Modern Bioeconomies from an Intellectual Property Perspective

Ivar Virgin,
Stockholm Environment Institute (SEI)
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
**Natural economy**
- Renewable feedstock
- Low-tech
- Non-sustainable

**Fossil economy**
- Non-renewable feedstock
- High-tech
- Non-sustainable

**Bio-economy**
- Renewable feedstock
- High-tech*
- Sustainable

(*appropriate to level of economic development)

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

- Biochemicals
- Biofuel
- Bio-based products

Replacement for fossil products

More locally produced feed

Better utilization

Less waste

DTU Chemical Engineering, Technical University of Denmark
The Bioeconomy is full of policy/regulatory/governance issues

IP/FR issues are Central…
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, biobuisnesses 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!
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

- New ideas
- Proof of concept
- Technology development
- Application development
- Pilot testing
- Commercial scale-up

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
Who is missing the bioeconomy/bioscience train?
Governments, business 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 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