GLOBAL TRENDS FOR INVESTMENTS IN FOREST, FOREST PRODUCTS AND ENERGY

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Forest Sector Insights AB

Oaxaca, Mexico
May 2013
SYSTEMS MATTER EVEN MORE:
6.8 billion in 2009
9.3 billion in 2050

Source: http://www.optimumpopulation.org/opt.earth.html
## REVISED POPULATION PROJECTION
(United Nations, 2011)

### Billion People

<table>
<thead>
<tr>
<th>Countries having:</th>
<th>2010</th>
<th>2050</th>
<th>2100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-fertility</td>
<td>2.9</td>
<td>2.9</td>
<td>2.4</td>
</tr>
<tr>
<td>Intermediate fertility</td>
<td>2.9</td>
<td>3.7</td>
<td>3.6</td>
</tr>
<tr>
<td>High fertility</td>
<td>1.2</td>
<td>2.7</td>
<td>4.1</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>7.0</td>
<td>9.3</td>
<td>10.1</td>
</tr>
</tbody>
</table>

### Over 65 Years of Age

<table>
<thead>
<tr>
<th>Countries having:</th>
<th>2010</th>
<th>2050</th>
<th>2100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-fertility</td>
<td>11% (319 million)</td>
<td>26% (754)</td>
<td>28% (642)</td>
</tr>
<tr>
<td>Intermediate fertility</td>
<td>6% (174 million)</td>
<td>16% (575)</td>
<td>26% (936)</td>
</tr>
<tr>
<td>High fertility</td>
<td>3% (36 million)</td>
<td>6% (162)</td>
<td>16% (656)</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>0.5 billion</td>
<td>1.5 billion</td>
<td>2.2 billion</td>
</tr>
</tbody>
</table>
DISTRIBUTION OF POPULATION

World population (in Billions): 1950-2050

Population in less developed countries: 85%
Population in more developed countries: 15%

2010 = 6.9 billion
2050 = 9.2 billion
+33%

70% urban in 2050: 6 billion
2010: 3 billion

GLOBAL GDP BY REGION

Source: ExxonMobil – 2012 The Outlook for Energy: A View to 2040
CHANGING MIDDLE CLASS – ADDITIONALLY 3 BILLION IN 2030 – GROWTH RATE 172%
GLOBAL ECONOMY

- Unsustainable economic imbalances between surplus and deficit regions
- Euro-zone and USA cliff-hangers
- Hard landing in emerging economies?
- Risk for another recession?
- Default risk in 28 countries
- Low economic growth
THE ECONOMIC CRISIS
did not return in 2011 – it never left

• Public debt
• Euro Zone – no end to the problems in sight
• Financial industry did not learn (still hooligans)
• China is prone to bubbles and growth will slow down
• Unhealthy relations between states and banks (the bond market)
• Conventional crisis tools already consumed

Global financial crisis → economic crisis → recession → political economy crisis → global crisis of confidence → makes the economic problems all the more severe

The result is 5 to 10 years of low growth and high probability of another financial crisis before 2015
ECONOMIC GROWTH – ASIAN TIGERS AND AFRICAN LIONS

• Ethiopia
• Mozambique
• Nigeria
• Rwanda
• Congo
• Tanzania
• Ghana
• Zambia
GLOBAL ECONOMIC POWER IS SHIFTING
Top 10 economies by GDP in 2050

GOVERNMENTAL DEBT

Source: Fitsch, Deutsche Bank, 2010
GLOBALIZATION INCREASES TRADE, TRADE INCREASES GLOBALIZATION

Source: http://nhop.files.wordpress.com/2010/07/globalization.jpg
SOUTH-SOUTH TRADE

Source: ECLAC, International Trade and Integration Division, based on WTO data and United Nations COMTRADE database

SOUTH–SOUTH TRADE (SST)
Average percentage shares of SST in regions of the South (1995–2008)

