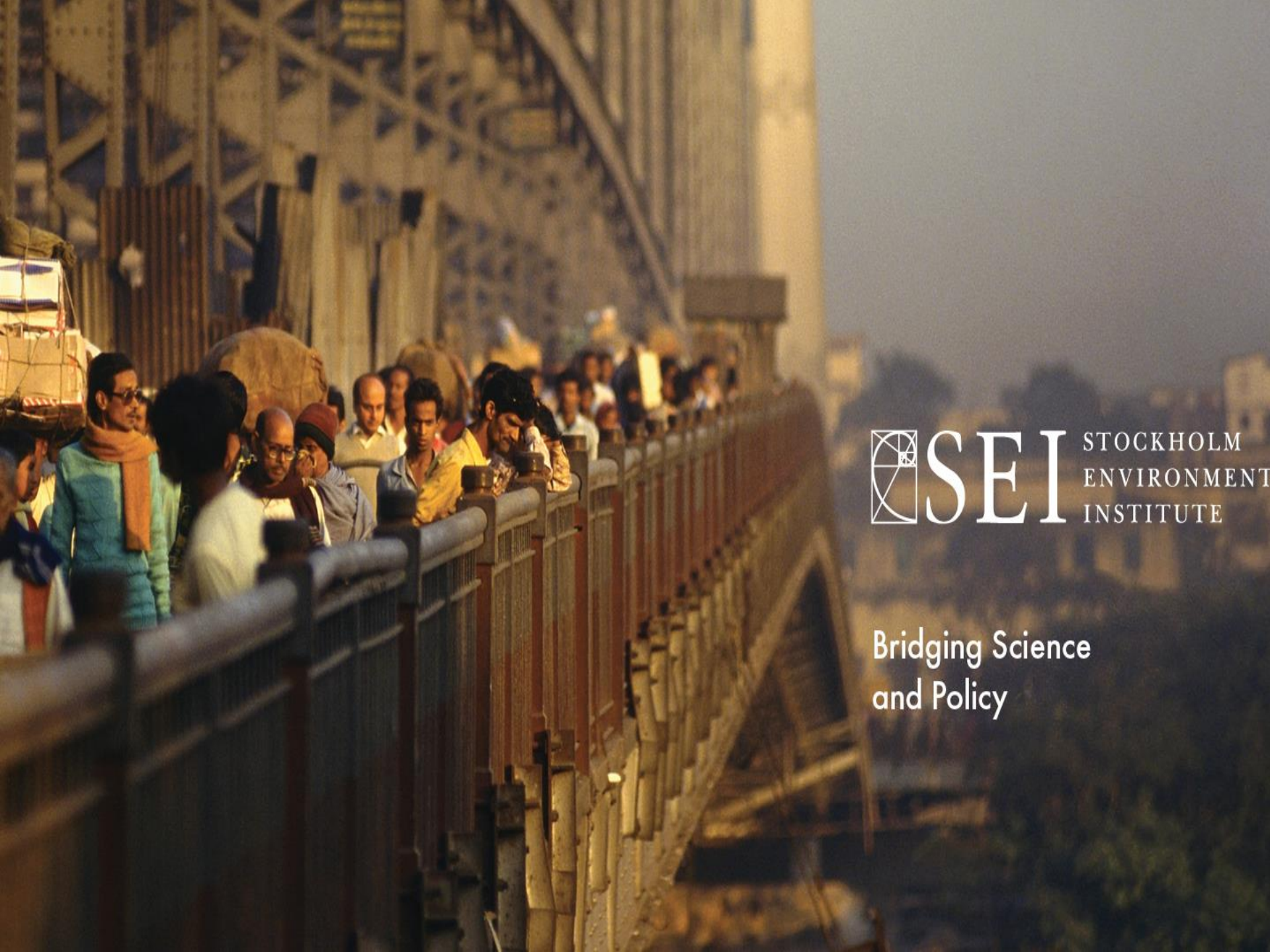




Modern Bioeconomies from an Intellectual Property Perspective

Ivar Virgin,
Stockholm Environment Institute (SEI)



