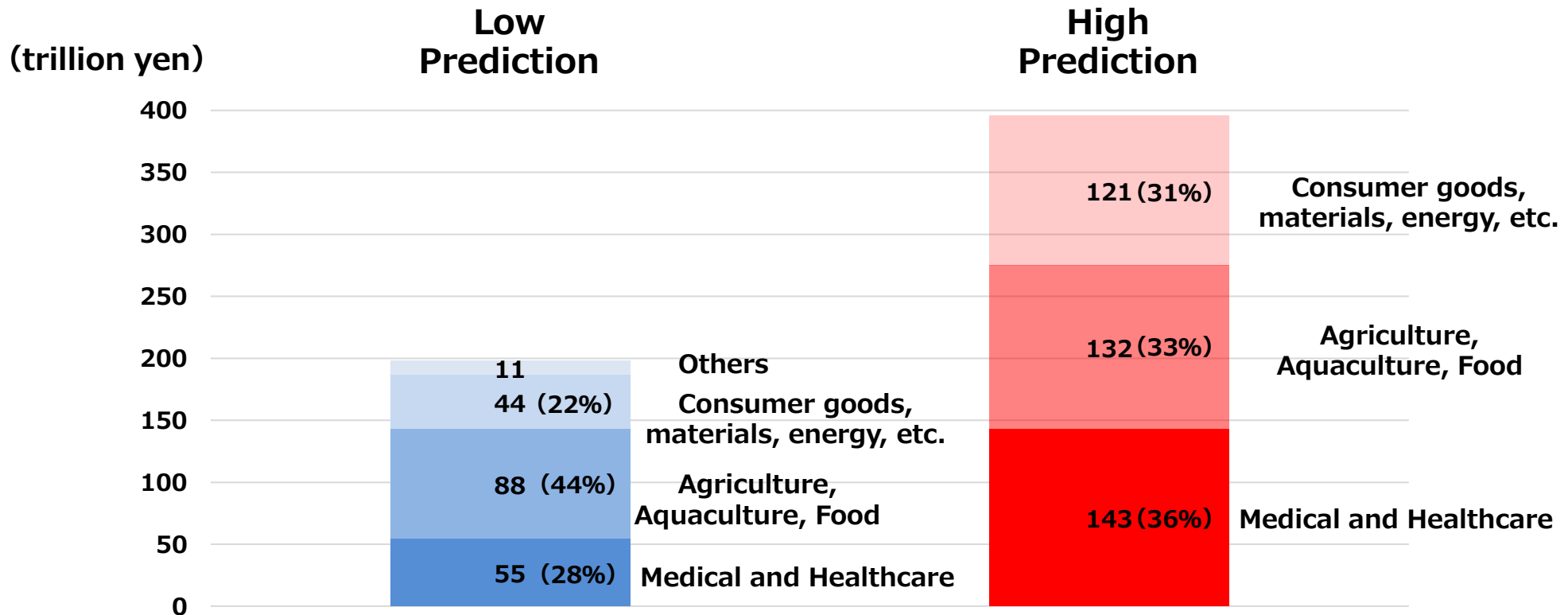


 Impossible Foods

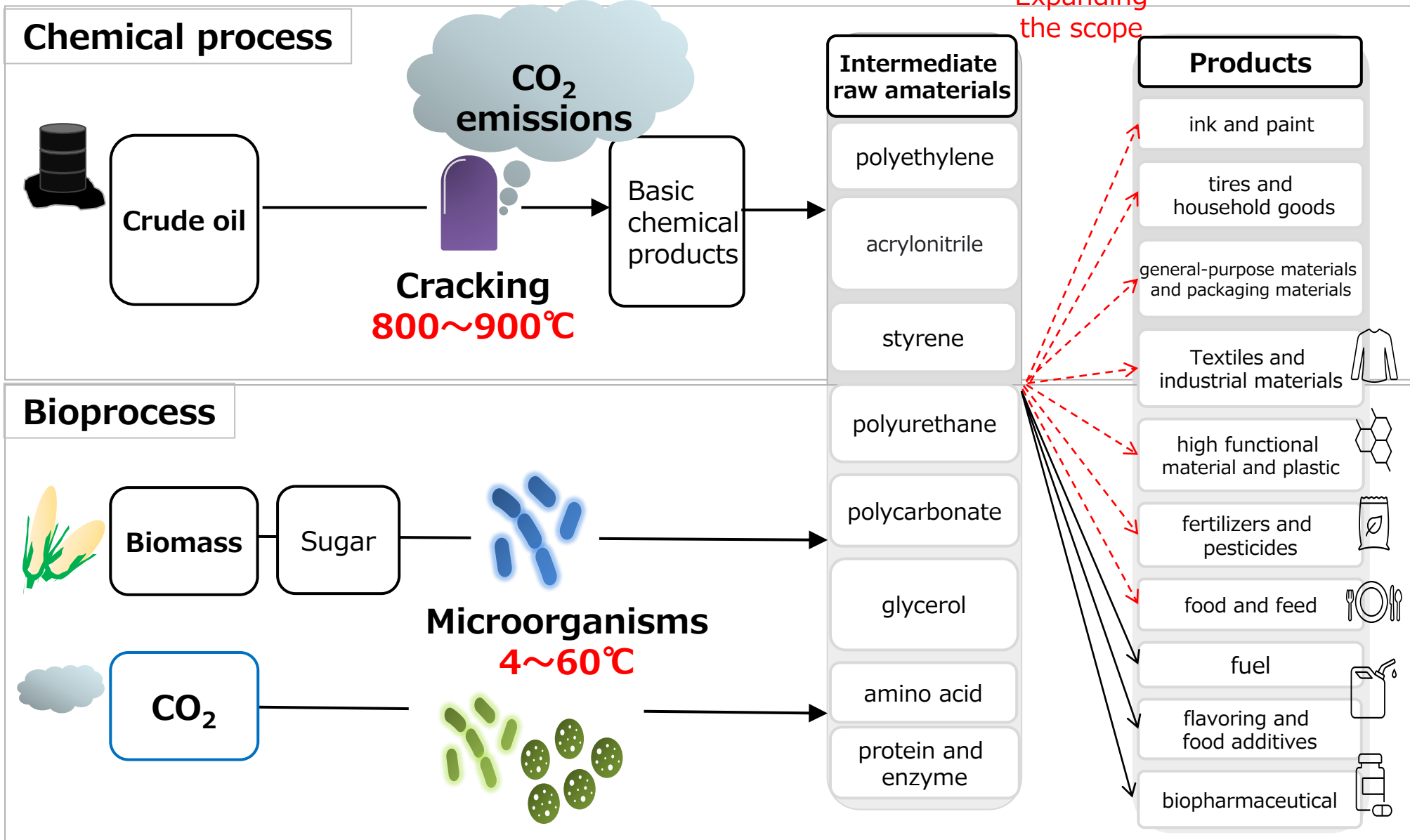
Market sectors expected to grow by biotechnology

- Analysis by McKinsey[†] predicts that the global market for the bioeconomy will reach 200 trillion yen to 400 trillion yen in 2030-2040.
- In addition to medical and healthcare, high growth is projected in the material, energy, and food sectors.

Bioeconomy growth forecast (2030-2040)



Conversion from Chemical process to Bioprocess



Economy

Economic growth



QOL



Social issues



Global warming



Resource shortage



Food crisis



Ocean pollution

Conflict?

Compatibility through **synthetic biology (biotechnology)**

||
Solution

Summary of bioeconomy strategy 2019

- As worldwide attention is paid to biology due to changes in situation such as the pandemic or climate change, promoting bioeconomy is ever more important
- Bioeconomy Strategy has three featuring points to “realize the most advanced bioeconomy society by 2030”
 - i) Promote **market segment measures to achieve 92T yen market size by 2030** in the fields of bio-manufacturing, primary production and health care
 - ii) Create outstanding **bio-communities** and attract human resources and investment and enable new products and services
 - iii) Draw up **guidelines for data linkage and usage** by the end of FY2022 and establish R&D and market introduction platform
- International collaboration is essential to promote bioeconomy, and there is high potential for creating synergies among states sharing fundamental values