<table>
<thead>
<tr>
<th>Region</th>
<th>LAC</th>
<th>CEE</th>
<th>AFR</th>
<th>ME</th>
<th>DA</th>
<th>SST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latin America &amp; Caribbean (LAC)</td>
<td>18.4</td>
<td>1.3</td>
<td>1.7</td>
<td>1.1</td>
<td>6.4</td>
<td>28.9</td>
</tr>
<tr>
<td>Central &amp; Eastern Europe (CEE)</td>
<td>1.6</td>
<td>19.4</td>
<td>1.4</td>
<td>3.2</td>
<td>7.5</td>
<td>33.1</td>
</tr>
<tr>
<td>Africa (AFR)</td>
<td>1.7</td>
<td>0.3</td>
<td>10.0</td>
<td>2.4</td>
<td>15.5</td>
<td>29.9</td>
</tr>
<tr>
<td>Middle East (ME)</td>
<td>0.2</td>
<td>0.9</td>
<td>3.8</td>
<td>12.2</td>
<td>33.6</td>
<td>50.7</td>
</tr>
<tr>
<td>Developing Asia (DA)</td>
<td>2.4</td>
<td>2.1</td>
<td>2.6</td>
<td>2.9</td>
<td>37.4</td>
<td>47.4</td>
</tr>
<tr>
<td>All South regions (SST)</td>
<td>4.2</td>
<td>3.5</td>
<td>3.1</td>
<td>4.5</td>
<td>27.8</td>
<td>43.1</td>
</tr>
</tbody>
</table>
## REGIONAL MERCHANISED TRADE
### 2000-2009 (in US$ Billion)

<table>
<thead>
<tr>
<th>Merchandised Exports</th>
<th>2000</th>
<th>2005</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2020*</th>
</tr>
</thead>
<tbody>
<tr>
<td>South to South</td>
<td>724</td>
<td>1,511</td>
<td>2,116</td>
<td>2,654</td>
<td>1,849</td>
<td>60%</td>
</tr>
<tr>
<td>South to North</td>
<td>1,332</td>
<td>2,295</td>
<td>2,299</td>
<td>2,753</td>
<td>2,055</td>
<td>40%</td>
</tr>
</tbody>
</table>

*Forecast by Gitonga, 2010

- South to South exports of all southern trade grew by 16% per year during 2000-2009, the corresponding number for the South to North exports is 11% per year
- Thus, South to South trade is expected to grow much faster than South to North trade
- South to South trade drives a second wave of globalization; the trade of forest products will follow trends of general merchandised trade
CLIMATE CHANGE

Source: Haroldo Mattos de Lemos, June 2010
LIFE AT 400 PPM OF CO$_2$

Source: Brian Merchant, May 2013.
GET USED TO ‘EXTREME’ WEATHER, IT’S THE NEW NORMAL

WATER BALANCE 2030 in km$^3$

<table>
<thead>
<tr>
<th>Category</th>
<th>Existing withdrawals$^2$</th>
<th>2030 withdrawals$^3$</th>
<th>Basins with deficits</th>
<th>Basins with surplus</th>
<th>Existing accessible, reliable, sustainable supply$^1$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Municipal &amp; Domestic</td>
<td>4,500</td>
<td>600</td>
<td>900</td>
<td>1,500</td>
<td>2,800</td>
</tr>
<tr>
<td>Industry</td>
<td>800</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture</td>
<td>3,100</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ENERGY DEMAND – 2010-2040 + 30%

Without improved efficiency and intensity gains, OECD demand would grow by nearly 90 percent and Non OECD by more than 250 percent.

Source: ExxonMobil – 2012 The Outlook for Energy: A View to 2040
GLOBAL ENERGY DEMAND BY FUEL TYPE

Quadrillion BTUs

From its peak in 2025, coal will decline by more than 10 percent by 2040.

Latin America and China are the biggest users of hydro power, which makes up over 80 percent of total Hydro/Geo supplies.

Source: ExxonMobil – 2012 The Outlook for Energy: A View to 2040
OIL PRODUCTION

Global oil production by discovery date

Meeting energy needs over time – safely and with minimal environmental impact – is vital, and technology advances are a big part of those efforts. For example, 3-D seismic mapping enables exploring for prospective oil and gas deposits without the need for drilling a well, and extended horizontal drilling enables resource areas to be developed from a single location. In many ways, technology is minimizing environmental footprints associated with providing energy for human progress.

