



IEA Bioenergy
Technology Collaboration Programme



Investments in biomass supply chains that could contribute to the post-COVID19 recovery

economic growth, jobs, resilient and cleaner energy systems

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IEA Bioenergy Webinar, 3 June 2021

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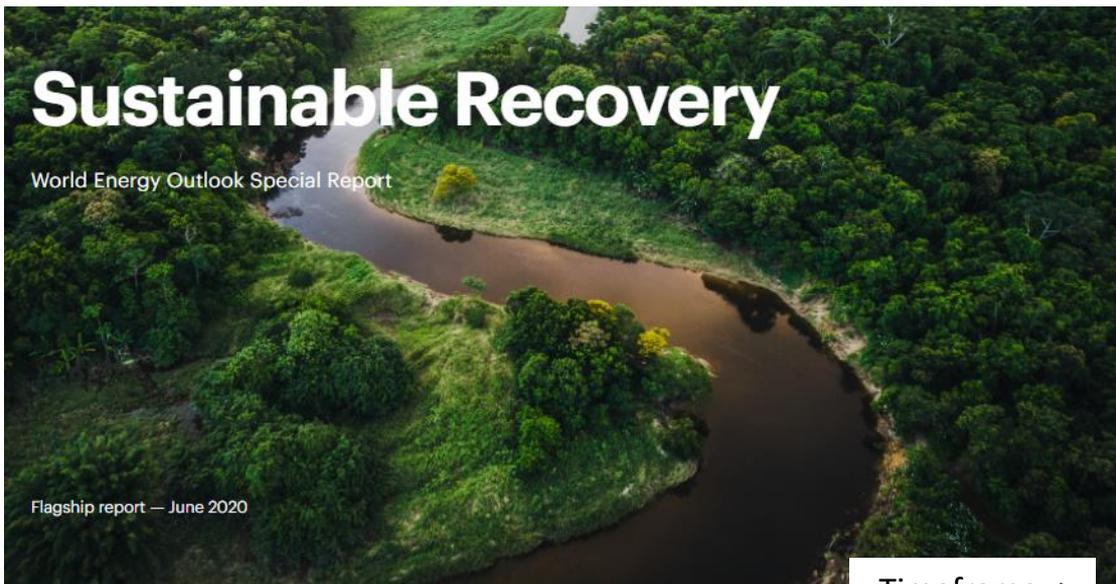
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Research team from IEA Bioenergy Task 43: Biomass supply for bioenergy within bioeconomy

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Aim of research

- to provide evidence - based advice, supported by expert opinion that would aid policy framing in a recovery programme and beyond
- How investments in biomass supply chains can contribute to the post-COVID19 recovery in terms of affecting:
 - Economic growth
 - Job creation
 - Resilient and clean energy systems
- In 4 possible futures (scenarios) that would occur short- (by 2023) and long- (by 2030) term.



Sustainable Recovery

World Energy Outlook Special Report

Flagship report — June 2020

☰ Contents

Cite

Timeframe ->

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In this report

[Overview](#)

[Covid-19 and energy: setting the scene](#)

[Evaluation of possible recovery measures](#)

[Electricity](#)

[Transport](#)

[Buildings](#)

[Industry](#)

[Fuels](#)

[Strategic opportunities in technology innovation](#)

[A sustainable recovery plan for the energy sector](#)

Since the scale of the economic crisis began to emerge, the IEA has been leading governments to make the recovery as resilient as possible. This means immediately addressing the core issues of global recession and soaring unemployment – and doing so in a way that also takes into account the key challenge of building cleaner and more secure energy systems.

Influence ->

As they design economic recovery plans, policy makers are having to make enormously consequential decisions in a very short space of time. These decisions will shape economic and energy infrastructure for decades to

"Governments have a once-in-a-lifetime opportunity to reboot their economies and bring a wave of new employment opportunities while accelerating the shift to a more resilient and cleaner energy future"

Dr Fatih Birol, IEA Executive Director

In response to calls from governments around the world, the IEA has produced a Sustainable Recovery Plan for actions that can be taken over the next three years. This detailed plan is focused on cost-effective measures that could be implemented during the specific timeframe of 2021 to 2023. It spans six key sectors – electricity, transport, industry, buildings, fuels and emerging low-carbon technologies. The plan takes into account national and international objectives for long-term growth, future-proofed jobs and sustainable development goals.

Based on rigorous analysis conducted in co-operation with the International Monetary Fund (IMF), the Sustainable Recovery Plan has three main goals: boosting economic growth, creating jobs and building more resilient and cleaner energy systems.