Global Bio Community



バイオコミュニティ関西 (BiocK)

事務局：NPO法人近畿バイオインダストリー振興会議
公益財団法人都市活力研究所



Osaka, Kyoto, Kobe

京都大学
京都大学iPS細胞研究所 (CiRA)
京都大学iPS細胞研究財団 (CiRA_F)
理化学研究所 (けいはんな)
地球環境産業技術研究機構 (RITE)
京都リサーチパーク (KRP)

大阪大学
大阪公立大学
医薬基盤・健康・栄養研究所
国立循環器病研究センター
産業技術総合研究所 (関西センター)
理化学研究所 (吹田)
彩都、健都、中之島
関西医薬品協会、道修町
近畿バイオインダストリー振興会議
都市活力研究所、LINK-J WEST

神戸大学
理化学研究所 (神戸)
神戸医療産業都市 (KBIC) / スーパーコンピュータ「富岳」
先端バイオ工学推進機構 (OEB)
次世代バイオ医薬品製造技術研究組合 (MAB)
バイオロジクス研究・トレーニングセンター (BCRET)
播磨科学公園都市 / 大型放射光施設「Spring-8」



Greater Tokyo Biocommunity

事務局：一般財団法人バイオインダストリー協会 (JBA)



Tokyo, Kanagawa, Chiba

③本郷・お茶の水・東京駅エリア
東京大学 (本郷) や東京医科歯科大学
など、東京圏最大のアカデミア集積地

④日本橋エリア
バイオ・製薬産業と研究・臨床・情報・開発
の連携機能が集積するライフサイエンス
ビジネス拠点

⑤川崎エリア
羽田空港直結のキングスカイフロント
など、研究開発から新産業を創出
するオープンイノベーション都市

①つくばエリア
筑波大学をはじめとする多様な
研究機関・企業等が集積する
世界的サイエンスシティ

⑥横浜エリア
東京工業大学 (すずかけ台) や
横浜市立大学先端医科学研究
センターなど、産学官金による健康・
医療分野のイノベーション都市

②柏の葉エリア
東京大学 (柏) や国立がん研究
センター、千葉大学 (柏の葉) など、
新産業創造、健康長寿、環境
共生を軸とするイノベーション
キャンパスタウン

⑦湘南エリア
世界最大級のライフサイエンス研究
施設である湘南ヘルスイノベーション
パークを核に、隣接病院や周辺地
域とも連携する産官学医のオープ
ンイノベーション拠点

⑧千葉・かずさエリア
かずさDNA研究所、千葉大学など、
最先端ゲノム研究による植物・免疫
医療等の推進拠点

5. Kawasaki Area

The Open Innovation City with Direct Access to Haneda Airport



3. HOTS HILL

(Hongo/Ochanomizu/Tokyo Station Area)
 The Largest Concentration of Academia in GTB



From Press Release

4. Nishi-Shinjuku Area

Global life science business hub in the heart of Tokyo



From LINK-J HP

1. Tsukuba Area

The Biggest Science City with Various Institutions

From brochure



6. Yokohama Area

Innovative City Focusing on Health and Medical Care



7. Shonan Area

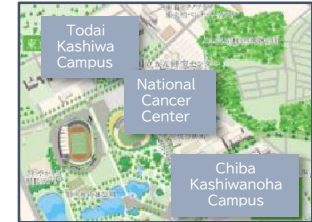
An Innovation Hub with the Largest Wet Lab, in Collaboration with Neighboring Hospitals