GEA 2012 – TOWARDS A SUSTAINABLE ENERGY FUTURE

Targets for 2050:
• Radical improvement of energy efficiency
• Substantially higher shares of renewables
• At least a 60-80% share of global primary energy must come from 0-carbon options
• Electricity sector has to be decarbonized by 75-100%
• Transformation is required immediately – policy changes
• Socio-cultural changes and universal access to modern energy
• Investments needed – US$ 1.7-2.2 trillion/yr

Source: Global Energy Assessment, IIASA, 2012
GLOBAL SHALE GAS BASINS – THE GAME CHANGER

# FOOD CONSUMPTION

<table>
<thead>
<tr>
<th></th>
<th>2000</th>
<th>2030</th>
<th>2050</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Calorie Intake (FAO, 2006)</strong></td>
<td>100%</td>
<td>145%</td>
<td>165%</td>
</tr>
<tr>
<td><strong>Cereal Demand (IIASA, WFS, 2007)</strong></td>
<td>100%</td>
<td>142%</td>
<td>167%</td>
</tr>
<tr>
<td><strong>Meat Demand (in million tons)</strong></td>
<td>229</td>
<td></td>
<td>465</td>
</tr>
</tbody>
</table>

*Source, Liverman, D, 2011 and *IFPRI, 2011*
GLOBAL LIVESTOCK

Today: 60 billion – 2050: 100 billion

11 million tons wasted food yearly

Extreme global inequalities: rich countries should go first

Source: Peter A. Victor, 8 June 2010
INDUSTRIAL WOOD DEMAND INCREASE TO 2030 IS SIZEABLE

<table>
<thead>
<tr>
<th>Product Area</th>
<th>RWE Increase 2010-2030&lt;sup&gt;A&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulp &amp; Paper&lt;sup&gt;B&lt;/sup&gt;</td>
<td>150 million m³ sub</td>
</tr>
<tr>
<td>Sawnwood&lt;sup&gt;C&lt;/sup&gt;</td>
<td>250 million m³ sub</td>
</tr>
<tr>
<td>Wood-based panels</td>
<td>400 million m³ sub</td>
</tr>
<tr>
<td>TOTAL (gross)</td>
<td>800 million m³ sub</td>
</tr>
<tr>
<td>TOTAL (net)&lt;sup&gt;D&lt;/sup&gt;</td>
<td>700 million m³ sub</td>
</tr>
</tbody>
</table>

A) Increase according to Pöyry scenario in KSLA presentation  
B) Virgin pulp based demand increase  
C) Softwood & hardwood sawnwood including demand recovery 2020  
D) Including utilization of sawnwood residues in pulp and panels

<table>
<thead>
<tr>
<th>Region</th>
<th>Wood/Biomass Deficit</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU</td>
<td>Wood/biomass deficit 100-150 million m³/yr</td>
</tr>
<tr>
<td>RUSSIA</td>
<td>A production ceiling of 150 million m³/yr</td>
</tr>
<tr>
<td>JAPAN</td>
<td>Wood deficit of 50 million m³/yr</td>
</tr>
<tr>
<td>CHINA</td>
<td>Wood deficit of 150-200 million m³/yr</td>
</tr>
<tr>
<td>OCEANIA</td>
<td>+ 10 million m³/yr of industrial wood</td>
</tr>
<tr>
<td>SE ASIA</td>
<td>Wood deficit of 60 million m³/yr lower harvest</td>
</tr>
<tr>
<td>INDIA</td>
<td>Wood deficit of 40-50 million m³/yr</td>
</tr>
<tr>
<td>AFRICA</td>
<td>Wood deficit of 20 million m³/yr</td>
</tr>
<tr>
<td>LATIN AMERICA</td>
<td>+ 100 million m³/yr of industrial wood; domestically consumed</td>
</tr>
<tr>
<td>U.S.A</td>
<td>???</td>
</tr>
<tr>
<td>CANADA</td>
<td>Reduced harvest from 200 to 150 million m³/yr of industrial wood</td>
</tr>
</tbody>
</table>
# DEMAND OF WOOD FOR ENERGY