The Sustainable Recovery Plan is not intended to tell governments what they *must* do. It seeks to show them what they *can* do.

(...)

Governments have a once-in-a-lifetime opportunity to shape a better energy future.

Possible “futures” are...

Scenario planning for a post-COVID-19 world



By Professor [Michael R. Wade](#)



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The COVID-19 virus is sweeping across the world, leaving a trail of economic and social damage in its wake. Forward thinking organizations are starting to plan for a post-COVID-19 world. However, predicting what this world will look like is not easy. We

... determined by a combination of 3 factors:
Virus Longevity / Global Mindset / Digital Adoption



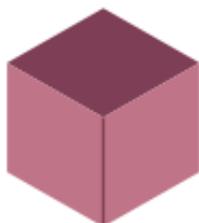
Global Marketplace

- Short-term virus longevity
- Global acceptance
- Digital acceleration



Digital Reset

- Long-term viral longevity
- Global acceptance
- Digital skepticism



Back to Basics

- Long-term virus longevity
- Global rejection
- Digital skepticism



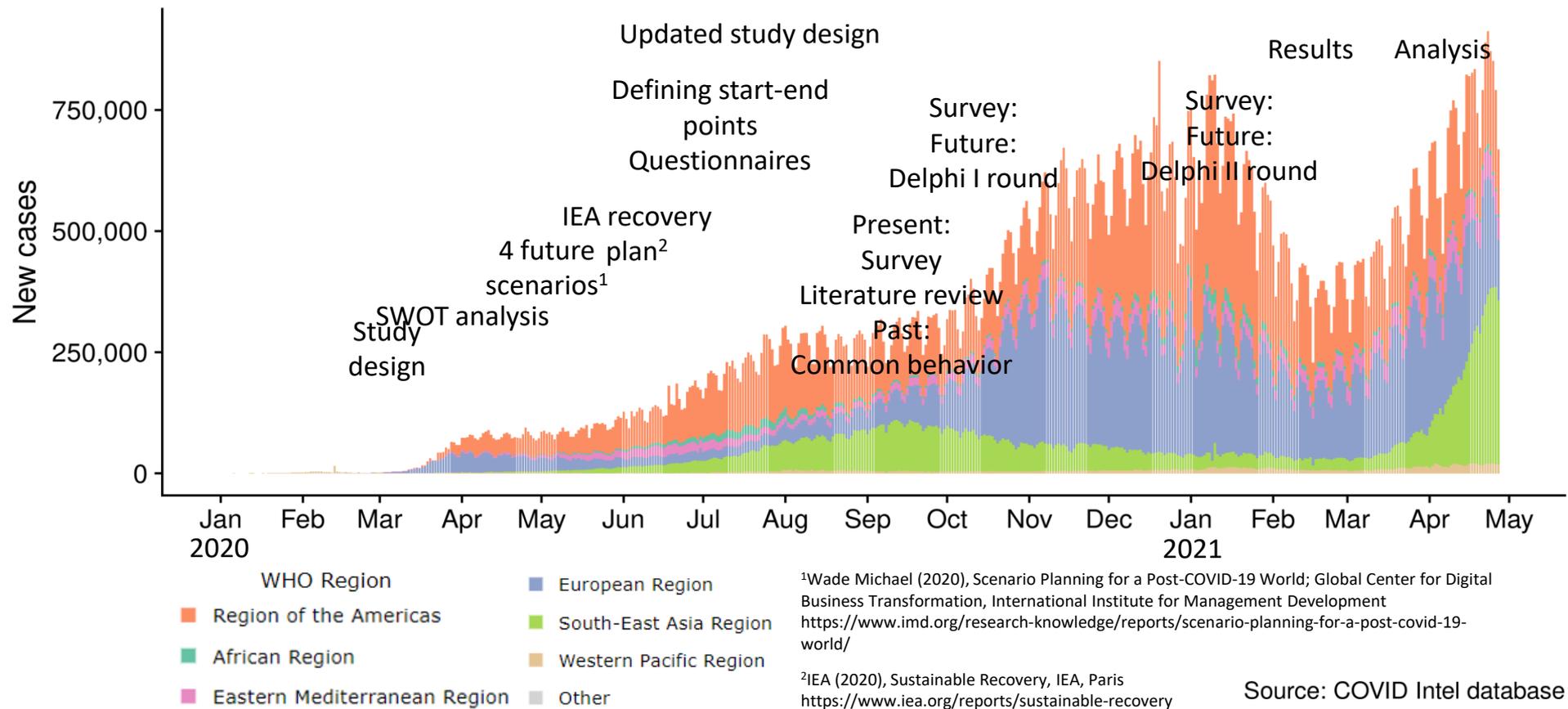
Walled Gardens

- Short-term virus longevity
- Global rejection
- Digital acceleration

Study design

- SWOT analysis on contribution of biomass supply chains to the economy, jobs and resilience without pandemic (similar to Global Marketplace scenario), from supply and demand side
- Foresight method 2-round Delphi to decide on the possible investments effect
- Moving ground: what is the effect of pandemic on biomass supply chains?
 - Study re-design to detect behaviour of biomass supply chains in pandemic
- Results built on different research streams (past, present, future)
- Discussion and policy recommendations

New confirmed cases, by date of report (n = 148,329,348)



Past: SWOT

- Strong local impact
 - Local supply / supply chain
 - Adds value for local land owners (farm and forest)
 - Diverse market for different quality of biomass
- Opportunities to improve land management - valorise waste and provide ecosystem services
- Act local with potential for local and global impact - reliable local energy
- Semi-perishable supply chain but reliable supply - can be managed to demand
- A range of mature technology solutions for safe investment