Shonan Health Innovation Park

2. Kashiwanoha Area

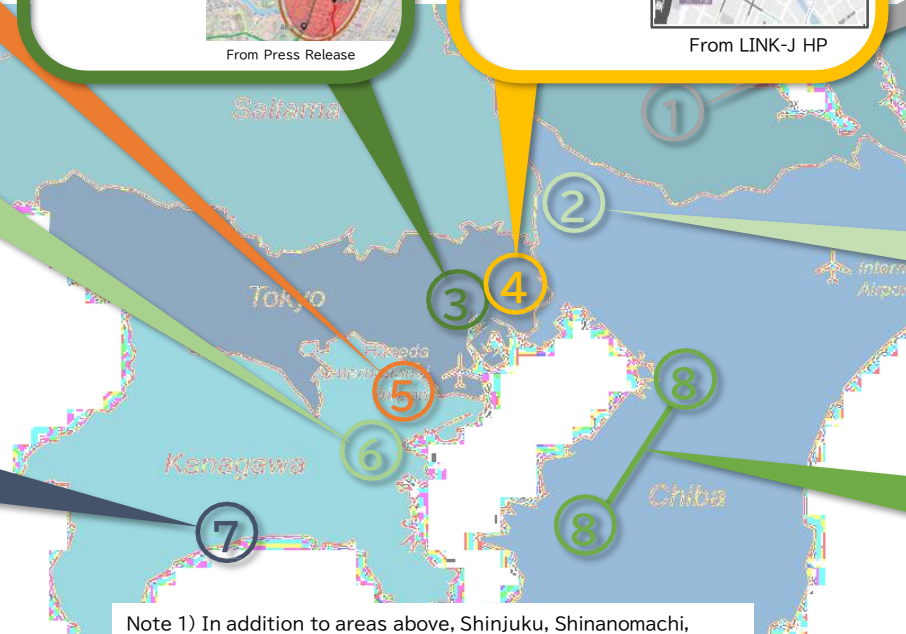
The Smart City with Top-Tier Universities and the National Cancer Center



From Kashiwanoha Smart City/HP

8. Chiba/Kazusa Area

The Research Base of Plant, Immunological Medicare and Biomanufacturing



Note 1) In addition to areas above, Shinjuku, Shinanomachi, Waseda, Tsukiji, Daiba, Tokorozawa, and Wako are emerging areas.

Note 2) As new areas are developed, area definition maybe restructured.