(Whiteman, A., 2011 – in billion m3 RWE)

<table>
<thead>
<tr>
<th></th>
<th>2020</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat &amp; Power (primary solid biomass)</td>
<td>3.0</td>
<td>3.25</td>
</tr>
<tr>
<td>Traditional solid biomass</td>
<td>5.3</td>
<td>5.0</td>
</tr>
<tr>
<td>Coal replacement</td>
<td>1.5</td>
<td>2.95</td>
</tr>
<tr>
<td>Biofuels</td>
<td>0.9-1.25</td>
<td>1.25-1.75</td>
</tr>
</tbody>
</table>
NATURE INFRASTRUCTURE – ECOLOGICAL FOOTPRINT 2050 = 2.5 WORLDS

Additional land requirements by 2030:
120 million ha = area of South Africa
INFRASTRUCTURE INVESTMENTS 2013-2030
$ Trillion constant 2010 $

WHERE DOES LAND COME FROM IN 2030? HOW TO BALANCE THE DEMAND?

Availability
250-300 million ha

Industrial Forestry
25 million ha

Agriculture Demand
200 million ha

Bioenergy
290 million ha

Deficit:
220-250 million ha

Biochemical Industry?
<table>
<thead>
<tr>
<th>Source</th>
<th>Land Deficit Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lambin and Meyfroidt, 2011</td>
<td>Deficit: 0-435 million ha in 2030 based on unused land and additional land needed. With accumulated deforestation of 150-300 million ha in total, the land deficit will be 0-285 million ha.</td>
</tr>
<tr>
<td>IIASA and WWF, 2011</td>
<td>Business as usual, accumulated deforestation by 2050 of 230 million ha (no deficit of agricultural land)</td>
</tr>
<tr>
<td>McKinsey Global Institute, 2011</td>
<td>Deficit of 175-220 million ha of cropland in 2030 to cover food, feed, and fuel demands (productivity increase in agriculture: 1% per year)</td>
</tr>
</tbody>
</table>
LARGE SCALE LAND USE CONFLICTS ALREADY EXIST
INTERNATIONAL LAND GRABBING SINCE 2000

Oxfam (2012): 230 million ha
30% is forest land

- Number of hectares (millions) cross-referenced: ~70 million ha
- Number of hectares (millions) reported: ~200 million ha

Source: Adapted from: Khare, A. Large-Scale Land Acquisitions – An International Overview, Rights + Resources Institute, 18 Dec. 2012.
DOMESTIC LAND GRABBING – INDIA

Additional land requirements by 2030 (agrifuel, infrastructure, extractive activities, non-conventional energy):

11.5 million ha

4% of the total land area

Source: Adapted from: Khare, A. Land Acquisition and Related Disputes, Rights + Resources Institute, 18 Dec. 2012.
## AVERAGE AGRICULTURE LAND PRICES IN US$ PER HA IN SAO PAULO STATE, BRAZIL

<table>
<thead>
<tr>
<th></th>
<th>&lt;7.26</th>
<th>7.26-24.2</th>
<th>24.2-72.6</th>
<th>72.6-242.0</th>
<th>242.0+</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>6680</td>
<td>5580</td>
<td>4990</td>
<td>4280</td>
<td>3890</td>
</tr>
<tr>
<td>2012</td>
<td>12 260</td>
<td>10 080</td>
<td>8865</td>
<td>7880</td>
<td>7350</td>
</tr>
</tbody>
</table>

Source: Economic Agriculture Institute, Brazil, 2012.

### Average price relation 2012:

- **North:** 100
- **Northeast:** 266
- **Central Western:** 300
- **Southeast:** 564
- **South:** 662

Source: Kory Melby's Brazilian Ag Consulting Services and Investment Tours, 1 Nov. 2012.
UNPLANTED URUGUAYAN FOREST
LAND PRICES

• Marginal cost of pulpwood in Uruguay at parity with marginal costs in the Nordic countries

• Land prices in Uruguay have increased by 5x during last 10 years

• In 2000, good quality forest land with deep soil sold for US$ 500/ha, and similar land with shallower soils now selling for US$ 2,500-3,000/ha

• 28 000 land transactions in Australia, 1992-2012; 6% real price increase/yr.