- Fit with emerging carbon constrained, bio, or circular economies

Present: Behaviour of biomass supply chains in pandemic



- Traditional assumptions of uncertainty do not account for event related to current pandemic
- Biomass supply has traditionally filled the role of renewable energy source, energy storage capacity, short supply chains (more local), sustainability, circular economy and net neutrality
- Current pandemic exposed limitations (short-run) and opportunities (long-run) in dealing with energy supply in general and the role of biomass in particular

Futures: Foresight with a Delphi study

- 1 wave: 23/49 experts from 3 continents completed the first survey (55% response rate)
- 2 wave: 13/23 or 56% experts provided feedback
- For the second survey, experts were only surveyed about responses that differed from the consensus.



Consensus

- Because of the continuous nature of the scales used, linked/proximate values were merged to accumulate >60% agreement required for consensus.
- Consensus serves as a compass to point towards a general impact of the investment
- The consensus range is provided descriptively
- Wave 1 Result: 84% consensus (208/248 responses)
- Wave 2 Result: 98.8% consensus (245/248)

Survey Section	Expert consensus (% agreement)			
	Wave 1		Wave 2	
	By 2023	By 2030	By 2023	By 2030
Economic Growth - Biomass Supply Chain Investments	15/20	13/20	20/20	19/20
Economic Growth - Investments in Technology and Infrastructure	18/24	21/24	24/24	24/24
Jobs - Investments in Biomass Supply Chains	33/36	27/36	36/36	34/36
Cleaner, Resilient Energy Sectors	33/36	34/36	36/36	36/36

Possible “futures” are...

... determined by a combination of 3 factors:

Virus Longevity / Global Mindset / Digital Adoption



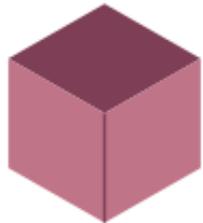
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The term "INVESTMENT" in this exercise covers a wide range of investments needed - from the investments in equipment and infrastructure to investments in R&D, know-how and education, soft loans and other types of market support to facilitate a policy since any market intervention is coupled with a cost.

Scenario planning for a post-COVID-19 world



By Professor [Michael R. Wade](#)