Biotechnological Transformation(BX) Strategy


II. BX Vision for Japan

A sustainable circular economy with capacity for renewal: Society 5.0 for SDGs

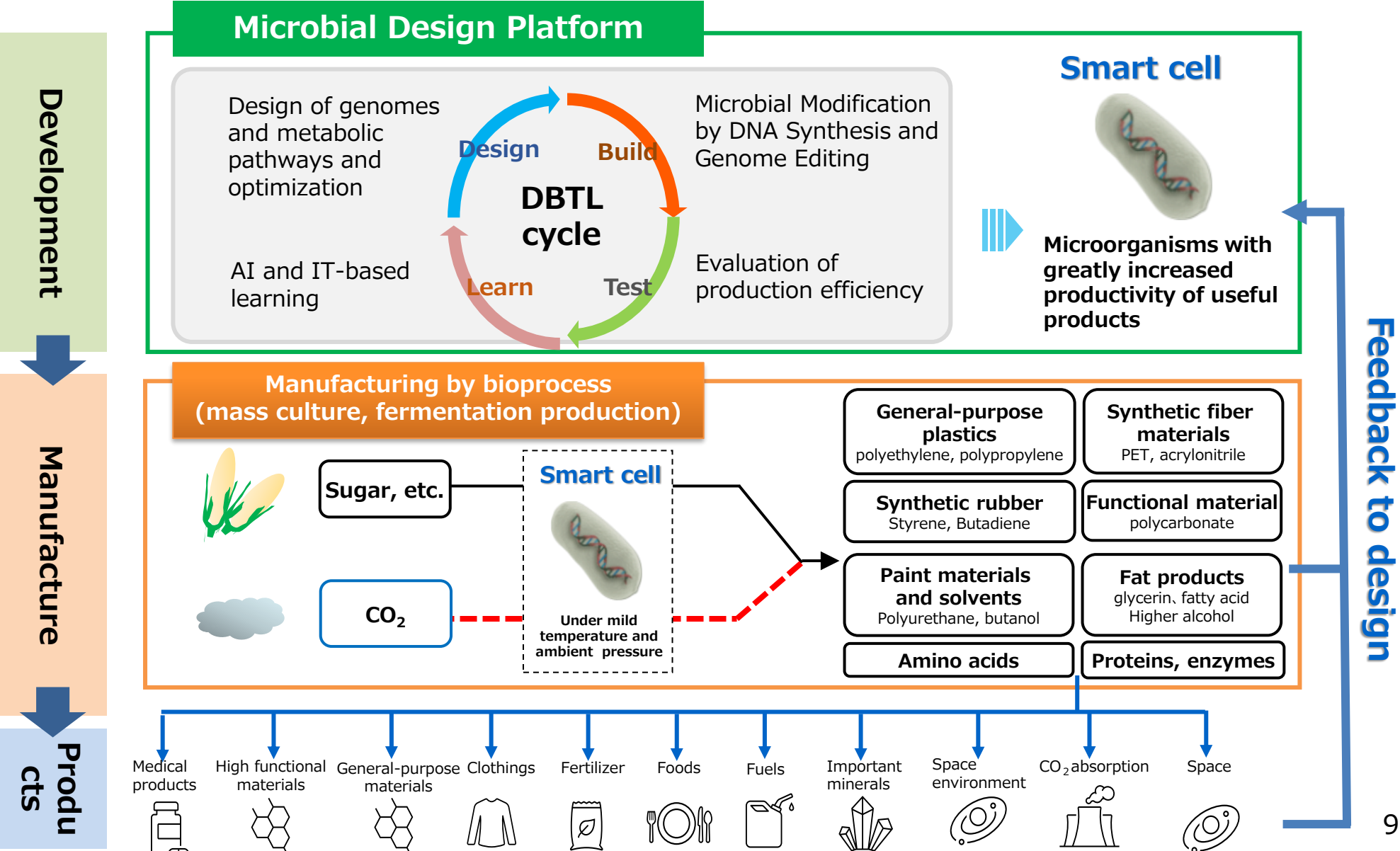


III. The Five Strategies

- It is vital that Japan be the first country in the world to put BX into practice
- We indicate the issues that are particularly important for Japan to quickly realize BX and declare our commitment to solve them

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1. Use biotechnology to **create value**: Build ecosystems
 2. Use biotechnology to **protect the Japanese public's way of life**: Ensure economic security
 3. Use biotechnology to **take a proactive role internationally**: Global rulemaking
 4. Position biotechnology as **a priority for the nation**: Integrate policymaking from a command center
 5. **Support** biotechnology **as an entire society**: Cultivate understanding among the public

Prospects for the Industrial Structure of Bio-Manufacturing



Biomanufacturing Initiatives

- The Kishida Cabinet has designated biomanufacturing as a key agenda item for the GOJ.
- The Ministry of Economy, Trade and Industry (METI) has established two funding programs for biomanufacturing. The total size of the funds is 500 billion yen (about \$3.5billion).
- These funding programs will be used for projects that produce a variety of target substances, such as high functional materials and biofuels, from CO2 and waste, etc.
- The program will foster a biomanufacturing industry that will diversify raw materials and products, and design and develop efficient substance-producing microbes (smart cells).

① Green Innovation Fund (176.7 billion yen)
 Development and demonstration of bio-manufacturing technology using CO2 as a raw material.

ex) CO2 microbe

plastic fuel synthetic rubber

② The Biomanufacturing Revolution Fund (300 billion yen)

- Circulate clothing and food residues through biomanufacturing.
- Promoting technological development for both solving social issues and strengthening competitiveness.

ex) waste fiber Escherichia coli

cashmere fiber

urban waste dirty mud Anaerobic bacteria

ethanol

Bio-Manufacturing Revolution Fund(300 billion yen)

Establish a bio-based manufacturing value chain

Unused domestic resources

Innovative bioproduction technology

Product diversification

Examples of social issues that could be solved

Waste fiber



Escherichia coli



Bio fiber
(Cashmere substitute)



Resource and water shortage



Joint development between BioPF and textile companies

Food waste



Municipal waste, sludge



Anaerobic bacteria



Essential chemicals
(ethanol, etc.)