Source: Don Roberts, CIBC World Markets Inc., 2010
THE PERFECT STORM OF STRUCTURAL CHANGE

NEW PLAYERS
China, Latin America
Subsidies:
China 33 bill. (2002-09)

RAW MATERIAL
• Increased competition/cost
• Recycling reaches limits

MARKETS
• Shift in geographical consumption
• Strong decline in certain products
• New societal demands on products

STRUCTURAL CHANGE OF INDUSTRY

SUBSTITUTE
• ICT
• Growing substitutes (e.g. plastic)

UNSATISFACTORY
Economic performance

TECHNOLOGICAL CHANGE
Hardwood instead of softwood
MORE OF LESS

Maximizing the value of wood raw material

<table>
<thead>
<tr>
<th>CONSUMER PRODUCTS</th>
<th>LIGNIN</th>
<th>VANILLIN</th>
<th>ETHANOL</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Cosmetics</td>
<td>- Animal food</td>
<td>- Food</td>
<td>- Paint</td>
</tr>
<tr>
<td>- Food</td>
<td>- Colorants</td>
<td>- Perfumes</td>
<td>- Laquer</td>
</tr>
<tr>
<td>- Medicines</td>
<td>- Batteries</td>
<td>- Medicines</td>
<td>- Medicines</td>
</tr>
<tr>
<td>- Textiles</td>
<td>- Briquettes</td>
<td>- Biofuels</td>
<td>- Biofuels</td>
</tr>
<tr>
<td>- Filters</td>
<td>- Thickeners</td>
<td>- Car service chemicals</td>
<td>- Car service chemicals</td>
</tr>
<tr>
<td>- Building materials</td>
<td>- Compressed products</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Borregard, from Helsingin Sanomat, 30 August 2009
VOLUMES OF NEW BIO-BASED PRODUCTS?
THE NEW 5-Fs

- Food
- Fodder
- Fuel
- Fiber
- Feedstock (bio-chemicals, bio-composites, bio-materials)

These 5 Fs are forming the Land Use
AFTER LEHMAN BROTHERS

• The logic of international relations has changed
• The win-win logic has changed to zero-sum logic (one’s gains is another’s loss)
• The New World Order is questioned
• Tension between established and rising economies
• Threat of trade wars, failing states, rising food and oil prices, cross-border flows of refugees and illegal immigrants, growing power of international organized crime, climate change, ravaged populations, persistent poverty, etc.
SOCIETAL CHANGES

• The societal changes will demand brand-new products from the forest industry and new services from the forest eco-systems

• Among other things, there will be more eco-tourism and recreation

THE INTERCONNECTIONS ARE THE RUBBER HITTING THE ROAD

- Peak of fossil fuels
- Peak of copper
- Peak of water
- Peak of productive land
- Peak of biomass
- Peak of green revolution
THE BIG QUESTION

• The biggest question of the 21st century will probably be whether resources will be binding constraints for development again (like prior to 1800)

• If YES, we will probably have climate change, famine, state failure, large scale migration, disease, etc

• Or will the technology and societal developments be fast enough to handle the foreseen transitions?
WHAT DOES ALL THIS TELL US?

• We CAN do it
• WILL we do it
• … Probably NOT

• Taking, for example, human livelihood, equity, knowledge distribution, energy, water, biodiversity, climate… into account, they generate a problem of immense complexity with cascading sets of interactions, trade-offs, and synergies that for decision makers make the problems impossible to solve (Obersteiner M., 2011)

• Land use stake-holders are conservative and are not willing to change (aversion to new technologies, innovations, risks, and markets)

• The political will is lacking and there are no universal ‘fixes’
THE TRAGEDY-TRANSFORMATIONS

- Policy makers and the scientific community under-estimate the impacts of the transformational changes occurring.
- They under-estimated how the South radically transforms the global society and the globe.
- They do not have a plan that aspires to action.
THE RESOURCE CHALLENGE