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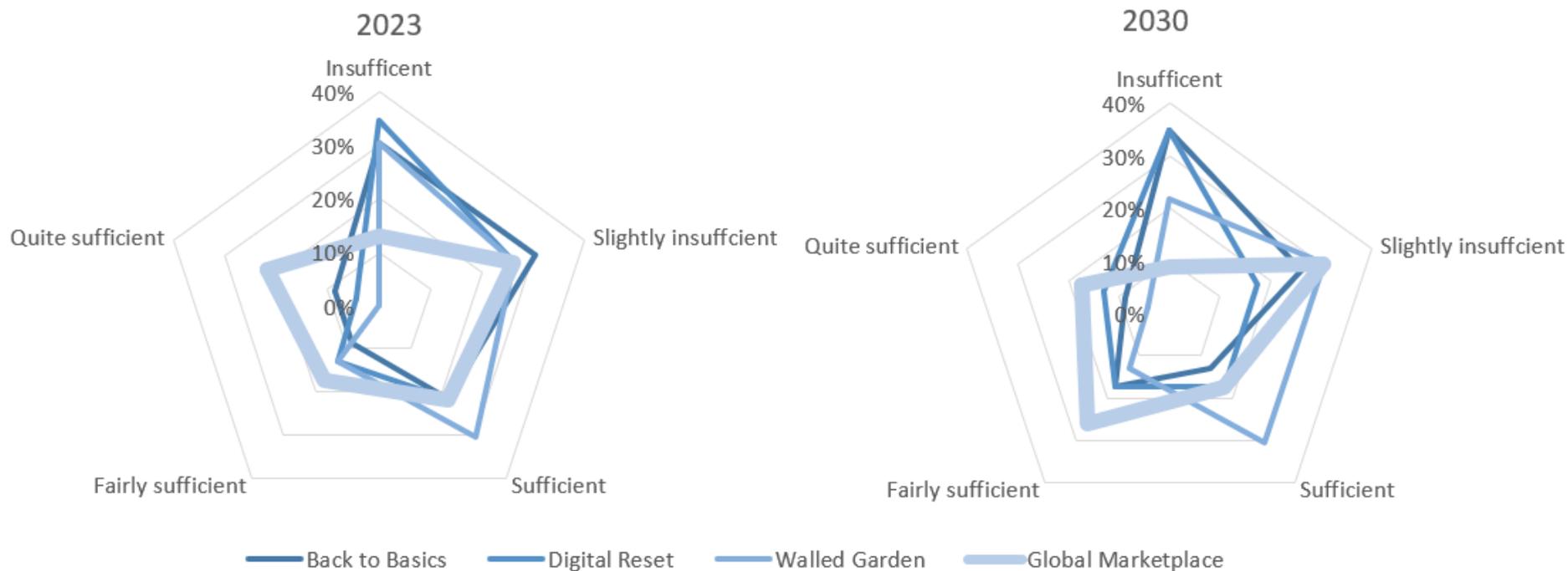


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Are current national bioenergy policies sufficient to deal with pandemic?



- Under “Global Marketplace” scenario: yes (moderately sufficient to quite sufficient)
- Under more challenging future scenarios: to be improved (insufficient to sufficient)

Where do you think the investments in biomass supply chains would have the strongest impact on economic growth?

Investments	Short term				Long-term			
	Global Market place	Back to Basics	Digital Reset	Walled Gardens	Global Market place	Back to Basics	Digital Reset	Walled Gardens
Forest biomass supply chains	↑	↗	↗	↗	↑	↗	↑	↑
Agricultural supply chains	↗	↗	↗	↗	-	↗	↗	↑
Growing terrestrial biomass (e.g., energy crops)	↘	↘	↓	↘	↗	→	↗	↗
New biomass supply chains from waste and by-streams	↗	↘	↘	→	↑	→	→	→
Aquatic biomass (e.g., algae)	↘	↓	↓	↓	↘	↓	↘	↓

Definitively, definitively to probably yes	↑
Probably, probably - possibly	↗
Possibly	→
Possibly - Probably not; probably not	↘
Probably – definitively not; definitively not	↓

Where do you think the technology and infrastructure investments in would have the strongest impact on economic growth?

Investment	Short-term				Long-term			
	Global Marketplace	Back to Basics	Digital Reset	Walled Gardens	Global Marketplace	Back to Basics	Digital Reset	Walled Gardens
1 Investment programs for preferred bioenergy technologies coupled with targeted biomass supply chains	↗	↘	→	↗	↗	↗	↗	→
2 Programs supporting all technologies and biomass supply chains	↗	↘	→	→	↗	→	→	→
3 Investment in biomass logistic-distribution centres (bio-hubs)	↗	→	↘	→	↗	↗	↗	↗
4 Investments in upgrading the existing agricultural collection and processing centres into bio-hubs	→	→	↘	→	↗	↗	↗	↗
5 Investments in small scale, decentralised bioenergy facilities, coupled with substitution of fossil fuel use, fit for a local supply chain	↗	→	↗	→	↗	↗	↗	↗
6 Investments in large scale, centralised bioenergy facilities, coupled with substitution of fossil fuel power plants (coal, gas) or a biorefinery	→	↘	↘	→	↗	↘	↗	→

Very strong impact, strong to very strong impact	↗
Strong impact, strong to moderate impact	↗
Moderate impact	→
Slight impact, slight to moderate impact	↘
Weak to slight impact	↘

Which investments related to the biomass supply chains are more likely to create jobs under different scenarios?