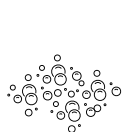


Resource and energy shortages

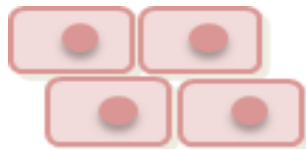


Joint development between BioPF and materials companies

Nutrient (e.g., sugar),
Growth factors



Animal cell



Dietary protein
(meat substitute etc.)

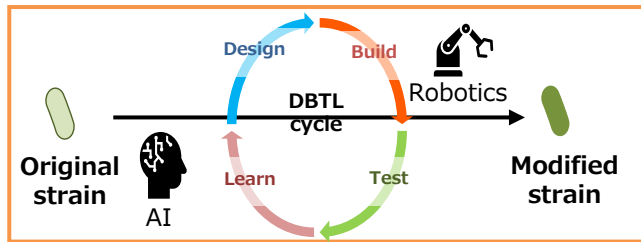


Food crisis

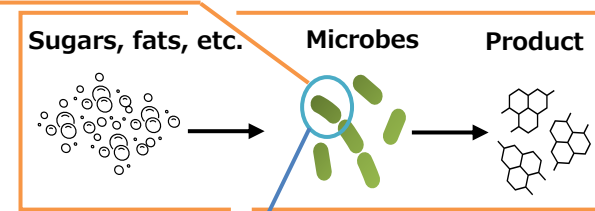


Joint development between BioPF and food companies

Bio-Manufacturing Revolution Fund(300 billion yen)



(1) Procurement of unutilized resources and demonstration of raw material conversion, etc.

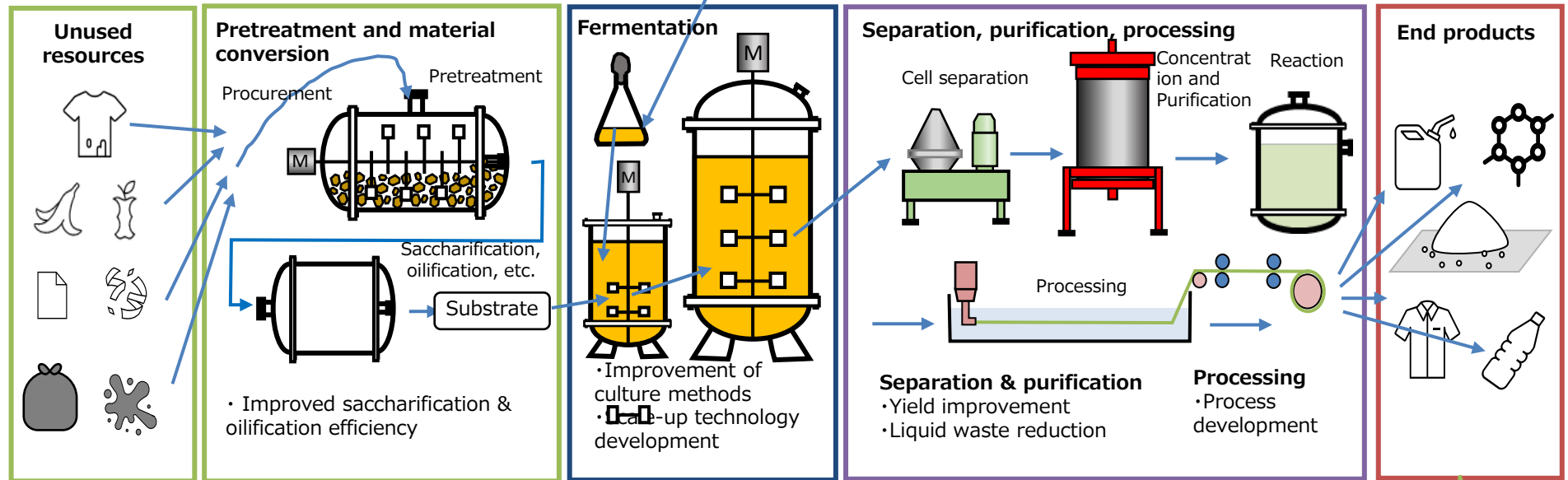


(2) Development and demonstration of production technology using microorganisms, etc.

(3) Development and demonstration of separation, purification, and processing technologies

(4) LCA and modification of product labeling, etc.