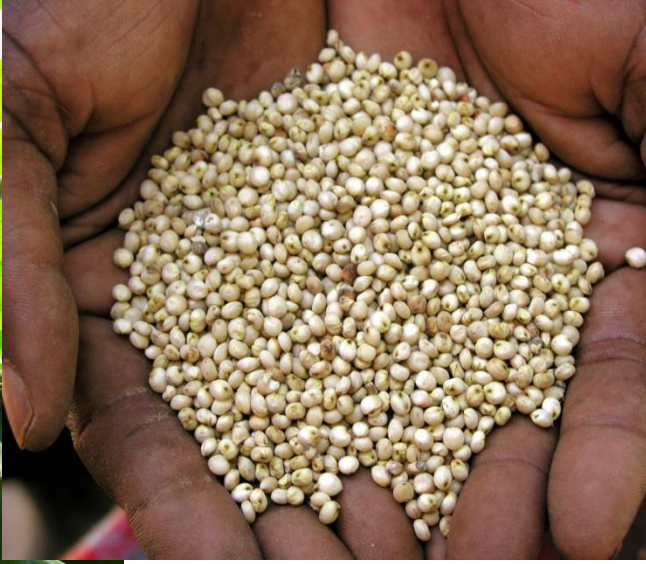


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Bridging Science
and Policy

**How modern biosciences and the new biology
can support sustainable development?**

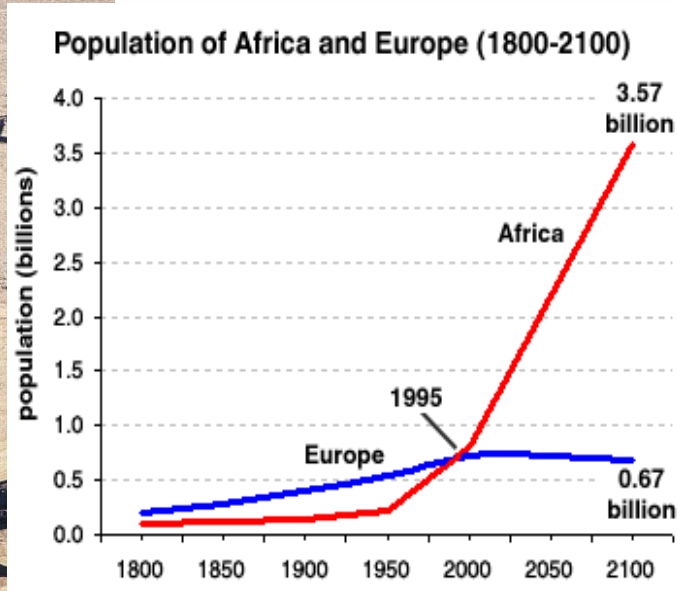




A dramatically increased demand of bioresources.....