Investment	Short-term				Long-term			
	Global Marketplace	Back to Basics	Digital Reset	Walled Gardens	Global Marketplace	Back to Basics	Digital Reset	Walled Gardens
1 Investment in information exchange points to inform the market players how to add value to the unused biomass with a portfolio of financing schemes	→	↓	→	→	→	→	→	→
2 Market incentive programmes for replacing fossil fuel heating and cooling with biomass in agriculture (e.g., stables, greenhouses), post-harvest (e.g., drying, cooling), primary processing (e.g., dairy, juices, spirits)	→	→	→	↑	↑	→	→	-
3 Investments in replacing fossil fuels in public institutions with a biofuel with the highest multiplier effect in jobs	→	→	→	→	↑	→	→	→
4 Investment in re-skilling of unemployed workers due to the COVID-19 for biomass supply related jobs	↓	→	↓	→	→	→	→	→
5 Investments in establishment of biomass logistic-distribution centres to stabilise the biomass supply market: secure supply, quality, price, and sustainability	→	→	→	→	→	↗	→	→
6 Investments in planting biomass for bioenergy within a bioeconomy, in general	→	↓	↓	→	↑	→	-	→
7 Investments in planting biomass for bioenergy within a bioeconomy at non utilised agricultural land	→	↓	↓	→	↑	→	↓	→
8 Investments in planting additional biomass as a part sustainable intensification of agriculture (intercropping, agroforestry...)	↘	↓	↓	→	↑	→	→	→
9 Increased demand for bioenergy would increase jobs in biomass supply chains	↑	→	↑	↗	↑	→	↑	→

Definitively, definitively to probably yes	↑
Probably, probably - possibly	↗
Possibly	→
Possibly - Probably not; probably not	↘
Probably – definitively not; definitively not	↓

Where do you think bioenergy-related investments would contribute most to supporting and building the resilient and cleaner energy systems under different scenarios?

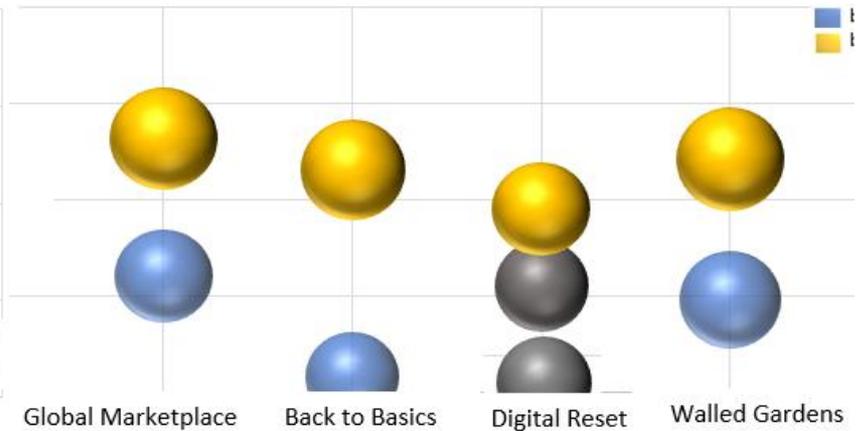
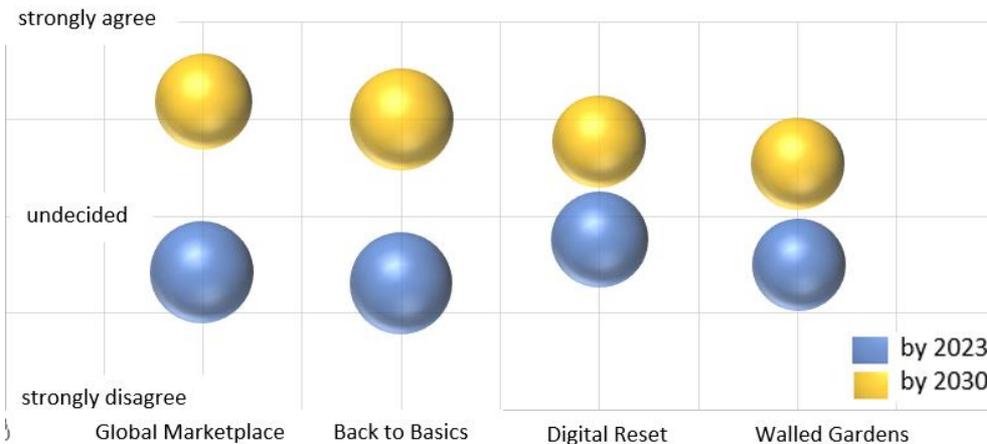
Investment	Short-term				Long-term			
	Global Marketplace	Back to Basics	Digital Reset	Walled Gardens	Global Marketplace	Back to Basics	Digital Reset	Walled Gardens
1 Investing in research to select biomass supply chains appropriate for a country	→	↓	↓	↓	→	↗	→	↗
2 Investment in establishment of locally available biomass supply chains to facilitate a targeted fossil fuel replacement or power grid flexibility	↓	↓	↓	↓	↗	↗	→	↗
3 Investment in diversification of conversion technologies to accommodate local biomass supply	→	→	→	↓	→	↗	↗	↗
4 Investment in R&D to increase efficiency in the bioenergy system relying on local biomass supply	↓	↓	↓	↓	→	↗	→	↗
5 Investment in biomass logistic-distribution centres (bio-hubs) to stabilise the biomass supply market: secure supply, quality, price, and sustainability	↗	↓	→	↓	↗	→	↗	↗
6 Investment programs for preferred bioenergy technologies coupled with targeted biomass supply chains	↗	↓	→	↓	↗	↗	↗	↗
7 Investments in upgrading the existing agricultural collection and processing centres (e.g., flour mills, oil mills, vineries, dry fruits, and nuts...) into bio-hubs to mobilise waste- and side-streams	↓	↓	↓	↓	↗	↗	↗	↗
8 Investments in small scale, decentralised bioenergy facilities, coupled with substitution of fossil fuel use, fit for a local supply chain	↗	↓	↓	↓	↗	↗	↗	↗
9 Investments in large scale, centralised bioenergy facilities, coupled with substitution of fossil fuel power plants (coal, gas) or a biorefinery	↗	→	↓	↓	↗	↗	→	↗