Microbial development efficiency and Improved efficiency of microbial material production



Scale-up and lower production costs

Stable supply of raw materials through establishment of domestic supply chain and advancement of pretreatment technology

Development of Biotech Human Resources

Skills required for each related area of biomanufacturing

	PF	Strain modification	Fermentation/ production	Separation/ purification/ processing	Standardi- -zation
Area	AI·bioinformatics		Chemistry		General engineering
	Robotics	Genetic engineering			
	Synthetic biology		Chemical and process engineering		
	Microbiology				

Enhancing Supporting Industry for bio-manufacturing



• DNA sequencer
(USA, CHN,
GBR)

• Electroporator
(DEU, USA)
• DNA/RNA
synthesizer (JPN)
• Genome editing
tools
(USA)

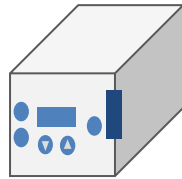
• Automated
equipment
(USA, DEU)
• LC-MS, GC-MS
(JPN, USA)
• NMR
(JPN, USA)

• Fermentation tank
(JPN)
• Spectrophotometer
(JPN)
• Ultrasonicator
(JPN)

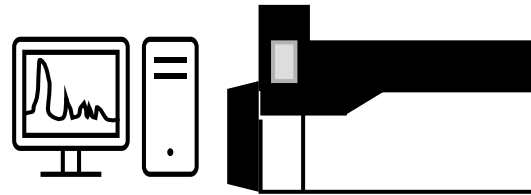
DNA sequencer



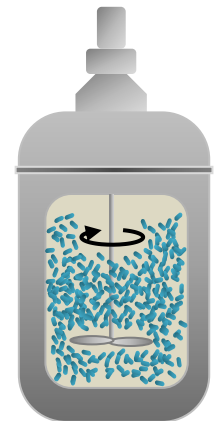
Electroporator · Cell fusion device



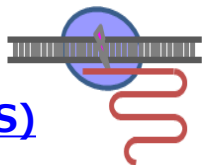
LC-MS, GC-MS



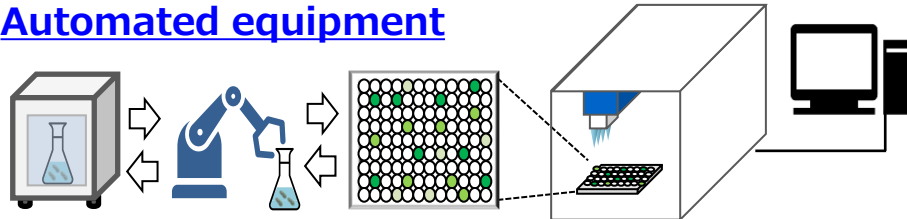
Fermentation tank



Genome editing tools
(e.g., CRISPER-CAS)



Automated equipment



Future actions for establishing bio economy

1. Cost Reduction and Efficient Bio Economy

Technology Development, Establish bio circular economy

2. Value Creation

Certification system for GHG emission reductions and carbon credits

3. Market Creation and Public acceptance

Standards of product labeling, Consumer communication

Import/export rules

Public procurement

Foster international understanding and formulate rules

- G7 (April 2023) forms common understanding that biomanufacturing is the key to solving climate change, resource scarcity, and other issues.
- To promote the formation of a global market for biomanufacturing, while communicating its advantages both domestically and internationally, and to promote related rule formation and standardization from an early stage.

G7 Climate, Energy and Environment Ministers' Communiqué (Sapporo, April 16, 2023)

78. Biomanufacturing :

We take note that biomanufacturing, which utilizes engineered microorganisms under contained use to produce various kinds of products, including materials, fibers, and fuels from recycled resources and CO₂, as an emerging technology that could, under certain circumstances and provided that appropriate measures are put in place, provide solutions to climate change and other issues such as resource shortages.

We will advance cooperation on these technologies.



OECD



Other bio-communities



(Global Biofoundry Alliance)



Global Standards for the [Bioeconomy](#)



International Advisory Council on Global Bioeconomy





Designing **Future Society** for **Our Lives**

April 13 – October 13, 2025