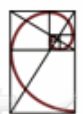
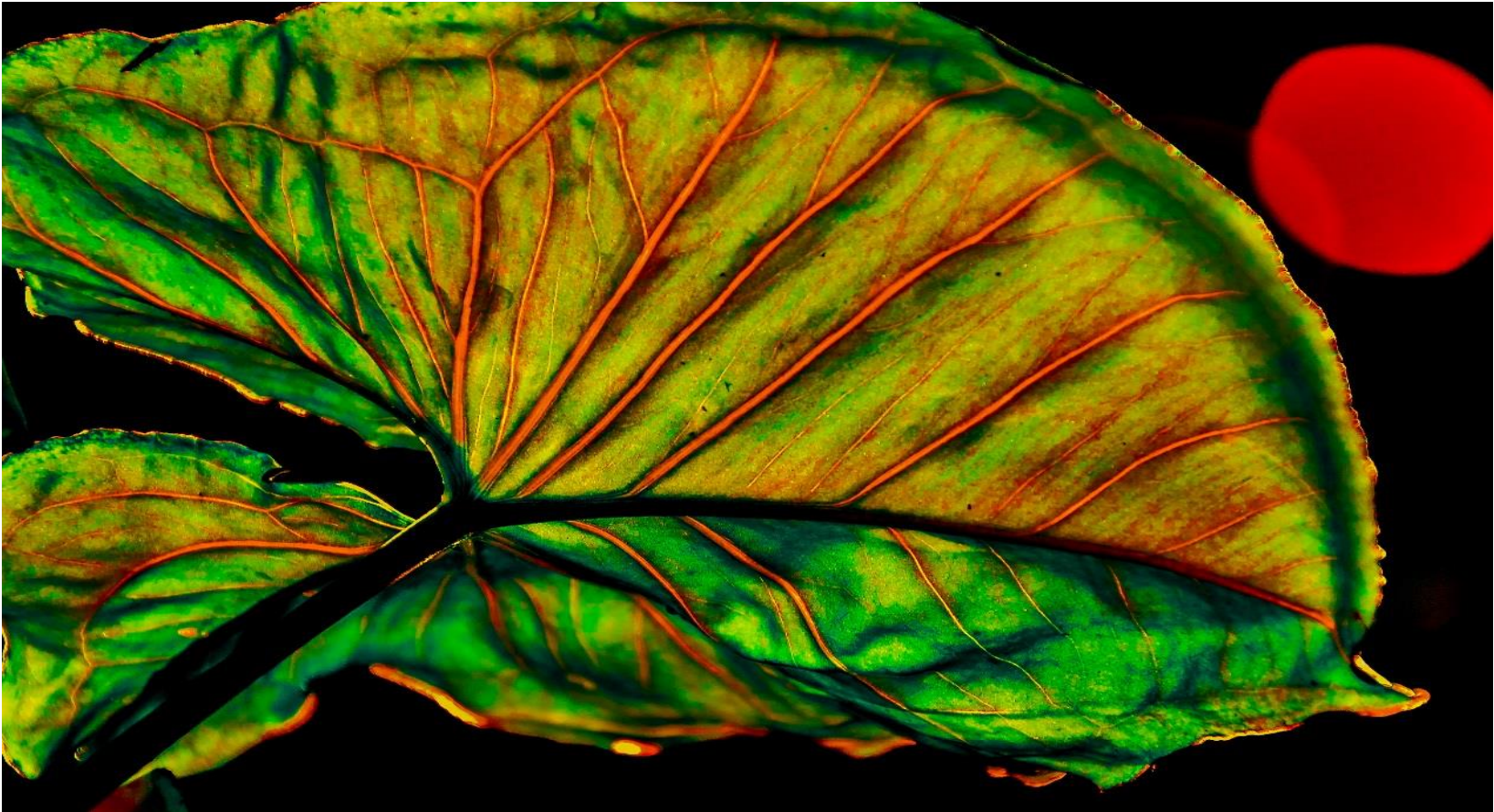