Strongly agree, strongly agree to agree	↗
Agree, agree to undecided	↗
Undecided	→
Disagree to undecided, disagree	↓
Disagree to strongly disagree, strongly disagree	↓

Increasing specific bioenergy demand (bioheat, bioelectricity, liquid or gaseous biofuels for transport) would generate (...) through investments:

(...) Sufficient job growth

(...) More resilient and cleaner energy systems



Preliminary conclusions:

- The experts opinion indicates that the **strongest impact from investment in biomass supply chains would be in economic growth**, followed by contribution to the resilient and cleaner energy systems and job creation.
- Most contributions from investments in biomass supply chains in the post-COVID19 recovery would be visible in longer than in short-term period.
- Investments that experts have flagged with the most impact to the recovery are investments that improve biomass material efficiency and circularity, in particular from forestry and agriculture biomass short-supply chains, in longer time frame, including dedicated crops:
 - Investments in small scale, decentralised bioenergy facilities, coupled with substitution of fossil fuel use, fit for a local supply chain
 - Investment programs for preferred bioenergy technologies coupled with targeted biomass supply chains
 - Investments in biomass logistic-distribution centres (bio-hubs)
 - Investments in upgrading the existing agricultural collection and processing centres (e.g. flour mills, oil mills, vineries, dry fruits and nuts...) into bio-hubs

An ideal portfolio for investments in biomass supply chains: Short-term

- Investments in forest and agricultural biomass supply chains linked investments in specific technology and infrastructure - short term economic growth under scenarios with short virus longevity
- Under Walled Gardens, market incentive programs - increase jobs
- Current conditions are not consistent with a Global Marketplace, but if these conditions are restored, consensus for *multiple* paths exist to create cleaner, more resilient energy systems:
 - biomass logistic distribution centres (bio-hubs)
 - preferred bioenergy technology linked to biomass supply chains
 - small-scale and large scale bioenergy facilities

An ideal portfolio for investments in biomass supply chains: Long-term

- By 2030, preferred bioenergy supply chain investments still included forestry and agriculture, but had widened to also include terrestrial biomass
- Experts hesitant on biomass from waste and by-streams in unfamiliar scenarios
- All technology and infrastructure investments produced positive economic growth, although large-scale biohubs dependent on open borders
- Bio-hub investments were viewed by a consensus of experts as (e.g., small-scale, large-scale, and upgrading existing agricultural collection and processing centres into biohubs) - cleaner, resilient energy systems
- Impact of bioenergy industries on job growth was strongly dependent on the world returning to a global market place, with a majority of investments producing job growth under this scenario:
 - incentive programs
 - Programs to replace fossil fuels with biofuels
 - planting biomass

Thank you on behalf of the
research team and IEA
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