• Finding new sources of supply of natural resources is becoming increasingly challenging and expensive
• Resources are increasingly linked. Changes in one resource impacts others
• Environmental factors increasingly constrain the utilization
• Increasing societal concerns over the utilization of the natural resources
• Meeting future demands will require a large expansion of supply
LANDSCAPE APPROACH

Production of natural values = stocks and states; biodiversity, climate, wildlife, water, etc. over large scale landscapes

Forest production = flows; wood and money created in individual stands

Production of societal values = stocks and states created over large scale landscapes
AGRICULTURE PRODUCTION IS OF MAJOR CONCERN

THE GLOBAL FARM

Source: NATURE, Vol 466, 29 July 2010
WORLD CROP YIELDS – Annual Average Growth Rate

Required productivity: 1.4% per year until 2050 to meet food demands.

Source: Fischer and van Velthuizen, 2011
GLOBAL CROP PRODUCTION: 1995-2005

WATER AND AGRICULTURE

• Today agriculture accounts for 70-75% of human freshwater consumption
• In 2030 a gap of 40% between demand and supply of freshwater is foreseen
• By 2030 farming will need 45% more freshwater compared to the consumption today
AGRICULTURAL EXPANSION 1988-2000

About 80 million ha forest grabbing

Source: Gibbs, HK et al., PNAS 107 (38) 16732-16737, 2010.
IMPEDIMENTS TO INCREASED AGRICULTURE PRODUCTION

- Lack of access to land
- Inadequate infrastructure
- Weaknesses in governance
- Lack of financing
- Limited access to technologies
- Lack of access to international markets
- Persistent price distortions and subsidies
WHERE IS THE CONVERSION VALUE TO AGRICULTURE? US$/ha

WHERE IS THE CONVERSION VALUE TO AGRICULTURE? US$/ha

FOREST FIBRE MULTIFOLD PRODUCTS

NATUROPATHIC PREPARATIONS
- Cholesterol reduction
- Methane, motor fuel
- Methanol, fuel cells
- Ethanol, vehicle fuels, research
- Polyurethanes
- Biological protection against fungi and bacteria

PACKAGING
- Super-absorbing diapers
- Antioxidants

PHARMACEUTICALS
- Lubricating medicine
- Water retention medicine
- Methane
- Dissolving pulp
- Pulp
- Lignin

FOOD
- Emulsifier
- Fish food
- Fertiliser
- Impregnation

NUTRITION SOURCE
- Cellulose derivative
- Distillate heating
- Electricity

BUILDING MATERIALS
- Emulsifier

POWER FUELS
- Weight loss therapy
- Ethanol, vehicle fuels, research
- Chemicals

CHEMICALS
- Polyurethanes
- Emulsifiers

Source: PROCESSUM, 2011

Forest raw material

Today

Future
3D PRINTING – TECHNICAL REVOLUTION?

Source: Jeff Kowalski, 3D Printing basics explained, Autodesk, 4 Jan, 2013.

Global resource extraction increase by 50% between 1980-2005; the increase is predicted to be 75% between 2005-2030.

Source: Jacqueline McGlade, 2010
A GLOBAL PERSPECTIVE ON THE STATE OF THE BIOECONOMY AND KEY EMERGING ISSUES – A CONCEPT IN THE MAKING
THE BIOECONOMY

• Bioeconomy is about **POLITICS**, changing **POLITICAL ECONOMY** of how big decisions are made

• Bioeconomy is about **QUALITY**

• Bioeconomy has **MANY ‘R’s:**

  Reduce, Reuse, Recycle, Replace, Redesign, Rebuild, Redefine, Revive, Regenerate, Reform, Reorganize, Reimagine, and be Resilient
THE BIOECONOMY

• Bioeconomy is the transition of the **TOTAL ECONOMY** and not just a subset of the economy

• Bioeconomy is a **FUNDAMENTAL CHANGE** in production and consumption

• Bioeconomy is to **FIND NEW WAYS** to create products and services more efficiently

• Bioeconomy is a **TECHNOLOGY-RICH, INNOVATION-DRIVEN** and **SERVICE-FOCUSED** economy
Thank you for your attention!

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Email: stenbnilsson@gmail.com