Climate change and resource scarcity



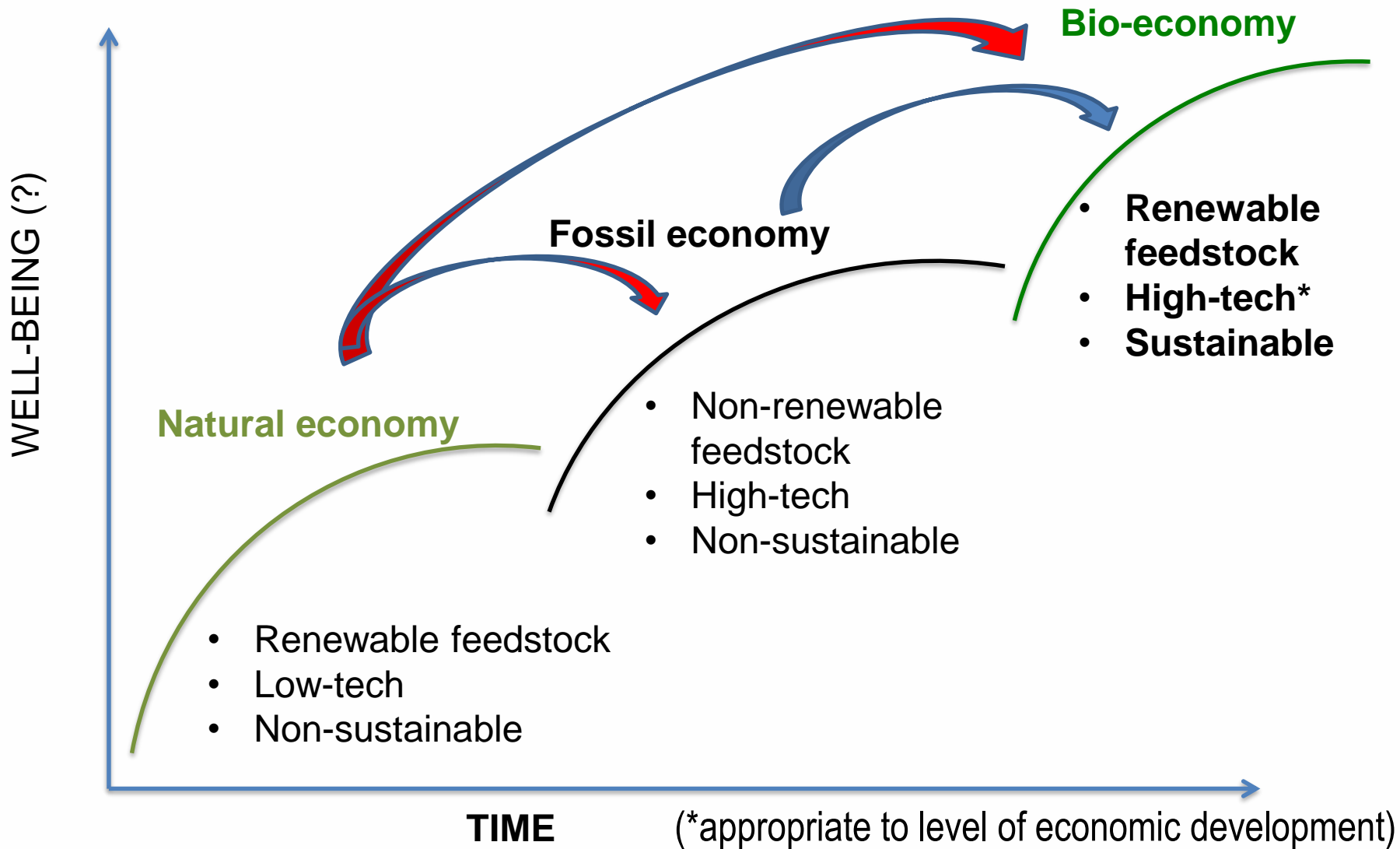
Meeting the increase of bioresource demand in a resource effective, climate smart and sustainable manner

Development of modern biomass utilisation and biobased production technologies



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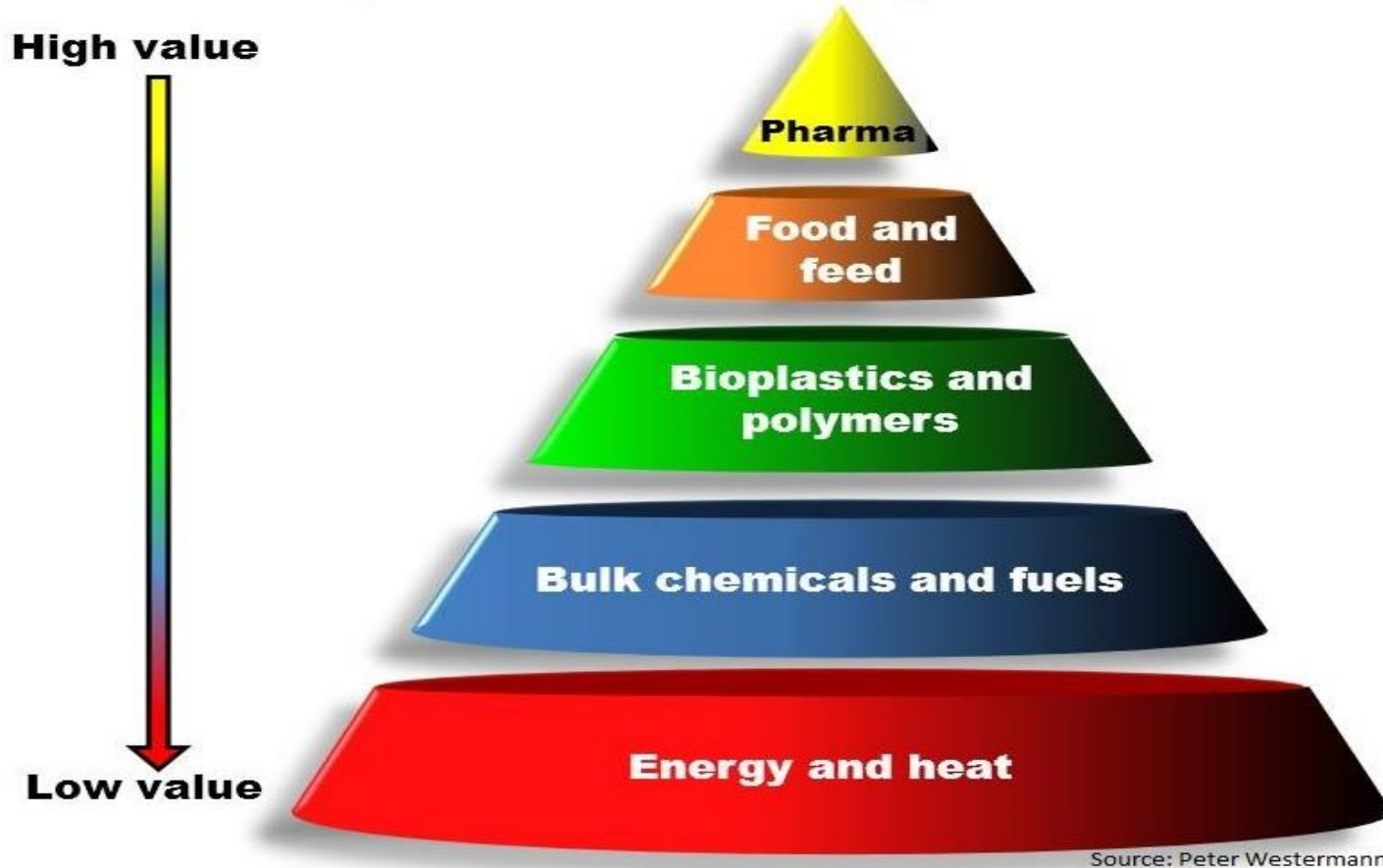


(Modified from Finnish Bioeconomy Strategy)

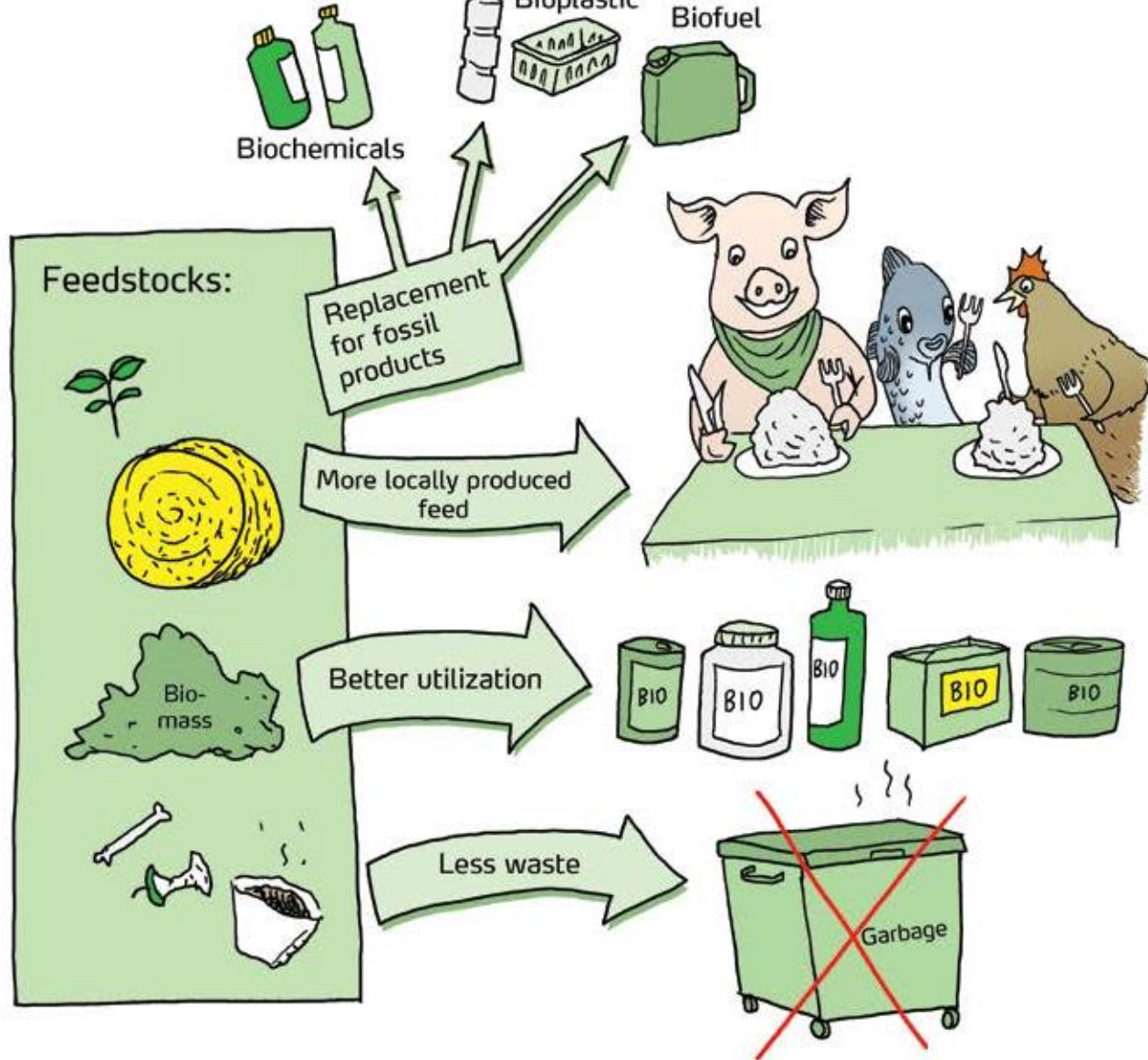
Global drivers of the Bioeconomy

- Biobased economies where non-renewable raw materials and energy sources are replaced with renewable biobased resources
 - Biomaterials, Biochemicals and Bioenergy
- Improved resource efficiency
 - Now 30-50% of the bioresources goes to waste....
 - More resource efficient production, agro-biomass processing systems
- Optimized use of the biomass
 - Unlocking its full potentials; not just energy content
 - New and more optimised value chains
- Making use of waste- close the loop-circular economy

The Biomass Value Pyramid



Cascading Principle: Unlocking its full potentials: recover higher value products first. Energy, biogas and electricity of residual only!



DTU Chemical Engineering, Technical University of Denmark

The Bioeconomy is full of
policy/regulatory/governance
issues

IP/FR issues are Central...

ROUTLEDGE STUDIES IN ECOLOGICAL ECONOMICS

Creating Sustainable
Bioeconomies

The bioscience revolution in Europe and
Africa

Edited by
Ivar Virgin and E. Jane Morris



Creating Sustainable Bioeconomies
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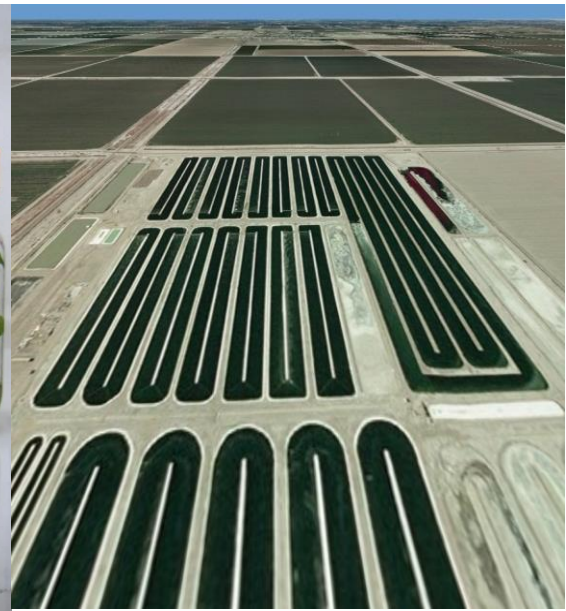
New scientific and technology frontiers in biomass production and utilisation



New scientific and technology frontiers in biomass production and utilisation



Modern biosciences allow us to tailor
make resource efficient and climate smart
biological production systems
...and the development just begun....



**The future is here...but unevenly distributed
and focus is still narrow.....**



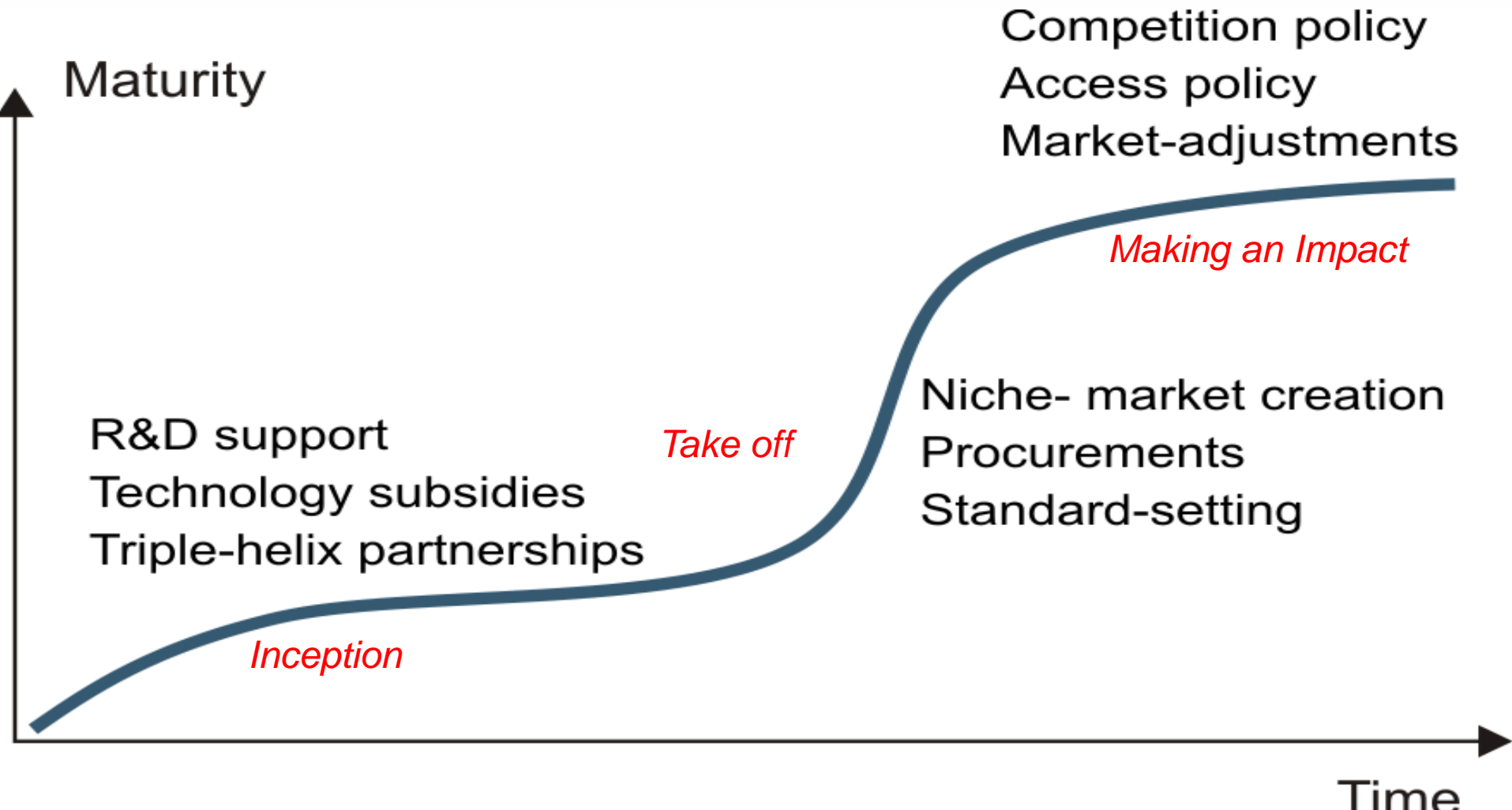
We need to

- Broaden the Innovation Agenda
- Support inclusive innovation
- Develop appropriate technologies serving small scale farming systems, biobusinesses and biorefineries

.....Public sector institutions key

**So much potential,
but why is
progress so slow?**

.... **Structural, governance, policy constraints, rather than scientific and technical knowledge, are now main barriers.**



Small-scale farmers key to food security

- How to best support the millions of small-scale farmers (1-10 ha/farm) in Africa and Asia?



These farmers are often dependent on technologies, extension, and seeds from public institutions.

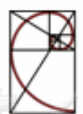
- How to roll out new technologies/new cultivars to resource poor farming/agroprocessing systems?
- How to disseminate technologies with high potential for e.g food security, resilience to climate changes, where markets incentives are weak?

Public sector is key !

- We have all these powerful bioscience/ag-improvement technologies...
- The growing commercial technology providers (seed/aginput/agtech/bioscience companies show limited interest in marginal crops/markets where they cannot protect their proprietary rights.
- Strong public research efforts will be essential for harnessing the benefits of modern technology/modern biology to the needs of small-scale farmers in developing countries.



**Modern biosciences
is proprietary science
!**



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Green revolution vs Gene revolution!

Back then...

- Green revolution driven by Public Institutions for local markets (subsidies, protected markets)

Now...

- Gene revolution driven by the private sector
- The growing role of global actors, trade and markets
- Much stronger IP protection/IPR

The need for Public-Private partnerships

- Ownership of patents and the restrictions on access to technology critical, and restrict the Freedom to Operate of public institutions
- **Close collaboration** needed between public sector R&D institutions private sector

Market research and business development



Policies and regulations

Public R&D efforts

Where market actors take over.....

Public R&D institutions must improve their ability to manage IP



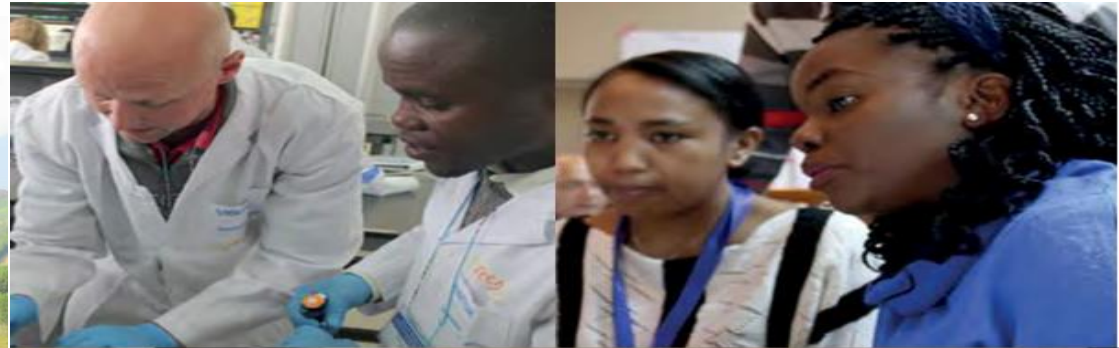
Public R&D institutions engage in:

- Regional and international collaboration,
- public-private partnerships
- multidisciplinary innovation platforms

... key factors in ensuring that the new biosciences and appropriate modern technology eventually benefit developing country farming systems.

And, public institutions need

Institutional IP Policies/technology transfer policies...and a Management structure



Collaboration platforms helps!

- Regional and international collaboration,
- Public-private partnership platforms/incubation
- Multidisciplinary innovation platforms

....key factors in ensuring that the new biosciences eventually benefit developing country farming systems.

- National strategies
- Long term government commitment
- Capacity building
- Prioritization



Countries need the capacity to manage, regulate and foster innovation





PHOTO: PER-ANDERS PETTERSSON/GETTY IMAGES

Who is missing the bioeconomy/ bioscience train?

Governments, buissness actors, donors struggling with questions such as

- How to prioritize investments, support and interventions?
- How to create an enabling policy environment for Bioeconomy development, bioresource value addition, biowaste conversion?
- Are there winners and losers?
- What kind of tensions do development of bioeconomies bring with it?
 - resource conflicts (food vs fuel, large scale-small scale,etc)
 - socio-economic challenges.
 - urban-rural transformation,
 - farming/livelihoods dynamics?

The Art of Balance

Governments/institutions need to ensure that the regulatory systems ensure safety, builds credibility.....

....and at the same time doesn't stifle the innovation of local crops

Weighing benefits with risks...

- How to regulate the the new biology and biological innovation
- How to balance investments in biological innovation with CBD principles "Fair and equitable sharing"





Way forward ?

What policies/regulatory systems do you want your country or institution or organisation to develop?



Thanks!

ivar.virgin@sei.se

